

# Key resources

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Key resources for teachers and teacher educators



*TESSA (Teacher Education in Sub-Saharan Africa) aims to improve the classroom practices of primary teachers and secondary science teachers in Africa through the provision of Open Educational Resources (OERs) to support teachers in developing student-centred, participatory approaches. The TESSA OERs provide teachers with a companion to the school*

*textbook. They offer activities for teachers to try out in their classrooms with their students, together with case studies showing how other teachers have taught the topic, and linked resources to support teachers in developing their lesson plans and subject knowledge.*

*TESSA OERs have been collaboratively written by African and international authors to address the curriculum and contexts. They are available for online and print use (<http://www.tessafrica.net>). The Primary OERs are available in several versions and languages (English, French, Arabic and Swahili). Initially, the OER were produced in English and made relevant across Africa. These OER have been versioned by TESSA partners for Ghana, Nigeria, Zambia, Rwanda, Uganda, Kenya, Tanzania and South Africa, and translated by partners in Sudan (Arabic), Togo (French) and Tanzania (Swahili) Secondary Science OER are available in English and have been versioned for Zambia, Kenya, Uganda and Tanzania. We welcome feedback from those who read and make use of these resources. The Creative Commons License enables users to adapt and localise the OERs further to meet local needs and contexts.*

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*As well as the main body of pedagogic resources to support teaching in particular subject areas, there are a selection of additional resources including audio, key resources which describe specific practices, handbooks and toolkits.*



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## Introducing the TESSA Key Resources

Each **Key Resource** provides practical advice about a particular classroom approach (e.g. group work) or skill (e.g. questioning). They are suitable for primary and secondary teachers, and for teacher educators designing learning experiences for pre-service or in-service teachers.

The approaches and skills described in the Key Resources are exemplified in activities and case studies, throughout the TESSA Subject Resources. As teachers and teacher educators try out these activities, they will develop expertise in a range of skills and classroom approaches. It is important to remember that there are no rules or 'recipes' for these approaches, rather a few guiding principles. How an individual teacher or teacher educator manages each approach will depend on the topic they are teaching, the context, the learners and their own 'teaching personality'. Expertise will come through practice, and reflection on that practice. The TESSA **Key Resources** set out the guiding principles.

As with all the TESSA OER, the Key Resources can be copied, adapted and distributed as single resources, or as a complete set.

## Key Resource: Assessing learning

### Assessment

Assessment falls into two categories. One category looks back and makes a judgement on what has been learned already. This is called summative assessment. The second category is when we use assessment as part of the learning process (for example when we use questioning to check whether pupils have understood something). We call this formative assessment.

Summative assessment can be seen in the form of tests and marks which tell the pupils how well they have done in a particular subject or piece of work. Formative assessment is quite different.

Formative assessment – or assessment for learning – is based on the idea that pupils will improve most if:

- they understand what it is they are meant to learn;
- they know where they are now;
- they can see how they can close the gap between these two.

As a teacher, you will get the best out of your pupils if you aim to use the three points above, which makes assessment as much a responsibility for the pupil as it is for the teacher. How does this work?

### Pupils understanding what it is they are meant to learn

When you decide the learning outcomes for a topic or a piece of work you should share it with the pupils. You need to be clear by distinguishing not just what it is they have to DO, but what it is you are expecting them to LEARN. So to check they have understood, rather than saying 'Have you all understood?' ask a question that gives you the chance to assess whether they have really understood. For example:

- 'Who can explain in their own words what we have to do and what we aim to learn?'
- 'How can you make me sure that you have understood what I have just said?'
- 'So what is it we are going to do today?'

Their answers will enable you to know if they understand what it is they have to learn before they start. Give them time to explore the true meaning of your learning outcomes.

### Knowing where they are now in their learning process

In order to help pupils improve, you and they need to know the current state of their knowledge. It is your role to be sensitive, constructive and enthusiastic in finding out the current state of knowledge of your pupils. Insensitive comments and behaviour can have a damaging effect on pupil confidence, motivation and enthusiasm. Think back to those teachers who damaged your own confidence and enthusiasm, and do not follow their behaviour. Instead, when you talk to pupils about their current learning, make sure that they find your feedback both useful and constructive. Do this by:

- pinpointing pupils' strengths and suggesting how they might further improve them;
  - being clear about weaknesses and positive about how they might be tackled, checking that pupils understand and are positive about your advice;
  - checking with pupils for examples of your feedback that they found useful.
- Assessment for learning is a two-way process.

## Closing the learning gap

You will need to provide opportunities for pupils to improve their work. This means that by talking to them about their work you may discover misconceptions that mean you have to modify the content and style of what you have been teaching if you want to close the gap between where they are now and where you wish them to be.

Very often, by slowing down with a group of pupils you can actually speed up, because you have given them time and confidence to think and understand what they need to do to improve. By letting pupils talk about their work amongst themselves and reflecting on where the gaps are and how they might close them, you are providing them with ways to assess themselves.

Key to all this is you, the teacher, demonstrating a belief in your pupils, giving constructive guidance on how to improve and providing opportunities for them to take charge of their own learning.

## Key Resource: Using mind maps and brainstorming to explore ideas

### What is brainstorming?

Brainstorming is a group activity that generates as many ideas as possible on a specific issue or problem then decides which idea(s) offers the best solution. It involves creative thinking by the group to think of new ideas to address the issue or problem they are faced with.

Brainstorming helps pupils to:

- understand a new topic;
- generate different ways to solve a problem;
- be excited by a new concept or idea;
- feel involved in a group activity that reaches agreement.

### How to set up a brainstorming session

Before starting a session, you need to identify a clear issue or problem. This can range from a simple word like 'energy' and what it means to the group, or something like 'How can we develop our school environment?' To set up a good brainstorm, it is essential to have a word, question or problem that the group is likely to respond to. In very large classes, questions can be different for different groups. Groups themselves should be as varied as possible in terms of gender and ability.

There needs to be a large sheet of paper that all can see in a group of between six and eight pupils. The ideas of the group need to be recorded as the session progresses so that everyone knows what has been said and can build on or add to earlier ideas. Every idea must be written down, however unusual. Before the session begins, the following rules are made clear:

- Everyone in the group must be involved.
- No one criticises anyone else's ideas or suggestions.
- Unusual and innovative ideas are welcomed.
- Lots of different ideas are needed.
- Everyone needs to work quickly. Brainstorming is a fast and furious activity.

### Running the session

The teacher's role initially is to encourage discussion, involvement and the recording of ideas. When pupils begin to struggle for ideas, or time is up, get the group (or groups) to select their best three ideas and say why they have chosen these.

Finally:

- summarise for the class what they have done well;
- ask them what they found useful about their activity. What did they discover in the brainstorming that they didn't realise before?

## What is mind mapping?

Mind mapping is a way of representing key aspects of a central topic. Mind maps are visual tools to help pupils structure and organise their own thinking about a concept or topic. A mind map reduces large amounts of information into an easy-to-understand diagram that shows the relationships and patterns between different aspects of the topic.

## When to use a mind map

A mind map is useful when you want to encourage creativity as its structure encourages free thinking.

When trying to solve a problem, a mind map helps to highlight the aspects of the problem and how they relate to one another.

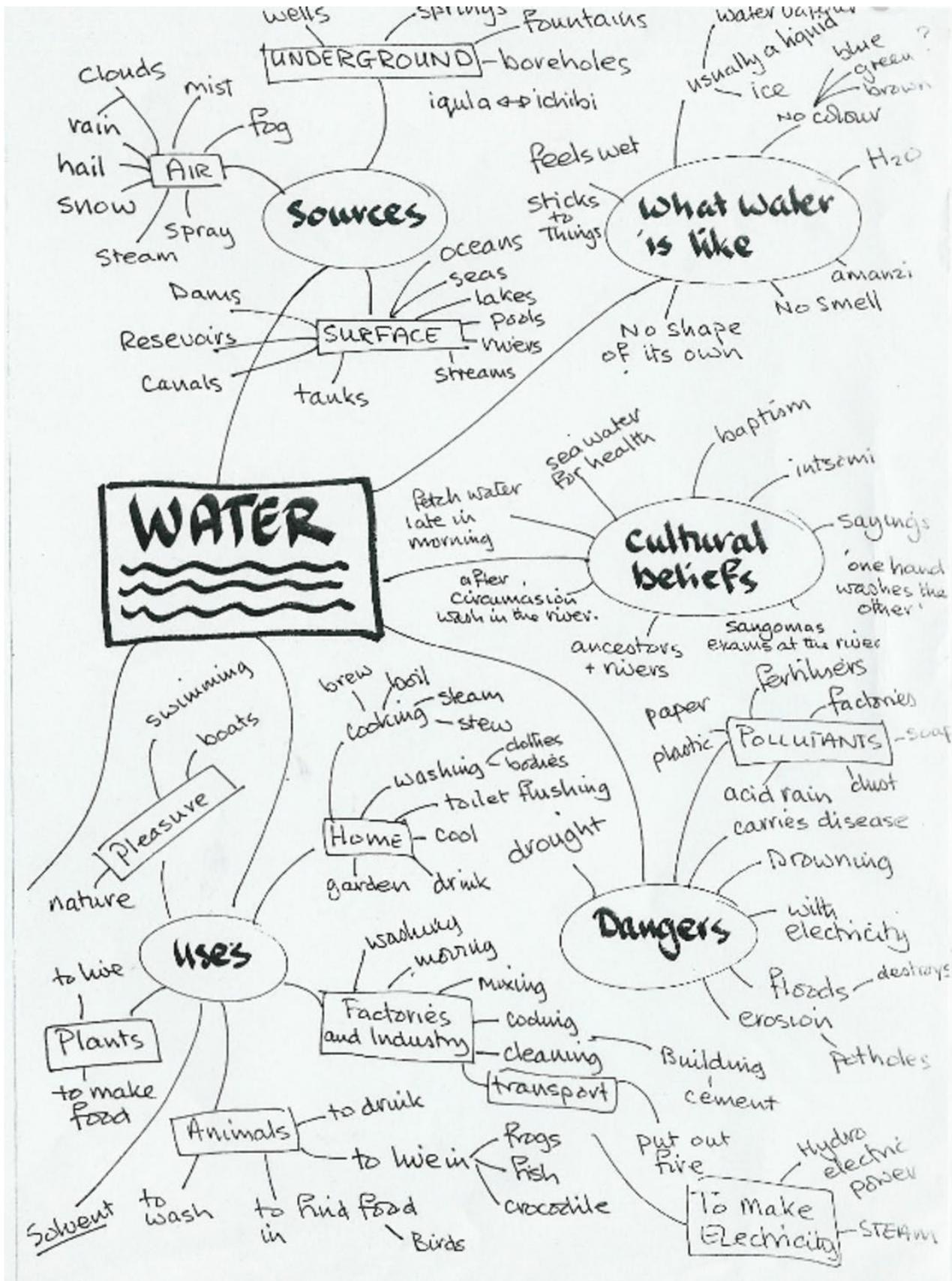
A mind map can help to revise previous work with a class – quickly and in an organised way.

Use mind maps when you want to encourage discussion, variety, experimentation and thinking in class groups

## How to make a mind map

- Begin by drawing a box in the centre of a piece of paper. Write in it the main theme, topic or idea you are going to represent.
- Make branches from the main box that have sub-themes associated with the main theme.
- Be creative with your basic map, adding in ideas around your sub-themes.
- Try a mind map out on your own before trying it with your class. You could use it as a demonstration.

Below there is a mind map of all the information teachers thought of at a workshop on the topic ‘all we know about water’:



## Key Resource: Being a resourceful teacher in challenging circumstances

Many teachers work in difficult contexts. They may have large classes. They may have few resources. The pupils in these contexts are not likely to have resources at home to compensate for limited school resources.

A group of teachers working in such circumstances recently brainstormed suggestions about how to be resourceful despite such difficult conditions. They came up with many ideas and decided that the following seven were most useful:

- Make maximum use of the local environment as a teaching aid. All schools have an environment that can be exploited for discussion, investigations and sources of classroom data.
- Make maximum use of the local community as a teaching aid. Parents and others are an important source for stories, for remembering what things were like in the past, and for having opinions on everyday issues.
- Exploit the communication systems currently in place. Nearly all communities now have access to radio, often with many channels available. Use the systems available to stimulate debate and discussion.
- Make teaching aids from materials around the school. Old boxes, magazines, newspapers and even plastic bottles can be turned into teaching aids (one of the teachers in the discussion group described how she had built a model of a volcano using such materials, the model could be opened out to show the 'inner workings' of the volcano).
- Cooperate with other schools, directly or by exchange of letters. This can be highly motivating for pupils and it opens up all sorts of possible exchanges of information (for example, exchanges of information between urban and rural schools can lead to interesting comparisons).
- Let the school become a resource for the local community: one teacher described how mothers joined in the reading classes and thus improved their own literacy.
- Set up a school garden: plants can be grown in even a small area. Pupils of all ages can benefit from participating in the planning, planting, growing and use stages in the development of a garden.

The TESSA programme would like to receive letters or emails about ideas for teaching in challenging conditions.

## Key Resource: Using explaining and demonstrating to assist learning

### Introduction

Explaining is the giving of understanding to another. Demonstrations are ways of assisting the explanation process by using artefacts or other methods to show pupils something so that they understand it better.

### Explaining

An explanation used in a lesson can help pupils to understand:

- concepts or ideas – including those that are new or unfamiliar to pupils, for example ‘density’ or ‘volume’;
- cause and effect – rain is caused by air cooling, a flat battery means the car won’t start;
- processes – how things work, how people and animals behave;
- relationships – between people, things and events: the role of grandparents in a family, why flies are insects and spiders are not, the common features of important yearly festivals.

To explain well, you, the teacher, have to understand the subject matter well (what is to be taught). For example, if you do not understand that a spider is not an insect, neither will your pupils.

### Key knowledge features about explaining

When explaining new concepts or ideas, four key features will help you structure and sequence your explanation:

- Labels and names. The actual words used to name the concept (insect, electricity, colour, ambition)
- Attributes. There are two kinds, namely:
  - ‘Must have’ features, which are essential parts of the concept like ‘wings’ (bird) ‘thorax’ (insect);
  - ‘May have’ features that may occur, but not always. A sparrow is brown, but not all birds are. Some insects have hard shells, but not all do.
- Examples. In your explanations you will need to give examples that illustrate what you mean. For example, ants and flies are insects, but a snail, though it has antennae, is not an insect. It is a mollusc.
- Finally, you will have a set of ‘must have’ rules at the end that apply to what you are explaining. So your rules for insects would be: six legs, a head, thorax, abdomen, two antennae, and two or four wings.

## Assisting learning by demonstrating

How explaining is done is just as important as having good subject knowledge. Just giving out information is not enough. Demonstrating an idea or a concept in a practical way often assists pupil learning. This can be done by:

- using pictures, diagrams, models, specimens and artefacts to show what you mean;
- getting pupils themselves to examine the subject of your explanation. For instance, as you explain about a plant, they can see what you are talking about better if they have a specimen in front of them;
- enabling all pupils to see clearly what you are explaining. A demonstration provides the link between 'knowing about' and 'being able to do.' Let them experiment in small groups by handling, drawing, discussing, watching and experimenting. Demonstrations are most effective when they are accurate, when pupils are able to see clearly and understand what is going on, and when brief explanations and discussion occur during the demonstration.
- asking for feedback from the pupils about their understanding of what they have seen.

## Explaining is not one-way

Always remember that to avoid pupil confusion in your explanations and demonstrations, you need to fully involve them to check that they understand what you are saying and doing. Important points to be aware of are:

- asking them questions to find out what they already know and understand;
- finding out about misconceptions that are holding them back and which need to be 'unlearned';
- using small groups to exchange ideas and understanding about the topic you are explaining or demonstrating;
- asking them to explain to you and to each other what they understand about the current topic;
- being prepared to use different words with different pupils to make your explanations clearer.

## Summary

When explaining or demonstrating to really assist learning you need to:

- include the four key features named above;
- focus on clarity and a sequence to your explanation;
- check understanding as you go along, through questions and discussion;
- use effective teaching aids for your demonstrations that everyone is able to see;
- involve pupils in your explanations.

## Key Resource: Using group work in your classroom

### What group work does

Group work can be a very effective way of motivating pupils to learn by encouraging them to think, communicate, exchange ideas and thoughts, and make decisions. In groups, pupils can both teach others and learn from each other in ways that result in a powerful and active form of learning.

### When to do group work

Group work can be used:

- at the start of a lesson or topic, to find out what pupils already know;
- during a lesson, to encourage understanding or to share views and opinions about a topic;
- at the end of a lesson, to help pupils think about their learning and be clear about what they know and what they still need to understand.

### Before you start

- Before starting a group session, be clear about what you want to achieve from it. It needs to have a clear purpose or objective. For example: 'By the end of the session we will be able to describe how rain is formed and what it does to our local landscape.'
- Divide the class into manageable groups depending on the size of your class, but don't make them too large – everyone needs to be able to contribute. You may have to move furniture or perhaps have some groups outside.
- Give each individual a job to do in the group. These could include: recorder of what's said; organiser; devil's advocate; peacekeeper; spokesperson; link person with other groups.
- Decide ways in which you will divide pupils into groups. You could use friendship groups, put similar personalities together, different personalities together, similar ability groups, mixed ability groups – or have no category at all. Which one will work best in the situation you are planning?
- Plan enough time for the pupils to reach a conclusion as well as time at the end of the session for each group – and you – to summarise the conclusions.

### Introducing the group work

- Once pupils are in their groups, explain that working together to solve a problem or reach a decision is an important part of their learning and personal development. Tell them what you expect of them in terms of behaviour (e.g. respect for each other, listening, making decisions) and individual roles (e.g. spokesperson, recorder).
- Explain the task clearly and have it written on the board as well. Tell the pupils what they have to do and what the outcome of their group work should look like. This is very important because if they do not understand what they have to do, the session will get off to a bad start. Allow pupils to ask questions before you start, and be helpful with your answers.

## Managing the group work

Check how the groups are doing. Resist the temptation to get involved too soon. Let them struggle with difficulties for a while. If you give them answers too quickly they will come to rely on you rather than on themselves. If necessary, clarify your instructions. It is important to remember that all learning requires us to struggle with difficulty or uncertainty. So expect a lot from your pupils, telling them how confident you are in them as you go between the groups.

## Ending the group work

- End with a whole-class session in which you get, for example, one idea from each group until you meet the original objective, or ask each group to tell you about the most interesting thing they learned. Try to make the final session an exchange of ideas rather than you telling them what they have missed.
- Summarise the work of the groups in a way that makes them feel proud of what they have done. Also, ask them to tell you how well they thought they worked in a group. This gives you a clue about their own response to group work.
- Finally, think about how well you did in managing the group session. Recognise the parts you did well and note those areas where you could have done things differently to make the groups more effective. Use this information to develop your techniques for the next time, and note your own improvement and that of your pupils.

## Key Resource: Using investigations in the classroom

Children are naturally curious. Good teaching exploits this very human characteristic. Over the past few decades increasing attention has been given to using investigative approaches in the classroom. Rather than just telling pupils something, why not make them think about a topic or area of enquiry? At its simplest, this might just be ‘asking a question’ rather than ‘telling’. This promotes a more active approach that is much more effective than passive ‘telling’ in promoting lasting learning. Increasingly, however, teachers plan to use investigations to promote active learning.

Investigations are already well established in the teaching of science (through experiments) but the same technique can be used in all subjects. Mathematics or numeracy, for example, becomes much more interesting if pupils have to work out real problems. The same is true of other subjects. In geography or social studies, rather than just telling pupils about environmental problems, why not set them a task? You will find a number of examples of topics that can be taught in this way in the TESSA modules.

There are different strategies for approaching investigations. Below is a detailed example when looking at the teaching of science topics, but you can take a similar approach in any area. The following basic steps can be taken.

### Beginning

Use brainstorming to open a topic ([see Key Resource: Using mind maps and brainstorming to explore ideas](#)). You can do this with the whole class, or begin with groups and then have a whole-class session. The important things are to make pupils think actively about the issues being raised and to establish their current knowledge of the topic.

### Choosing the focus

A brainstorming session will throw up many different ideas: these will probably have been recorded on the chalkboard or on a chart of some sort. You, as the teacher, now have the opportunity to focus on the key area that is to be investigated. For example, you may wish to teach about the link between human activity (for example farming) and the local environment. In the brainstorm, some pupils talk about local worries about the declining fertility of the soil. You might decide that an investigation into ‘whether the local soil is less fertile and if so why’ should be the focus.

### Planning your investigative approach

All sorts of methods are available to you. You could carry out detailed interviews with local farmers or discuss with grandparents or older members of the community ‘what things used to be like’ or ‘how crops used to grow’. It is important that pupils think about the methods to be used and why. This helps them develop personal investigative skills.

### Carrying out and reporting the investigation

The pupils then have to carry out the investigation. Before they do this, it is important to establish the way the findings are going to be reported back. The form this takes depends on

the nature of the investigation. You can have a fairly informal investigation, for example where pupils ask older family members what the village was like 20 years ago. The report back might then be 'verbal reporting' to the whole class. You might have asked each member of the class to ask the same five questions to at least two older members of the family. The report back then could be in the form of a chart, so that you can show similarities and differences in the findings.

## Interpreting findings

Once the data is reported and recorded, the findings have to be interpreted. This is key and it is very important that you, the teacher, do not dominate discussions initially. Make the pupils voice their own ideas (in verbal or written forms) before beginning to steer them, perhaps through questioning, to the key learning interpretations you are looking for.

The investigative approach should become habit for the good teacher. Set out below is a much more detailed way of using investigations in science.

## An investigative approach to science

A possible approach to teaching investigation

Step 1 - Brainstorming/getting ideas

Step 2 - Choosing the variables

Step 3 - Asking a question

Step 4 - Planning the experiment

Step 5 - Carrying out the experiment

Step 6 - Recording and Presenting

Step 7 - Interpreting and Evaluating

Step 8 - Reporting back

## Key Resource: Tools for planning and carrying out investigations in Science

### Step 1 - Brainstorming or getting ideas

Planning [1]

| What could we investigate |
|---------------------------|
|                           |

| What could we measure or observe? |
|-----------------------------------|
|                                   |

This table is made available to the children. This may be put up on the wall as a poster or written on the board. The teacher then initiates a class discussion on the investigation topic.

Planning [1]

| What could we investigate |             |                    |
|---------------------------|-------------|--------------------|
| light                     | temperature | quantity of medium |
| acid rain                 | seed type   | closeness of seeds |

| What could we measure or observe? |             |                 |
|-----------------------------------|-------------|-----------------|
| light                             | Temperature | volume of water |

This table is made available to the children. This may be put up on the wall as a poster or written on the board. The teacher then initiates a class discussion on the investigation topic.

Example: Investigation into factors that affect germination and growth.

The teacher may begin by reminding the children about what germination means, then pose the question: What affects germination? The purpose of the investigation is to discover if and how a particular factor affects germination in a particular plant, e.g. cress.

The children are asked to suggest any factor that might affect the germination of cress.

## Step 2 - Choosing the variables

### Planning [2]

I am going to find out what happens to ...

... when I change ...

I am going to keep these the same (constant) to make it fair ...

Once again the table is made available to the children. This may be put up on the wall as a poster or written on the board or copies given to group leaders or to all the pupils.

The group are asked to select one variable that they will change (independent variable) and one that they will measure (dependent variable). All the other variables must be kept the same if there is to be a fair test.

### Fair Testing

The concept of a fair test is crucially important in planning an investigation. The pupils should be taught to control the variables other than the dependent and independent variables in a conscious way. Often the more 'obvious' a variable is, the more likely it is to be controlled, but the pupils should be trained to consider their set-up and decide on the variables to be controlled.

A fair test is one in which only the independent variable is seen to cause a change in the dependent variable. If, for example, two things change, say temperature and humidity, you cannot be sure which of these causes the change in the dependent variable; it may be temperature or it may be humidity or it may be a combination of both.

- It is only by carrying out a fair test that you can be sure that it is what you have changed (independent variable) that is affecting what you measured (dependent variable).
- It is easier to recognise that a test is fair than it is to plan and carry out a fair test.
- You will need to encourage the pupils to make sure that all relevant aspects have been controlled (kept the same).
- Most pupils need only say that they intend to keep certain things the same, but the most able pupils should be encouraged to discuss what value each control variable should have.

*Note:* the words independent variable and dependent variable do not need to be taught at this stage!

### Step 3 - Asking a question

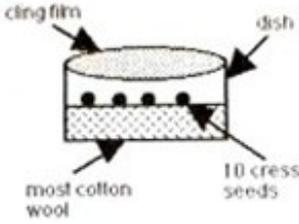
Planning [3]

| Making a prediction/hypothesis           |                                    |
|--|------------------------------------|
| When we increase/decrease                | <i>temperature</i>                 |
| ... we think that the                    | <i>number of seeds germinating</i> |
| will increase / decrease / stay the same |                                    |

At this stage, pupils are being asked to select the variable they want to investigate. They choose one of the things that they have said they could change and one of the things that they said they could measure.

The question posed is: If I change this (the chosen variable or independent variable), what will happen to that will increase / decrease / stay the same (the chosen measurement or dependent variable)?

### Step 4 - Planning the experiment

| Designing the experiment   |  |
|--|--|
| Listing what you need  | Describe how you will use them. Make a diagram if you want.                          |
| 30 cress seeds<br>cotton wool<br>3 dishes<br>cling film<br>thermometer<br>water  |  |
| <ol style="list-style-type: none"> <li>Put a layer of about 2 cm depth of cotton wool in each dish.</li> <li>Add 5 cm<sup>3</sup> water to each.</li> <li>Lay 10 cress seeds on top of each piece of cotton wool.</li> <li>Cover the dish with cling film. Leave dish A at 10 °C, dish B at 20 °C and dish C at 30 °C.</li> <li>Leave each for three days, then count how many seeds have sprouted in each dish</li> </ol> |  |

The pupils now plan the experimental procedure. It is very important to stress that only one of the variables can be changed during the experiment. As a result the variable being measured will, presumably, change. All other variables must be kept constant to ensure a fair test.

## Step 5 - Carrying out the experiment

Before they carry out their experiment it is important that the teacher makes sure that the procedure to be followed is safe. For this reason it is important to include a TEACHER CHECKPOINT before the pupils are allowed to continue with the practical and to ensure that suitable safety precautions are used.

The pupils collect evidence by carrying out the experiment and carefully noting the changes occurring in the dependent variable. They may also measure the variables they are keeping constant to ensure that they are kept constant throughout their experimental procedure.

## Step 6 - Recording and Presenting (1)

| What we changed  | What we measured         |
|------------------|--------------------------|
| temperature (°C) | no. of seeds germinating |
| 10               | 5                        |
| 20               | 7                        |
| 30               | 9                        |

The pupils are encouraged to record the results from their investigation by producing a table of results. The table includes the independent variable (what they were changing) and the dependent variable (what they were measuring).

The production of the table of results will help the pupils in constructing a bar chart or graph of their results.

An average may need to be taken to get more accurate results.

Graphs and charts are powerful tools because they enable pupils to see the result of what they changed (the independent variable) affecting what they measured (the dependent variable). This gives a picture of the information they have collected and helps them to identify patterns and trends. It also helps the pupils to develop understanding by relating pattern and trends to their scientific knowledge.

The type of graph that is appropriate depends on the type of variable used for the key variables i.e. what they change (independent variable) and what they measure (dependent variable). The table below shows the types of graphs that should be drawn for different types of variables.

## Step 6 - Recording and Presenting (2)

What type of graph should be used?

| What is ...  |   |               |                   |
|--|---|---------------|-------------------|
| ... changed? (independent variable) e.g.             | ... measured? (dependent variable) e.g.     | Type of table | Type of graph     |
| WORDS<br>type of cloth                               | WORDS<br>amount of wear                     |               | no graph          |
| WORDS<br>type of cloth                               | NUMBERS<br>size of stain (cm <sup>2</sup> ) |               | <p>BAR CHART</p>  |
| NUMBERS<br>length of pitch of note elastic band (cm) | WORDS<br>pitch of note                      |               | no graph          |
| NUMBERS<br>concentration of acid (%)                 | NUMBERS<br>no. of bubbles                   |               | <p>LINE GRAPH</p> |

## Step 6 - Recording and Presenting (3)

Looking for a pattern in the results

### What we measured

number of seeds germinating

temperature (°C)

By careful examination of the bar chart or graph, the pupils should be able to identify any trend or pattern that appears in their results.

In this case, there is an increase in the number of seeds germinating with increasing temperature.

## Step 7 – Interpreting and Evaluating (1)

Finding a pattern in the results

| When we increased         | temperature (°C)               |
|---------------------------|--------------------------------|
| There was ...             | number of seeds<br>germinating |
| <b>an increase in the</b> |                                |
| a decrease in the         |                                |
| no change in the          |                                |

The pupils are now asked to ‘make sense’ of their results.

## Step 7 – Interpreting and Evaluating (2)

Drawing a valid conclusion

| Was the investigation a fair test?   | YES | NO |
|--|-----|----|
| The conclusion from our investigation is ...   |     |    |
| The number of seeds germinating is controlled by temperature. When you increase the temperature the number of cress seeds germinating increases. |     |    |

If they are satisfied that the experiment represented a fair test, they may now draw a conclusion from their investigation.

If the experiment was not a fair test, no conclusion may be reached.

## Step 8 - Reporting back

After the practical part of the investigation is over, a reporting back session is vital. The importance of this stage is frequently underestimated and sometimes bypassed altogether (although admittedly often because of pressure of time). The reporting back session needs careful handling if the learning outcomes are to be fully achieved. Here the pupils should try to use their own evidence to justify the conclusions at which they have arrived.

The reporting stage can be followed by a ‘consolidation’ stage where the pupils are encouraged to use the information they have gained to further advance their knowledge and understanding. This kind of reflective discussion, where the group outcomes are shared, can be very useful.

## Key Resource: Working with large classes

### Top 20 ideas for teaching large classes

1. Plan ahead and prepare thoroughly; problems can be magnified in large classes, but they can also be dealt with effectively.
2. Maximise classroom space by removing unnecessary furniture, and use space outside the classroom for learning and activities. Ask your pupils for suggestions on arranging the classroom in a comfortable way.
3. Do everything possible to get to know your pupils. A positive relationship with your pupils means they will be more willing to actively participate in class.
4. Give opportunities for pupils to individually introduce themselves to the class.
5. Move around the class when talking – this engages pupils, and it can reduce the physical and social distance between you and your pupils.
6. Be natural and personal in class and outside of it – be yourself!
7. Tell your pupils you will be available before and after class to answer any questions they might have.
8. Keep track of frequently asked questions or common mistakes. Use these to develop lessons and help pupils avoid making mistakes.
9. Be aware of the class. If you notice or even feel that there is something wrong, ask a pupil what is going on. Invite small groups of pupils to visit you to discuss important class issues. When necessary, involve pupils and use positive discipline to deal with misbehaviour.
10. Check the content of your lessons and the knowledge and skills of your pupils, to identify those pupils that need your special attention.
11. Recognise the attention span of pupils is limited: 15 minutes of lecture followed by an activity and then additional lecture if needed is ideal. Determine what information can be delivered in forms other than lecture and develop these methods. For instance, group work, role play, pupil presentations, reading outside class, and in-class writing can be excellent ways to vary classroom routine and stimulate learning.
12. Develop a formal lesson plan to organise your teaching; this is a way to monitor whether or not your pupils are understanding what is taught; and a chance for you to think about what to do next and how to improve your teaching. In your plan, identify what topic is to be taught, the learning objectives, teaching methods, classroom arrangement, main activities, resources and assessment methods.
13. Explain to your pupils exactly how and why you are teaching in a certain way. For example, 'This is why I give quizzes at the end of class (to check on your understanding).'
14. Develop a visual display of the day's topics and learning objectives (such as a list on the chalkboard). This will make following the flow of the class much easier for you and your pupils. Plan for a clear beginning, middle and end to the class.
15. Use 'prompts' to develop pupils' question and answer skills, and count to ten after you ask a question to give time for the pupil(s) to answer.

16. Give assignments that really assess whether or not your pupils are learning what you are teaching. Can they explain the process they used to solve a problem, and can they apply what they are learning to everyday life? Give clear and thorough instructions for all assignments.
17. Develop a portfolio system or other ways to keep track of pupil performance – both successes and areas needing improvement – and to identify those pupils who require extra attention.
18. Develop exams that really tell you if your pupils have learned and can apply what you have taught them, not just what they remember.
19. Give prompt feedback on assignments and exams. Involve your pupils in the grading process to give faster feedback.
20. Reflect on your teaching. Discuss with your colleagues and pupils how your class can be improved. Visit the classes of colleagues who are also teaching many pupils, and exchange ideas and materials. Above all, view the challenge of teaching a large class as an opportunity, not a problem.

## Key Resource: Using the local community/environment as a resource

### Introduction

It is important that you plan and prepare your lessons so that they stimulate your pupils' interest. Part of this planning involves identifying resources that will engage your pupils in learning. One valuable resource you can explore and use is your local environment, where not only do you have people who have expertise in a wide range of topics but you also have access to a range of natural resources.

Using such dynamic resources will:

- motivate your pupils;
- stimulate their thinking;
- open their eyes to the richness and diversity around them;
- develop a link with the local community;
- provide you with support;
- link the curriculum to your pupils' lives;
- introduce them to new experiences.

### Using local experts in your classroom

Maybe you are doing some work on money in mathematics or you are doing pattern in your art lessons. How could you introduce these topics to your pupils in a way that will capture their interest? One way would be to invite in a local shopkeeper to talk about how they use money in their work or a local dressmaker who uses traditional patterned fabrics. Your pupils will be interested to hear about what the visitors do and will want to ask questions and so this needs to be carefully planned. If you choose to do this you need to be clear what you would like your pupils to gain and learn from the experience and then follow the steps below to prepare.

### Before the visit

- Ask your principal/head teacher's permission to invite the visitor.
- Identify who you would like to ask.
- Ask if they would be willing to come.
- Talk to your class about the visit and what they would like to know.
- Ask them to write an invitation to the visitor.
- Plan with your class the questions they want to ask.
- Agree together with your class who will do this.
- Discuss how you will sit when the visitor comes – in rows or in a horseshoe shape so that everyone can see.
- Confirm the visit with your guest and tell them what will happen.
- Ask them to bring some things to show the class.

### On the day of the visit

Arrange for some pupils to meet the visitor at the appointed time at the school gate and bring them to the class. Introduce the visitor to the class and allow them to talk for a short time to the class about what they do (10–15 minutes), showing what they have brought if appropriate. Encourage your pupils to ask questions. When the visit is finished, ask one of your class to thank the visitor for coming.

## After the visit

Think how you will use what your pupils have seen and heard. You could ask them to share their ideas in groups and make lists or posters of the key things they learned. You could plan more lessons using the ideas and information as the context for them to learn more about the topic. They could research more about the topic. They could share their ideas with other classes or their parents at a special parents evening or exhibition.

## Using other local resources

The outside environment can be seen as a place to collect resources but it can also be an extension of your inside classroom. Here are some ideas about how to use the local environment to support, resource and extend your classroom teaching.

## Living things

Wherever your school is, there will be a variety of living things that you could collect and bring into the classroom for short periods for your pupils to investigate and observe. You could do the collecting or you could take your class out to do the collecting. Bringing in leaves, for example, will enable pupils to study these more closely. Creatures such as praying mantis, certain spiders or other insects can be kept in suitable conditions/containers for a short period of time. Be clear what your pupils are going to learn and give them time to observe the creatures safely so they are not frightened and they do not frighten the animals either. Make sure they respect the animals and plants and understand how important these are to the community.

## Local materials

There are many other things that you might be able to collect from the local environment – whether you are in a rural or urban setting – that might help you in the classroom. These include:

- rocks and stones to study;
- rocks and stones to use as counters;
- recyclable materials, such as card, paper, wire, wood, fabric, plastic containers.

All of these and many other materials could be gathered over time, so that when you want to do modelling with your class you have a stock of paper and card. Or when you want to do posters with your class about science you have some card for each group to write on. Always ask if you can have the materials you see. Ask your class to help you gather materials in advance of your lessons.

## The extended classroom

Rather than bring the outside into the classroom, take your pupils out into the school grounds or further. If you decide to do this, always gain permission from the head teacher or principal beforehand. Taking pupils out to see the plants and animals in the real world will inspire more pupils. Taking them out to look at the way the environment is used, buildings are laid, the local stream flows or where the cattle graze will interest your pupils more and stimulate their deeper thinking skills if you plan challenging activities for them to do.

## Key Resource: Planning and preparing your lessons

### Why planning and preparing is important

Consistently good lessons have to be planned. By planning and preparing well, you are concentrating on:

- what your pupils need to know in order to progress;
- how you are going to teach this in a way they understand;
- how you judge what they have learned at the end of it.

So planning is a continual process that helps you to think and prepare what is needed to help your pupils respond well to you and the content of what you teach. For your pupils to learn from your lessons they need to be:

- interested – if they are not, nothing of any value will take place;
- very clear about what you want them to do and achieve.

### Planning lessons

First of all, think of the curriculum you need to follow, and begin by breaking up subjects and topics into sections that can fit into a lesson time. One topic may take up four lessons, but another only two. Now you need to use your skill to make these topics into lessons your pupils find interesting. To do this, you need to be clear about what you want to do. Learning objectives and learning outcomes will help you.

All lessons need learning objectives, that is, what is it that pupils should know/understand/be able to do/be aware of at the end of the lesson. A learning objective is a statement about what you aim to do. For example: At the end of the lesson the pupils will...

- have made their own clay pot.
- know how to recognise parts of a particular plant.
- understand how and why river meanders occur.

Lesson plans also need a learning outcome, that is, 'How do I know that pupils have achieved the objectives I set them?' For example:

- Are the pots complete?
- In what ways will I judge how much they know about the plant?
- How will I measure their understanding about meanders?

A successful lesson will show you can assess how much your pupils have achieved and that both you and they know what they need to tackle next.

## Preparing lessons

Preparing lessons concentrates on what you need to do to achieve the learning outcomes. Think of preparing your lessons in three parts. These parts are:

- Introduction
- Main part of lesson
- Checking on learning (often called a plenary session), in which you and your pupils find out what has been learned.

### Introduction

At the start of a lesson, explain your learning objectives in a way your pupils understand so that they know exactly what is expected of them. Get them interested in what they are about to do by allowing them to share what they know already.

### Main part of the lesson

In this section, you will explain new information and develop activities that help pupils to develop and confirm their own learning. These activities can be brainstorming, group work, problem solving, experimentation etc. Whatever you choose will be aimed at helping the pupils to achieve your original objectives in the most effective way. As well as the content you have prepared, the resources you use and the way you make use of your classroom space will influence how successful your lesson will be. Variety is an important part of lesson planning and preparation.

### Checking on learning

Always leave time at the end to find out how much progress pupils have made. Refer back to the learning objectives. Summarise the lesson by highlighting its key points. Also summarise what they have done already and what they will be doing next time. Allow time for pupils to tell you and each other about their learning so that you know what to plan next.

Finally, ask yourself if you are clear about the progress pupils have made. What did you do well to help them understand and what could you have done a bit better?

## Key Resource: Using questioning to promote thinking

### Introduction

Good questioning is an important skill for you, the teacher, to acquire. Questioning can be used to find out what your pupils know and assess their progress, but can also be used to inspire them, help extend their thinking skills and develop enquiring minds. Questions you can ask can be divided into two broad categories:

- Lower level questions, which involve the recall of facts and knowledge previously taught, often involving closed questions (a yes or no answer).
- Higher level questions, which ask the pupil to use bits of information previously learned to form an answer or to support an answer in a logical manner. Higher level questions are often more open-ended.

There are two issues with both higher and lower level questions. These are:

- encouraging pupils to respond;
- improving the quality of their responses.

### Encouraging pupils to respond

Many teachers allow just one second before answering the question themselves or asking another question. This leaves no time for pupils to think what they might say. By waiting between three and six seconds before saying anything gives pupils time to think of answers. Research indicates that this has a positive effect on pupils' achievement. By waiting after posing a question there is an increase in:

- the length of pupil responses;
- the number of pupils offering responses;
- the frequency of pupil questions;
- the number of responses from less capable pupils;
- positive interactions between pupils.

The way incorrect responses are handled will determine whether pupils continue to respond to the teacher's questions. 'That's wrong', 'You are stupid' or other humiliation or punishment often stops pupils volunteering any more answers from fear of further embarrassment or ridicule. Instead, if you can pick out parts of the answers that are correct and ask them in a supportive way to think a bit more about their answer you may encourage more active participation. This helps your pupils to learn from their mistakes in a way that negative behaviour towards them does not. The following phrase shows how you might handle an incorrect answer in a more supportive way:

'You were right about evaporation forming clouds, but I think we need to explore a bit more about what you said about rain. Can anyone else help us?'

### Improving the quality of responses

Helping pupils to think more deeply and improve the quality of their answers is a crucial part of your role. To help pupils achieve more, you need to be able to:

- prompt;
- probe to seek clarification;
- build on answers by refocusing;
- sequence questions in a way that extends thinking;
- listen very carefully to pupil answers in order to ask the right question.

Prompting is about adding hints that help pupils develop and improve their answers. Begin by choosing what is right in the answer and offering information, further questions and other clues. ('So what would happen if you added a weight to the end of your paper aeroplane?')

Probing is about trying to find out more, helping pupils clarify what they are trying to say to improve a disorganised answer or one that is partly right. ('So what more can you tell me about how this fits together?')

Refocusing is about building on correct answers to link pupils' knowledge to knowledge they have previously learned. This broadens their understanding. ('That is good. But how does it link with what we were looking at last week in our local environment topic?')

Sequencing questions means asking questions in a certain order to extend thinking. Here, your intention is to lead pupils to summarise, compare, explain or analyse. This means you must have questions ready that stretch pupils, but not so far that they lose the meaning of the questions. ('Explain how you overcame your earlier problem. What difference did that make? What do you think you need to tackle next?')

Listening enables you not just to look for the answer you are expecting, but to alert you to unusual or innovative answers that you may not have expected. Such answers could highlight misconceptions that need correcting, or they may show a new approach that you had not considered. Your response to these could be very important in maintaining motivation. ('I hadn't thought of that. Tell me more why you think that way.')

## Common mistakes in questioning

It is often said that 'questions are only as good as the answers they get'. Common errors in questioning, which discourage pupils from offering answers or participating, are:

- asking too many questions at once;
- asking a question and answering it yourself;
- asking a difficult question too early;
- always asking the same type of question;
- asking a question in a threatening way;
- not using probing questions;
- not giving pupils enough time to think;
- ignoring answers;
- not correcting wrong answers;
- failing to see the implications of answers;
- failing to build on answers.

If you do any of these, think about how you might adapt your approach and find ways of doing the opposite. Watch and see the improvement in pupil performance.

## Key Resource: Researching in the classroom

Good teachers like to find out as much as they can about their classes and the teaching approaches that work best. This is often a very informal process. For example, it is very common to discuss the best way to teach a certain topic with other teachers. These same discussions might extend to other topics. Why is the attendance of boys in the school much poorer than the attendance of girls? In what ways can parents or guardians be encouraged to come and talk to us about their children's progress?

This can become a more thorough process if you adopt the sorts of approaches and methods that researchers use. You can use what is often termed 'action research' to help improve your teaching and your school generally. The word 'action' is used to signify that you expect to gain information upon which you can 'act' fairly quickly.

Many books and publications now describe the 'action research' approach. Here we set out a very straightforward approach in just four stages.

### Stage 1 – Defining the research question

Take the problem or issues you want to examine and formulate it in terms of a research question. For example, you may have become worried that some girls in the class seem to have problems doing homework. This worry becomes a question:

'Why do some girls have problems doing schoolwork, especially homework, at home?'

### Stage 2 – Deciding on methods to help answer the research question

You then have to think about the methods you use to explore this problem. For example, you could give the girls a short questionnaire asking them about working at home and the reasons why they experience difficulties. This assumes the pupils have reasonably good written skills. You could carry out individual interviews with the girls. In some situations, you might be able to visit the homes and interview the parents or guardians.

### Stage 3 – Carrying out the research and recording findings

Find time to carry out interviews, observations or surveys. This is your research.

When you have carried out the research, it is a good idea to write up the findings. Sometimes teachers do this as part of a course (an upgrading course for example) and have to write things up in a formal way. Even if you are doing this for your own benefit, it is useful to note down your findings.

### Stage 4 – Make changes

Interpret and reflect on your findings. Once you have the data, you need to think about what it means and what the implications are. For example, if the interviews with the girls revealed that some of them are expected to take over 'childcare' at home and find doing homework a problem, then you need to think about how you deal with this. Do you talk to the parents or guardians to stress the importance of the girls being able to do their homework? Or do you provide, for example, lunchtime opportunities for the girls to carry out their homework?

The research process then carries on as you evaluate the impact of the changes you have made.

Action research can be built into the general strategies for improving teaching and improving schools. It can be done individually but it is also very effective when groups of teachers work cooperatively to try to solve particular problems.

## Key Resource: Using role play/dialogue/drama in the classroom

### Introduction

Pupils, and adults too, learn best when they are actively engaged in the learning experience. Role play, dialogue and drama are very active ways to explore what your pupils already know. By interaction with others and sharing their ideas, your pupils can build a broader and/or deeper understanding of the topic.

The three strategies in this key resource allow pupils to develop their thinking skills, work in contexts that allow them to talk about more sensitive issues and use their creativity and imagination to extend their knowledge and to resolve problems. You will have to plan your lessons carefully and think how you introduce them to the techniques. You will need to think about whether you work with the whole class at once or with small groups. This may depend on the size of your class and their ages.

All of the three methods below have strengths that allow you to use them across a range of curriculum areas.

So, how can you use these strategies in your classroom, what things do you need to think about if you want to use them and what benefits will they bring?

### Dialogue

An important part of your role in helping your pupils learn has to be helping them to think about what they know and what they do not know or cannot do. Unless you encourage them to talk about their ideas and listen to other people's viewpoints they will not be able to extend their own understanding as much as they could. Straightforward reading and answering questions exercises do not challenge their thinking and ideas as much as activities where they have to apply the ideas to relevant situations. For example, pupils will understand the idea of gravity and how things fall to the ground much better if they have to plan and investigate ways to slow down how things fall. By discussing what they are going to do, they have to think about what they already know, why and how things fall, and what they could do to slow them down.

Talking in groups of about four/five will give all pupils the opportunity to speak and listen to other's ideas, but sometimes just asking pupils to talk in pairs for a few minutes for one key idea to share with the class can be just as valuable. Shy pupils, who do not normally participate in larger class discussions, may feel more confident about speaking in these smaller groups and so you would be able to find out more about what they know and how they think.

As a teacher, you need to be aware of your pupils' interests and knowledge and how they learn so that you can match your teaching better to their needs.

Give pupils frequent opportunities to talk in groups about different topics and make sure they have enough time to do it.

## Role play

Role play is when pupils are assigned a role and, during a small scenario, act as they think the person they are being would act in such a situation. For example, in one of your citizenship or life skills classes, you may be exploring how to resolve conflict in the playground. Rather than use an incident from your class, you can make up a scenario in which a similar incident occurred. It may be in a home or community setting, but while the story is detached from the playground, the issues are the same.

You could assign pupils to roles and give them time to think about the little scene they are going to develop or you could just ask them to do it without any planning time. You will need to try both ways to see the benefits for yourself of both approaches. You could have just one group performing in front of the rest of the class or you could let all the class work in small groups at once (so no group is being watched). You could put your pupils into groups and ask them to assign roles themselves before giving them time to explore how they might resolve the conflict.

If you have a large class or a small classroom you may have to allow some groups to work outside. These pupils need to be aware of their responsibility to be sensible and not disturb other classes at work, although as they work you will be moving around and supporting them. You will have to think about what kind of feedback you want from the groups about their experiences and feelings. Some groups will be more willing than others to show their role plays. Some may prefer to tell you what they have learned from doing the role plays.

## Drama

Using drama in the classroom is a good strategy to motivate most pupils. It can be used in many different ways and provides opportunities for the whole class to be involved in the creative process of producing a drama. Not everyone has to be an actor in the drama; some pupils can be used in other ways that may relate more to their talents and personality. Drama or telling a story through acting or dancing can be a stimulating way to encourage pupils to think about issues such as relationships, power struggles in history, local environmental issues and debates. It is not unlike role play but has an end product. This is a production of some kind that can be shown to the rest of the class, the school at assembly or to the parents and the local community.

This will give the pupils something to work towards and motivates them. It is useful to use both scripted plays and improvised plays to explore their ideas around an issue. Drama is also a good way to assess what your pupils understand about a topic. For example, one class did a play about their understanding of how the brain works using pretend telephones to show how messages go from the brain to the ears, eyes, nose, hands and mouth and back.

If you decide to use drama in your classroom, you could use a scripted play that has been written down, or you could draft an outline and let the pupils write the script for themselves. They could also improvise their drama and then work out what to say as they practise acting out the scene(s).

When setting up a drama lesson – or series of lessons, as dramas take time to develop – these are the things you need to remember:

- Be clear why you are using drama to help your pupils learn.
- Give clear instructions and explanations about the purpose of the drama.
- Have an outline of a drama in mind if your pupils need such support when improvising so you can make suggestions.
- Build in time for them to practise.
- Be ready to give support and suggest ideas when they have difficulty.
- Use language lessons for them to write their plays and the dialogue.
- The play can relate to a topic in science or social studies or citizenship/life skills lessons.
- Give them opportunities to perform to an audience whenever possible as this will boost their self-esteem and confidence, even for those who work only on the production rather than performance side.
- Involve your pupils as much as you can in all the stages of the process and decision making.

## Key Resource: Using storytelling in the classroom

Stories help us make sense of our lives. There are many traditional stories that have been passed down from generation to generation, which were told to us when we were young, that explain some of the rules and values of the society that we were born into. Stories are a very powerful medium, especially if they are well told or written. Stories are entertaining, exciting, stimulating and can transport us out of our everyday life into fantasy worlds, but they can also be challenging. They can provide guidance about how we live our lives; they can stimulate our thinking about new ideas; they can help us explore our feelings and help us to think through problems in a context that is detached from reality and therefore less threatening.

Stories have a strong role to play in the classroom in all curriculum areas and can be used in a number of ways for a range of purposes. The next part explores when and how you might use story in your classroom to develop your pupils' knowledge and understanding of their world.

### How can you use stories in your classroom?

Stories can be used at the start, middle or end of lessons.

#### Start of the lesson

Most often stories used at this stage are to set the scene for the lesson, to stimulate interest, find out what pupils know already and to provide a context for the main work of the lesson.

#### Middle of the lesson

Stories used at this stage provide a context for the work the class is doing. They may be analysing or using:

- the values in the story;
- the reactions of the characters;
- the ideas contained in the story;
- the claims made in the story;
- the structure of the story;
- the ideas in the story to broaden and deepen understanding of a subject.

#### End of the lesson

Stories used at this stage are often used to pull learning together, so selecting a story for this stage is much more difficult.

They can be used to just relax the pupils and give them a pleasurable experience before they go home from school. Stories have an immense value in themselves in that they provide comfort, support and entertainment. They help build confidence and self-esteem and help your pupils learn more about themselves as they relate to the characters in the story, so the telling or reading of stories just for pleasure cannot be overestimated.

Most societies throughout the world have used storytelling as a way of passing on their history and values. This is very true in Africa, which has a wealth of national and local traditional stories.

## Where do we find and how do we select our stories?

Stories can be found in books, in the local community, and in yourself and your pupils.

You need to select the story because of its message and the purpose for which you want to use it. For example, you may be investigating the sun and moon in your science lessons and use a traditional tale about how the sun and moon came to be in the sky at the start of the lesson to stimulate interest and to explore the truths of the story.

You may find your story in a book or it may be a local traditional tale that has not been written down, from your childhood or that of your pupils. You could also invent or write your own story to tell or read to your class or ask them to write the stories. These could be collected and made into a book of local stories or into books of stories about a particular curriculum area. There is no age limit to using story with your pupils but obviously you would need to select appropriately for those in your class.

Using story in your lessons is one way to involve the local community, as you can invite a renowned storyteller to come in to tell the tale. You could extend this to set up a storytelling club within the school for those interested in developing their storytelling skills and ensuring that such tales are not lost from the community.

Stories and storytelling play a key role in holding many communities together and so their importance should not be ignored in the classroom.

## Key Resource: Using new technologies

New technologies, often in educational contexts meaning information and communication technologies (ICTs), offer huge potential for classroom use. Although the availability of such technologies is limited in many African countries, that situation is changing rapidly. New forms of ICTs are appearing all the time. The experience of those with some knowledge of ICTs is not always a guide to the way in which new forms of ICTs can be most effectively used for learning.

This key resource, therefore, suggests how you, as a teacher, approach new technologies, rather than acting as a guide as to how they can be used. Here are ten points to help you establish a good approach to the potential of new technologies:

- The use of new technologies, like any other teaching and learning strategy, needs planning for: you need to understand the potential of any specific form of ICT (a computer with Internet access, for example) before incorporating it into your daily teaching.
- Get advice about how different equipment and applications work. The introduction of computers into schools is usually linked to some sort of training. Computers also have plenty of 'self help' systems, so make sure that you understand how these work.
- Pupils may need some help in acquiring basic skills: it is important to establish good class routines and positive attitudes to the use of ICTs.
- ICTs allow the use of 'software' that can significantly help the learner, individually or in a group, but some software is better than others. As the teacher, you need to think carefully about which ICT applications are useful, in the same way that you might decide that some books are more useful than others.
- The most expensive technologies are not always the most effective! Audio clips or radio instruction, which has been around for a long time remains highly effective – but now you can deliver it using mobile phones and computers as well as radios and tape players.
- The presentation of pupils' work through the use of word processing packages can be very good, but it is important to remember that good presentation is not the same as good learning. Just using new technologies for 'presentational purposes' fails to exploit their potential for learning.
- New technologies can help speed up tedious processes and make learning more interesting. For example, mathematics or science investigations can move more rapidly if some calculations are done electronically.
- Some new technologies can really transform learning opportunities. The use of simulations in science teaching, for example, allows pupils to investigate things that it would be impossible to experiment with in the classroom. It is important for you, as the teacher, to think about how such technologies really do transform the learning experience.
- New forms of technology may have greater potential for use in the African context than older established technologies. Mobile or cell phones, for example, are now becoming like mini computers. Teachers and pupils can use the skills they develop in using mobile technologies for teaching and learning and this should be kept under review.
- Community awareness of the use of new technologies is also important. The resources that are likely to become available for schools and teachers could also provide useful support for the community.

For more ideas about using new technologies, look at the TESSA website.

## Key Resource: Working with multigrade classes

### Introduction

What counts in teaching is not the size of the class, nor the age or grade of the pupils in it, but the quality of the teaching. In this key resource document are some suggestions for teaching classes with pupils of different grades. You might also find it helpful to see the Key Resource: Working with Large Classes.

### Active learning strategies for multigrade classes

The following teaching strategies are for whole class or mixed-grade groups:

- **Round:** Each pupil has a two- or three-minute opportunity to express his or her point of view on a given topic while others listen. For older pupils, the topic can be controversial or thought-provoking, such as 'Education is valuable for my daily life.' For younger pupils, choose a simple topic, such as 'What I like about school.' This activity will provide you with a range of viewpoints to consider when delivering your lessons, as well as building a sense of 'safe participation' and confidence among your pupils.
- **Brainstorming:** Ask pupils to think individually about an issue or problem – for example 'Why is water becoming scarce?' or 'How can we improve our school?' – and to list its possible causes. Stress that people working together can create more than an individual alone.
- **Simulations and games:** Ask pupils to role-play a situation; for instance, 'What would you do if you were confronted by a bully?' By creating situations that are momentarily real, your pupils can practise coping with stressful, unfamiliar or complex situations.
- **Peer teaching:** Randomly select pupils to find out about a specific topic and then teach the basics of the material to a partner, group or the entire class.

### Involve your pupils

- The classroom is for everyone. Pupils can be very helpful in managing the classroom's physical space, and it helps them to develop a sense of responsibility.
- Involve your pupils in developing classroom rules! Ask your pupils to identify what behaviours are acceptable and what behaviours are not acceptable. Make only a few rules that emphasise appropriate behaviour. Remember that penalties should be consistent with the nature of the misbehaviour and based on positive discipline to help your pupils to learn good behaviour
- Encourage 'experts' from the community to come to class to talk about special skills and knowledge. You can even ask older pupils in the class to act as peer teachers and to work with different grade-based groups.

### Group exercises and cooperative learning

- In a large class, pupils working in pairs or larger groups can help each other and learn from each other. Have pupils from the same grade working together – but also mix up the grades to encourage peer learning

- Group exercises give pupils an opportunity to meet and work with one another, a good step towards building a sense of community. In the 'real' world, working with others is an important skill. Giving your pupils more opportunities to work together can help them develop this skill and releases you to work with groups of pupils of different grades.
- Small-group work encourages pupils who may be reluctant to participate in a large- class setting to participate more. Cooperative learning also helps to hold pupils' attention – a special concern for large classes – and to increase pupil thinking.

## Multigrade teaching and group work

- When designing your group exercises (or even individual exercises), the task that the pupils are to complete should be specific and clear to the group. This does not necessarily mean the group is all of the same grade. Variations of a similar task such as completing some or all of a worksheet, solving a similar problem but of different levels or answering specific questions selected from a range on the chalkboard, will keep your pupils focused
- Development exercises. Place a group of pupils in a real or simulated situation and ask them to solve a problem. This can be the same problem for all grades but the response might be different. Alternatively, write a question or statement with mistakes in it on chalkboards around the room. These mistakes can be structural (such as grammatical errors) or mistakes in interpretation (such as errors in judgement or in the use of facts) specific to a grade group. In mathematics, for example, you can give different groups of pupils a 'story problem' to solve; in science, you can ask all the groups, whatever the grade, to classify a group of seemingly unrelated objects into categories and justify why they chose these categories.
- Topic exploration exercises. Assign each grade group a specific topic to study (research), and give them access to resources they can use to learn about it. These resources can be books, or they can be people in the community who have knowledge about how to do a special activity.
- Simple exercises. These exercises focus on developing a particular skill, such as drawing, editing, quick problem solving, etc. In mixed grade groups, the pupils practise and are given feedback by their fellow group members. At the end of the exercise, volunteers demonstrate their new skills for the class.

## Evaluation of group work

- Require some type of group product for exercises that can be graded. (Remember: grading ten papers or projects is much easier than grading 60.)
- Carefully observe the groups and their members. Praise individual participation as well as the quality of group work.
- Occasionally, require an individual product based on group work, such as a one-minute paper about an issue learned from the exercise, a short quiz or an oral presentation by randomly selected group members. This rewards pupils who were actively involved in group learning and discourages 'freeloading' or the non- participation of some group members.
- Sometimes, use self and peer evaluations at the end of an exercise; for instance, give each pupil in a group a 'score card' and ask him or her to give a grade to themselves and to each of his or her group members. This method is especially

helpful for judging how well the members of a large class participate, where it can be difficult for you to evaluate all individuals personally.

## Assessment Strategies for multigrade classes

The following assessment strategies help give effective feedback and summative evaluations within a manageable workload for mixed-grade classes:

### Giving feedback

To identify which pupils need more personalised feedback, and to manage the paperwork, use the 'portfolio' method. A portfolio is a file, such as a manila folder, containing samples of a pupil's assignments, such as essays, stories and reports; illustrations, pictures, maps and diagrams.

- Pupils' non-curricular activities can also be recorded, such as taking responsibility in a classroom activity.
- The material in a portfolio is organised in chronological order with each item containing a date and the context in which it was produced. It follows the pupil's successes rather than failures.
- Once the portfolio is organised, you and your pupils can evaluate their achievements. At least twice every semester or term, review the whole range of work to identify those pupils who need more individual attention.

### Create exams that 'look' familiar to pupils

Exam questions should be in the same form as those that you used in quizzes, homework assignments, lectures or discussions.

### Conduct review sessions

Set aside class time to conduct review sessions, either with the entire class or in groups. One third of the session time can be spent in a short lecture revising the major points of a topic, and then the remaining time for pupils' questions and/or a short practice exercise.

### Develop exams that demonstrate learning achievement

Together with, standard multiple-choice exams:

- Add short essay questions; control the length of responses by providing pupils with a limited amount of space for answers (an 'answer' box).
- Ask pupils to answer questions using diagrams, flow charts or pictures. These are short and easy to grade, but can be very informative about pupils' analytical skills.
- For some multiple-choice questions, ask the pupil to choose the correct answer and then provide a one- or two-line explanation of how they got that answer.
- Give group examinations. The same grade can be assigned to all members of the group, based on the 'group product' they produce. For individuals, ask group members to anonymously grade each other, and then assign the average of the group's grade to each pupil.

- Ask pupils to write their own examination questions and answers based on your class lectures and activities. These can be used on actual tests.

## Give prompt feedback on assignments

- Ask pupils to do assignments in group
- Assign a short in-class assignment for individual pupils and ask them to bring you their completed assignments when they finish. You can grade these on the spot and give them instant feedback. To avoid a line at your desk, ask your pupils to take numbered pieces of paper when they have finished their work and to come to your desk for feedback when their number is called.
- Ask older pupils in upper grades to help you grade your pupils' assignments.
- Occasionally pupils can exchange their assignments and they can grade each other's work.
- Give out an answer sheet so pupils can assess their own work, or set aside class time to go through the answers to the homework with the entire class.



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