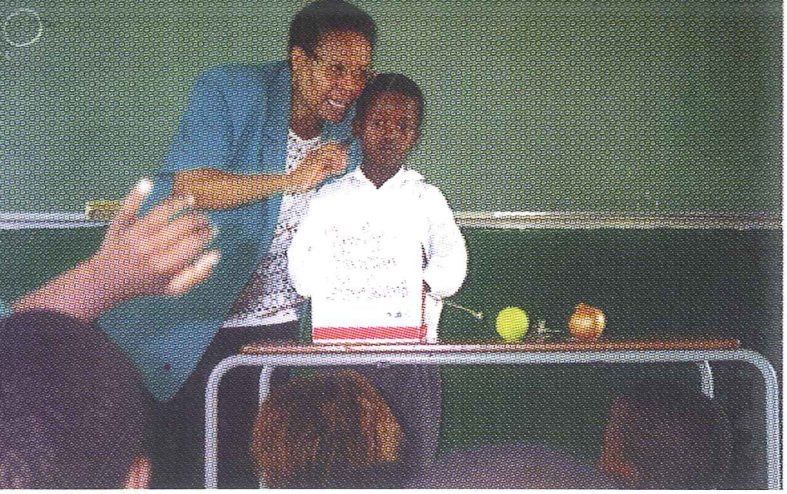

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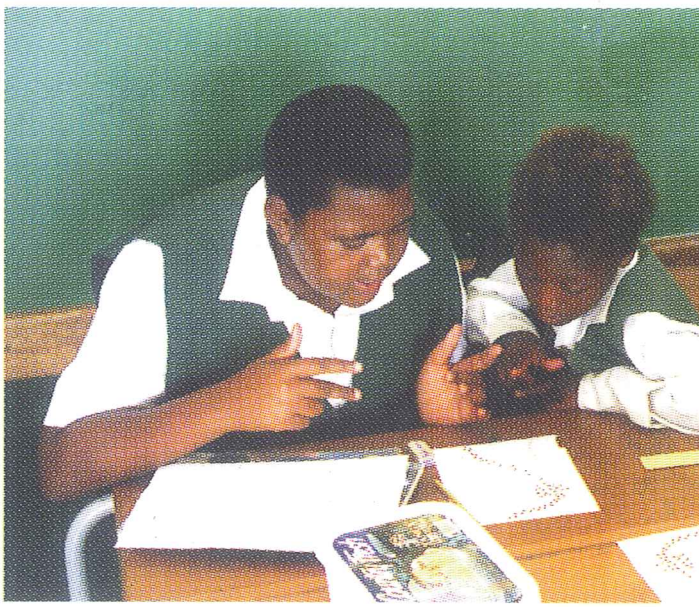


Core Learning Areas Course

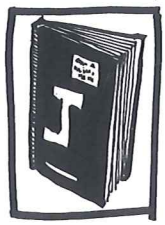
Natural Science

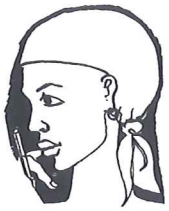
Umthamo 2

What's Happening Here?

(Pilot Edition)

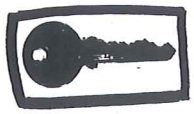
February 1999

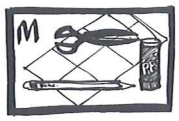

Journal


Thinking and Reflecting


Written Report

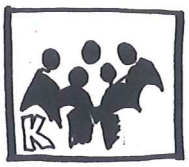

Classroom or School


Key Activity


Making materials

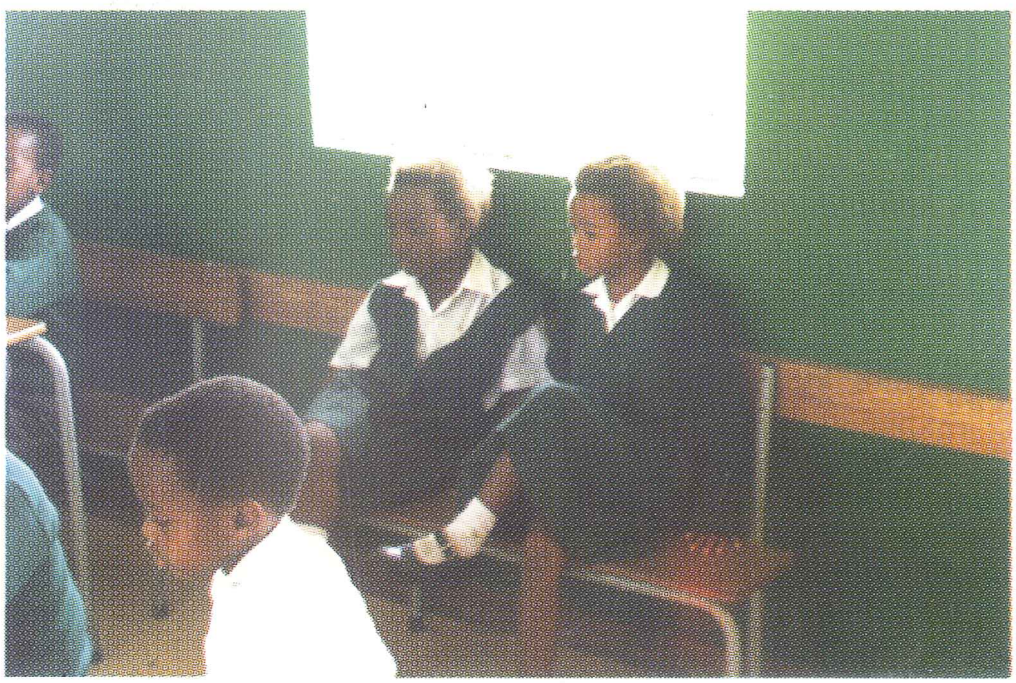

Reading and Thinking


Discussion


Face-to-face umkhwezeli


Concertina File for Portfolio


Time



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Abruscato, J and Hassard, J. 1976.*Loving and Beyond: Science Teaching for the Humanistic Classroom*. California: Goodyear Publishing Co.

Harlen, W. 1993 (2nd edn). *Teaching and Learning Primary Science*. London: Paul Chapman Publishing Ltd.

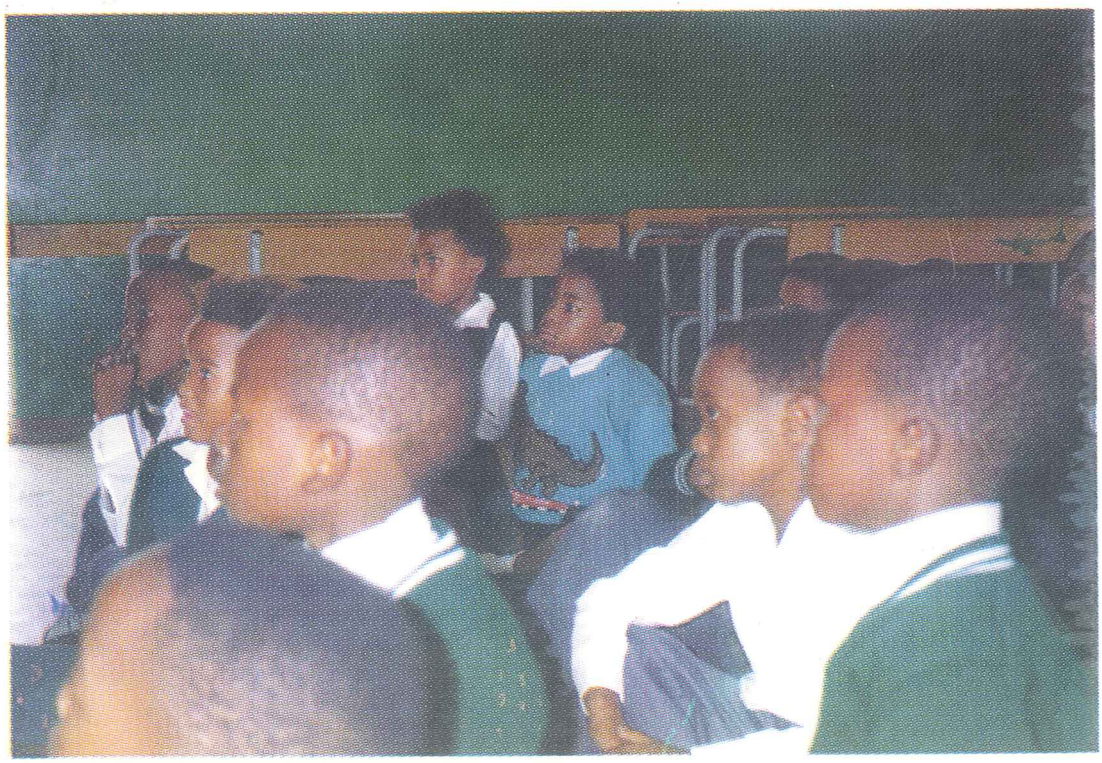
Young, BL. 1979. *Teaching Primary Science*. London: Longman Group Ltd.

Respect for evidence

Although a theory may have its beginning in an imaginative guess, it has no status until it has been shown to fit evidence or make sense of what is known. Thus the use of evidence is central to scientific activity; this is true at school level as much as at the level of the work of scientists, so attitudes towards it are of great importance in science education.

Children talking among themselves have a keen sense that an unsupported statement is not necessarily to be believed. 'How do you know that's true?', 'Prove it' feature in their private arguments in one form or another. ..... It is when they are in the company of adults who expect children to accept statements because of the force of authority behind them that the desire to ask for evidence often has to be suppressed.

Wynne Harlen - Teaching and Learning Primary Science (2nd edn). 1993. London: Paul Chapman Publishing Ltd.



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CONTENTS

Umthamo 2

What's happening here?

Introduction

In this second Natural Science umthamo, we will continue to think about some of the **Science process skills** that we learned about in the first Science umthamo. We will continue to base the work we do with pupils on the Natural Science strand, ***Matter and Materials.*** But this time we will also link it to the strand, ***Energy and Change***.

In the previous Natural Science umthamo we concentrated on the Science skills of ***observation*** and ***prediction***. This time we will add the skills of ***inference*** and ***developing theories*** (thinking of a hypothesis or an explanation of how or why something happens or works the way it does).

In this umthamo we will be thinking of ways to encourage learners to think about *how* and *why* things happen.

- We will ask them to think *how* they can *explain* their observations.
- We will base our Science work on **air**, as a gas form of **matter**, and think about how it supports the burning of something like a candle.
- We will also think about the **materials** that make a **candle**. And,
- We will try to help children work out their *own* story of what they think is happening when a candle burns.

You received a small booklet and a set of readings with the first Science umthamo. There are no supplementary readings for this umthamo. But you will see that we do ask you to refer to the Readings from the first umthamo in this strand.

We have included a set of learning materials for you to use in Activity 2 of Unit 2. You should receive an A3-size picture of footprints, and 24 smaller copies of the same picture.

Intended Outcomes

We have one main outcome for you in this umthamo. When you have completed this umthamo, you will have guided your learners through a set of activities in such a way that they can use Science **process skills** to form their own logical ideas, or **theories.**

We believe that the **Key Activity** in this umthamo will help you see the merit, or advantage, of a more **learner-centred approach**. As a result, another outcome might be that you

are prepared to adopt this approach more often when you plan Science work for your pupils.

So the outcomes for this umthamo are…

- **to continue to develop your own *Science Literacy***
- **to have worked more with developing *Science process skills***

Assessment and the Key Activity

You will assess yourself as you work through this umthamo. Your peers will assess your participation and involvement at the face-to-face sessions. Your umkhwezeli will continue to appraise your progress through the course and discuss this with you.

This umthamo has a formal hand-in assignment for the **Key Activity**. Your umkhwezeli will write a written response to the work that you hand in. S/he will also negotiate an assessment with you.

> The **Key Activity** has three parts. You are asked to write brief reflective reports of about two pages each, of the three different activities that you are required to do with your learners. The first activity involves a game to promote the Science skill of **inference**. The second activity involves interpreting a picture. And the third activity makes use of candles. You will also be asked to write a brief, one-page summary to explain what you feel you have gained or learned from working through this umthamo.

We hope that you enjoy working through this umthamo, and that both you and your learners benefit from the activities that we suggest.

Before you start on the first Unit, it might be useful to go back to the Reading from *Teaching Primary Science*, by BL Young. You read it when you were working through the first umthamo in this strand.

Carefully review what he has to say about the two process skills, **inference** and **hypothesis.**

If you want, you could make a few brief notes to help you. You might also want to look up the words in a good dictionary. (The Distance Education Project will try to ensure that there are suitable dictionaries available for you when you meet with your umKhwezeli at your Centre.)

UNIT 1

Making inferences

By now you will have worked out that an **inference** is the result of some thinking after you have obtained some information.

Often we notice something, hear something, or observe something, and we don't think any more about that thing. At other times we think about what we have noticed, heard, or observed, and we try to make sense of it. If as we think, we come to a new conclusion, we are inferring. And your new conclusion is an inference.

So, if you have noticed something, or heard something, or **observed** something, and then thought about it so that you come to some new conclusion about that thing, then you have been **inferring**. The result of your thinking is an **inference**.

Well, **inferring** is more than just guessing. It is more thoughtful and logical. You don't just jump to a conclusion. You consider carefully what you have observed. And then you work out what you think it means. You try to find a logical explanation for your observation.

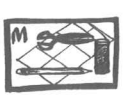
You might even ask yourself a question about the observed thing. The ***answer*** to that question will be what you have **inferred**.

Activity 1 - The Phatha-Phatha-Bhokisi

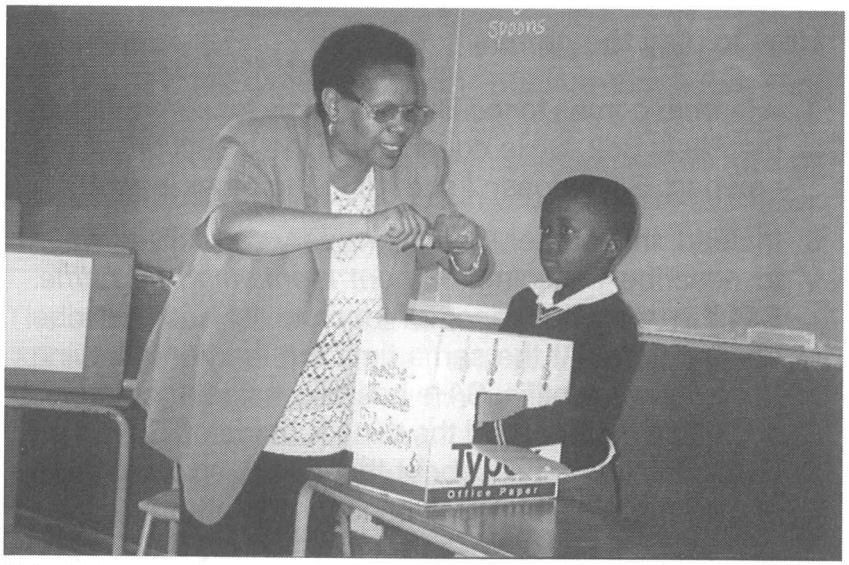
Here is an idea for a nice language game that you can play in your class. And while you play it, your learners will be making **inferences.**

It is called the Feely Box game. Do you know it? At Cape College, near Fort Beaufort, in the early eighties, it was known as the '*Phatha-Phatha Bhokisi*' game. It is fun, but it also requires *skillful description* and *good listening skills*. Those who play it, have to *listen* carefully, *think* clearly and use their *imagination*. So it is a very useful resource for learning.

What is a Feely Box?



Any medium sized cardboard box will do for a Feely Box. You have to cut a hand-sized opening in one side of the box. This is so that a learner can put a hand into the box and pick up something to feel. Some people cut two holes so that a pupil can put two hands into the box to feel for something. You can even have a Feely Bag instead.

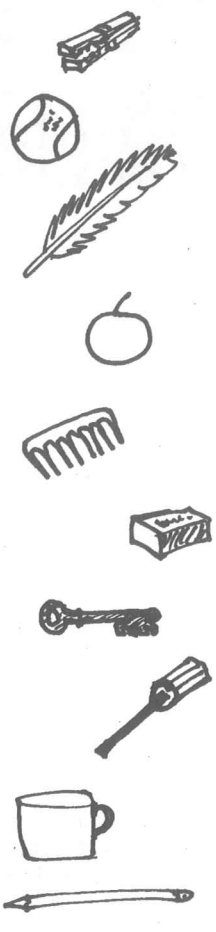


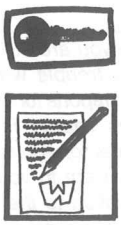
Winnie helping a Grade 1 learner to describe what he has found in the Phatha-Phatha box.

The idea of the game is to hide some interesting, different, things (which are familiar to your learners) in the Feely Box/Bag.

We have written out an example of some **observations** and **inferences** about an object found in a box. See if you can **infer** (work out) what was being described, from the **observations**.

Observation	**Inference**
'This something is long and thin.'	'Is it a ruler?'
'It is not flat.'	'Is it a stick?'
'It has a sharp point at one end.'	'It is a knitting needle.'
'It is fatter than a needle for knitting.'	'It is chalk.'
'It is made of wood'	.....
'It is flat at the other end.'	.....
'The point is not wood.'	.....
'It is not round as such.'	.....
'It has a sharp point, a flat end, and it has six sides'	.....
'It feels as if the sides are painted.'	'It is a .....'





Key Activity - Part 1

This is the first part of the Key Activity. You need to make notes as you carry it out, so that you can compile a careful 2 page Reflective Report on what you and your learners do. Make sure that you spend some time soon after the Activity so that you can write up your first rough draft while you can clearly remember what happened.

How to play the game

1. A learner comes to the front and feels for something in the Feely Box. S/He doesn't take the object out of the box/bag. S/He doesn't show it to the other learners.

   Instead, the learner then thinks very carefully of ways to describe the thing, *without mentioning its name.* S/He is using the sense of touch to list and describe observations. At the same time the learner is having to be quite scientific. S/He has to consider the properties of the material that the thing is made of. S/He also has to think carefully about the shape, size and form of the item. This brings in aspects of Maths.

2. Each time the learner gives an observation, another learner in the class is given a chance to try to work out, or **infer** just what the object is.

3. While this is happening the teacher acts as a scribe (or secretary), and records the **observations** and the **inferences** on the board, or on a large sheet of paper. S/He lists the main points only.

4. This carries on until someone actually works out what the item is. Then the item can be pulled out of the Phatha-Phatha Bhokisi, and shown to the rest of the class.

5. It is important that a little time is spent discussing

   the *accuracy* of the **observations** - Science process skills

   the *effectiveness* of the descriptions - Communication skills, and

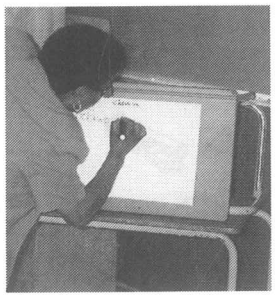
   the *quality* of the inferences - Science process skills.

In this way a teacher can begin to encourage her learners to think more carefully about the words they choose when they make **observations**.

They might also become more aware of their own thinking as they **observe** and make **inferences**.

So try this Feely Box game with your pupils. In our experience, it works well from pre-school and Grade 1, right up to Grade 7.

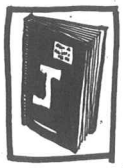
You can get a good idea of how this works in a classroom if you read Sindiswa Peter's report of her work with Grade1 learners in the Appendix on page 38.



This is known as meta-cognition, which means being aware of the quality of your thinking as you think.

This is part of meta-linguistic awareness, which means thinking about, and being aware of, the way that words are used while using language.

Are you are still having a little trouble writing your own reports for DEP work? This report is a good model for you to follow. If you want to you can pay attention to the style and structure as well as the content when you read the report.



Afterwards, write a brief comment in your Journal. Describe how the game went with your learners. What surprised you? How did you feel? You might want to keep a copy of one or two of the more interesting sequences of **observations** and **inferences** in your Concertina File for possible inclusion in your Portfolio.

The activity above is a nice example of how a teacher can "kill two birds with one stone", and achieve Language and Natural Science outcomes at the same time.

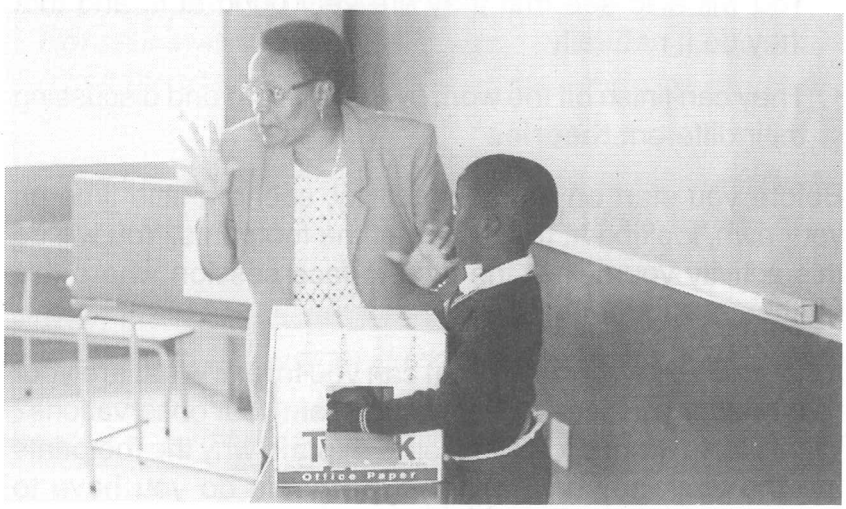
Reflective Report (Key Activity - Part 1)

While what you did is fresh in your memory, use your notes to write a draft reflective report for this first activity. Remember that you must write about 2 pages. We suggest that you use the following headings

- What I did, and how the learners responded
- Examples of learners' work
- Discussion of the learners' work
- What I learned, and what I felt

Re-read your report a day or two later and make some changes and improvements. Is what you have written clear? Are you satisfied with the quality? Can you think of any ways to improve the report?

In Unit 2 you will work with **observations** and **inferences** again. But this time you will take process skills a bit further. The learners will try to use their **observations** and **inferences** to develop a logical story. The story could be called a **hypothesis**, or the beginning of a **theory.**



Winnie gets the rest of the class to infer what is being described.

Unit 2

Developing Explanations

The next activity shows how you can move from a series of **inferences** to the development of a story. The story is rather like a simple **hypothesis** (the beginning of a **theory**) to explain what you have **observed** and **inferred**.

The idea for this activity comes from a very different Science book from the seventies, called *Loving and Beyond - Science Teaching for the Humanistic Classroom* by Joe Abruscato and Jack Hassard.

In this activity you will ask your learners to

- Look carefully at a rather puzzling picture of some footprints.
- They will have to use their imaginations and common sense to see if they can **interpret** the picture, based on what they can **observe**.
- They must work out what was happening when the footprints were made.
- They will have to **infer** things.
- Then they will have to try and **make sense of** what they have seen and done. This means that they will have to give **reasons** for what they think.
- When they try to put together a logical story to explain their **observations** and **inferences**, their **explanations** will make stories. These stories are like **theories** to explain something.
- You will see that young children really enjoy the challenge of developing **theories**.
- You will also see that they are very good at it, and that they do it naturally.
- They can finish off the work by **comparing** and discussing their different **theories**.

In the first Learning about Learning umthamo, in Unit 3, page 26 and 27, the writers included an extract from Understanding Reading by Frank Smith. In that extract, Frank Smith talks about the way each one of us develops a personal theory of the world in our head. We tell ourselves a story that makes sense, and explains certain things.

Before you start on the next activity, spend a little time on your own, looking at the picture of the footprints. You will do this activity yourself at the face-to-face session where this umthamo is introduced.

What can you **observe**? What can you **infer**? What are your **reasons** for your ideas? Can you **explain** your observations? What story (**theory**) can you tell to **explain** why the footprints are the way they are? What **hypothesis** do you have to explain the way the footprints are?

Write your information on a clean sheet of paper and store it safely in your Concertina File. Later on, you will compare this (your own work) with the work of your children.

Spend a little more time thinking about the Footprints Picture. Try to get into the minds of your learners. Try to *decentre*. (In other words, try to think from someone else's point of view.) What other possible explanations might be logical for the pattern of footprints in the picture? How many explanations can you think of?

In Umthamo 10, the second umthamo of the Learning about Learning strand, you have been reading something about decentring. Some people, like Piaget, believe that young children are not able to decentre. Others, like Margaret Donaldson, believe strongly that, in fact, young children can, and do, decentre.

What do you think of this version from two seven-year-olds from kwaLanga, near Cape Town?

> *"We see that a little baby duck is walking here. The baby duck is lost and it is very sad. It is walking so slowly.*
>
> *Then comes the mother duck looking for her lost baby. Here she walks (gesture to darker, bigger footprints). The other amadadana are hiding in the reeds by the dam waiting for the mother. They are not lost.*
>
> *Then the mother duck, she sees that lost baby and she runs to the baby and they dance and dance as you can see here.*
>
> *Then the happy baby duck is tired and it climbs up onto the back of the mother duck. It hides in the feathers of the neck of the mother duck. And the mother duck walks home with her happy, sleeping baby."*

Makes sense? What do you think?

The next Activity is the second part of the **Key Activity**. Again make sure that you make notes and collect any interesting work from the learners. As with the previous activity, You need to write a careful 2 page reflective report. You can use the same headings as a guide. (See page 7)

Activity 2 - Making Inferences

Option A - Pair work with older children

Before you start, make sure that you have enough pictures for each pair of learners in your class. (A class set of 24 has been provided with this umthamo.)

Also check that each pair have something to write with and some paper to write on.

Now

- Tell them that you are going to give them a puzzling picture. You want them to look at it carefully.
- Tell them that it is a picture of footprints.
- Tell them that they are going to have to think very carefully, and look at the picture of the footprints very carefully.
- Tell them that they must try to work out as much information as they can from the footprints.
- Tell them to write down very quickly any facts that they can work out from what they can see. Remind them that they might need to think of their own questions. This will help them find answers.
- Then leave them to struggle on their own for a while. Don't be tempted to interfere. Don't repeat the questions. Just observe them carefully to see how they are getting on. If they want to know anything, or if they need your help, then they can call you and ask you. Remember that this is a *learner-centred approach*. You want to see what they think. You want them to think for themselves, independently.
- After about 2 or 3 minutes, you can go quietly to any groups that seem to be stuck and suggest some leading questions to help them get started. Ask if the animals are of the same size. Ask them if the footprints are always the same distance apart. Ask them if they can tell the direction in which the animals are moving. Can they work out what the animals are doing?

When most of the pairs have written down some facts, you can proceed.

- Get the attention of the whole class again.
- Now tell them that you want them to behave like scientific detectives. You want them to try and make sense of what they can see from the footprints. Tell them that these footprints must tell a story of something that actually happened.
- Each pair must try to work out a good story that explains the pattern of the footprints.
- The story should be logical and it should make sense.
- Also, tell them that when they are satisfied with their story they must write it down roughly in point-form.
- Tell them that they have just 10 minutes to complete this.
- Just before the time is up, warn them that they have only a minute or so to finish writing their point form story notes.

Now ask them to move together with other pairs so that they make groups of six or eight learners.

- Tell them to share their stories and to argue in a sensible way about which story in their group makes the most sense. This means that they have to listen carefully to each story (explanation) and they have to assess which story they feel is the best or most logical.
- Explain that after a short time each of the larger groups will get a chance to present the version they prefer to the rest of the class.

Finish off by letting the chosen pair in each group present their story to the rest of the groups. After each presentation, chair a very short class discussion where you allow a few learners to comment, ask questions or make points.

You may choose to end off by telling your learners that there are Scientists called **Paleontologists.** These Paleontologists study the old bones and other evidence left behind by creatures that lived millions of years ago. They also try to make sense of footprints left behind by ancient creatures of long ago. They use their observations and findings to **infer** information. Then they use that information to develop **theories** to explain how life here on Earth has developed.

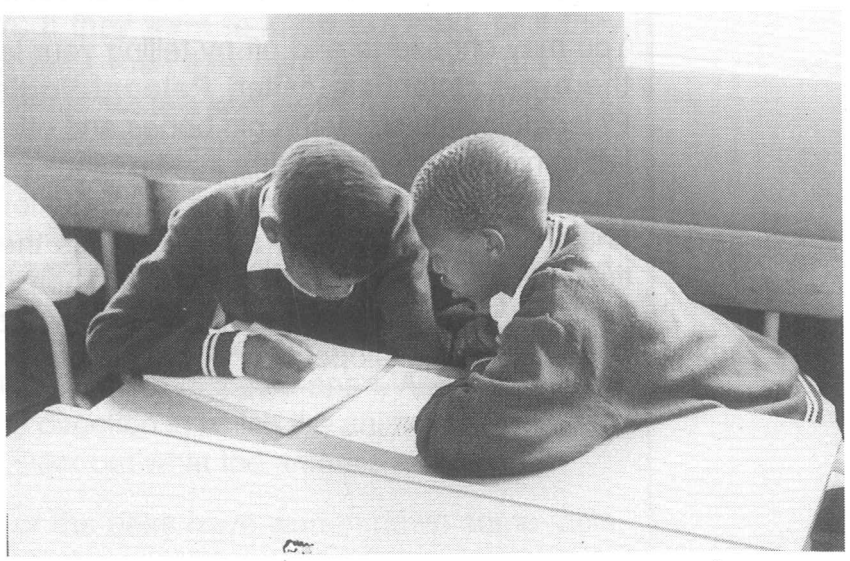
In the Box File of resource materials that go with this umthamo, you will find more information about fossil footprints. An interesting fact is that last year,1998, it was proved that the oldest known human footprints in the world are in the museum in East London. They were found at Bat's Cave near the mouth of the Nxarhuni River. They are believed to have been made more than 80 000 years ago here in our very own province. Isn't that something to be proud of?

You may want to discuss possible follow-up work with your learners.

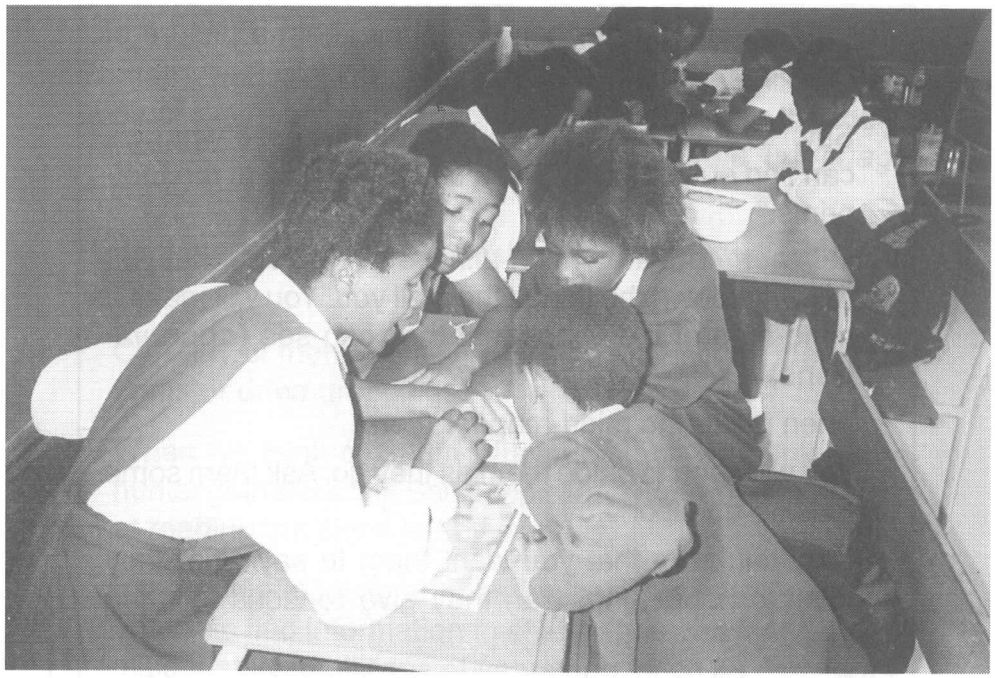
- Can any of them identify local wild animals by their footprints, or from dried droppings?
- When we think of South African history, we think of the hunter-gatherers, the San people, and how good they were at reading the signs left by animals.
- If there is a local library nearby, some learners may volunteer to find information to share about the kinds of animals that lived millions of years ago, such as dinosaurs.

If you and your learners think of other ideas and try them, then we would really like to hear about your work. Talk to your umkhwezeli about this extra work that you have done. Show her/him what you have done as extra work. We may even be able to include the ideas in a Distance Education Project magazine or newsletter.

Discussing the Footprints Picture.



Co-creating the story of the footprints.



Arguing about the story behind the footprints.

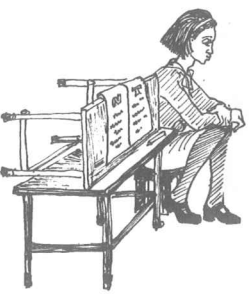
If you work with younger learners, and they are not yet independent writers, we suggest that you try Option B of this Activity. You will lead a discussion with your learners, and act as their secretary when they create their own story.

Activity 2 - Making Inferences

Option B - A Teacher Lead Discussion

Before you start this Activity, you need to check that you have the large A3 Footprints Picture to work with. You also need to have a large blank sheet of paper to record the important things that the learners tell you.

Decide if you are going to work with your whole class, or if you are going to work with a certain group. If you plan to work with a certain group, make sure that the rest of the learners are quietly settled with enough work to keep them busy for 15 to 20 minutes.



Then start by gathering the learners that you plan to work with around you, Make sure that they are comfortable and settled.

Then think of a way to introduce the idea of Footprints. Perhaps you can tell them about a gardener who had cabbages in her garden. At night something came and ate the cabbages. What could it be? How could the farmer lady tell if it was a cow, or a goat, or a pig, or a thief that was coming at night to take her cabbages?

Tell them that you are going to show them a picture of some footprints.

- Say, "We are going to work together to see what we can find out or tell, by just looking carefully at the footprints."
- Tell them that they must tell you things, and that you will write down the things they tell you. You will make a mind-map of the things that they can see **(observations).**
- Then make the mind-map for them.
- You will need to guide them as they go. Ask them some leading questions.
- Now tell them that you want them to say what they think is happening. Can they give reasons for their ideas?
- Suggest that your learners talk in little groups of two or three. Tell them to try to think of the story that these footprints are telling - the story of what happened when these footprints were made.
- Let different learners have a turn to tell their own little stories of what they think happened, and why.
- Finally decide on the best story as a group or class, and let the children dictate it to you. As they talk, write the story they dictate on a clean sheet of paper. Check the information, and let the learners help you edit the story as you go.
- When you have finished, read through your story with your learners.

Remember Umthamo 10? Praise them for their thinking and observing. Try to say things like..... 'That was a clever thing to notice!' .....'So, in your head you see a picture of a big animal and a small animal'. If you tell S'bongile that she has thought of a clever idea to explain why some footprints are far apart and why some are close, then she will see herself as a 'Thinker of Clever Ideas'. She will feel affirmed, and she will want to think more. She will see herself as a "successful thinker" in a school setting.

Reflective Report (Key Activity)

While what you did is fresh in your memory, use your notes to write a draft Reflective Report for this second activity. Remember that you must write about 2 pages. We suggest that you use the same headings as before.

- What I did, and how the learners responded.
- Examples of learners' stories to explain the footprints.
- Discussion of the learners' inferences, observations, and theories.
- What I learned, and what I felt.

Re-read this a day or two later and make changes and improvements. Is what you have written clear? Are you satisfied with the quality? How can you improve your report? Store this piece of work in your concertina file.

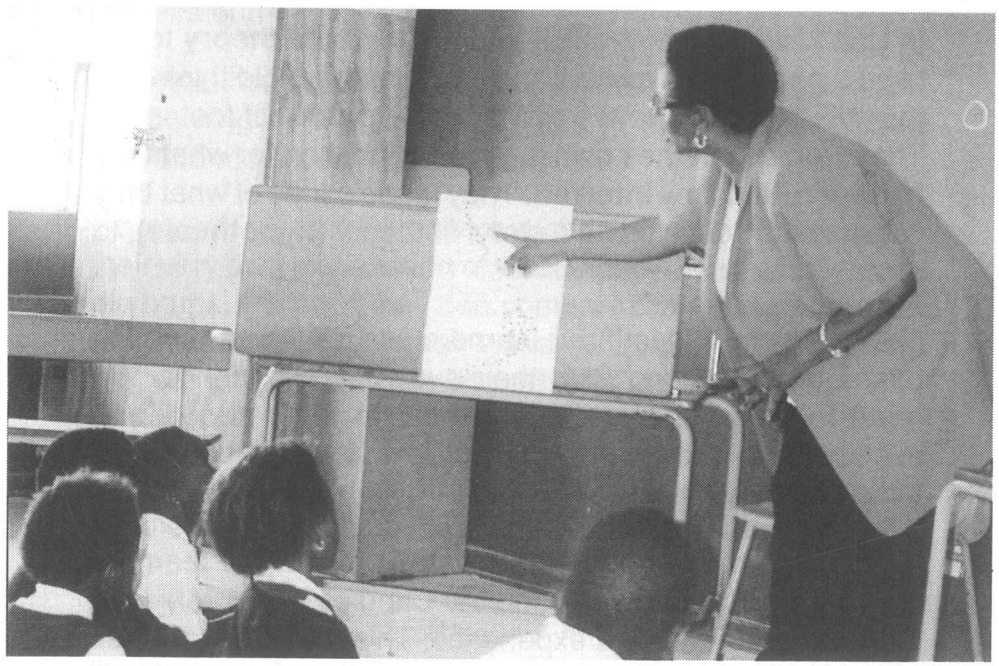
Other Ideas

Perhaps, you and your learners could make and illustrate a book of their version of the story. You could use the ideas from the Appendix in Umthamo 9, *A Whole Language Approach.*

You may want to discuss possible follow-up work with your learners.

- Can any of them identify local wild animals by their footprints or dried droppings?
- When we think of South African history, we think of the hunter gatherers, the San people, and how good they were at reading the signs left by animals.
- If there is a local library nearby, some learners may volunteer to find information to share about the kinds of animals that lived millions of years ago, such as dinosaurs.

If you and your learners think of other ideas and try them, then we would really like to hear about your work. Talk to your umKhwezeli about the extra work that you have done. Show her/him what you have done as extra work. We may even be able to include the ideas in a Distance Education Project magazine or newsletter.



Guiding Grade 1s with careful questions to help them create a story of the footprints.

Unit 3

Hypothesising - or developing a theory to test

In the introduction to this umthamo, we suggested that you should look back at the BL Young Reading from the first Science umthamo. We asked you to remind yourself of the meaning of the process skill of **hypothesis.**

You will have found that he says that a **hypothesis** is a reasonable 'guess' used to explain something that you have **observed.** He also says that when you are faced with a problem, you look for a **hypothesis** as a possible answer. Then you test your hypothesis by trying something to see if it is true.

If you look in some dictionaries you will find that a **hypothesis** is said to be the starting point for investigating a possible theory. Or, that it is a theory waiting to be proved, a sort of *untested* theory.

In our own personal lives, we all have our own personal theories that we believe in.

In Science, a *theory* is usually something that most scientists believe to be true. They believe that enough evidence has been gathered to support that *theory* so that it can be accepted and treated as if it were true.

In Unit 2, we saw how children can develop a **theory** to explain a series of **observations.** Your learners did this when they tried to make sense of a puzzling picture of footprints. They worked out their own logical explanation for what they had seen, and they **inferred.** They made sense of what they **observed** by developing a story, or theory **(hypothesis),** to explain their observations.

Now we want to see if our learners can do the same thing based on something from their everyday experience. We need to select something for them to think about, and explain, that is familiar to them. We want to select something that they know well.

What about the burning of a candle? Most of our learners will be very familiar with candles. Candles are surely very much a part of their life experience. This would fit very well with the new **OBE Curriculum.**

- If you consider what candles are made of, then the work fits in the Natural Sciences Framework in the strand, **Matter and Materials.**

- If you think about what happens when a candle burns and what is needed and produced, then the work fits in the Natural Sciences Framework in the strand, **Energy and Change.**
- Candles are things that people have invented, **designed, made, assessed,** and improved, to solve the problem of needing light to work in the dark or at night. This means that when you think about and work with candles, you are also touching the learning area **Technology.**

We have based the following activities in this Unit on the work of primary school teachers. The teachers who worked on these activities in early 1997, come from the Central Region of the Eastern Cape. There are a few copies of the booklet from which these ideas are taken, in the Resource Box for this umthamo at your Centre. The booklet has a pale yellow cover and is called, *Products of Combustion*. If you want more information, you can borrow a copy.

What do the learners have in their minds as an explanation for what happens when a candle burns? We are going to try to find out.

But first we need to give them a chance to recall/remember everything that they can from their previous experience. We want to do this in a systematic way. Then we can see for ourselves what they already know and can remember about candles burning.

After that, we want to give them a chance to **observe** a candle burning so that they can check what they remember, and add more detail if necessary.

Finally, we want to give them a chance to try and work out their very own explanation of what is happening when a candle burns. Perhaps they can compare their ideas and even test them. In this case their ideas will be a **hypothesis,** and the test will **prove** if their **hypothesis** is correct.

Short candles are safer and better than long ones for work in the classroom. You can cut longer candles into shorter bits, but just make sure that the length of the wick of each candle is long enough to give a good flame.

To do this activity you will need some clean paper, matches and candles. It is also a good idea to have a safe form of candle holder such as the metal lid of a jar for each candle.

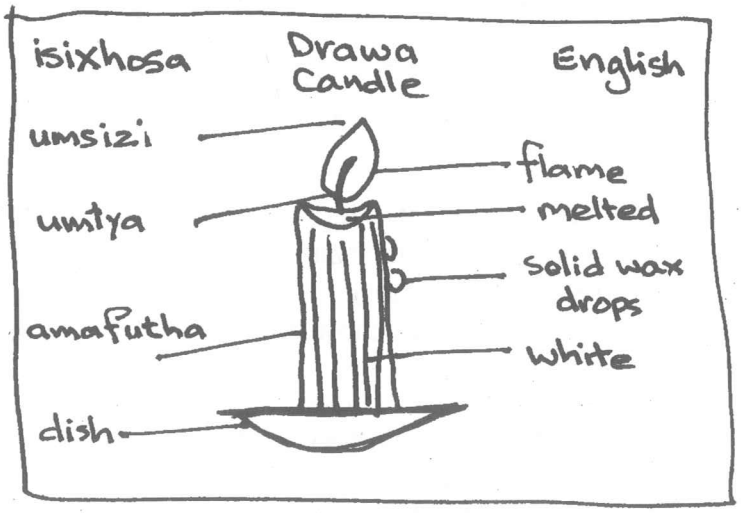
This is the third part of the **Key Activity.** Again make sure that you make notes and collect any interesting work from the learners. As with the previous activities, You need to write a careful 2 page reflective report. You can use the same headings as a guide. See the bottom of page 14.

Activity 3 - Thinking about candles

Part 1 - Describing a candle from memory

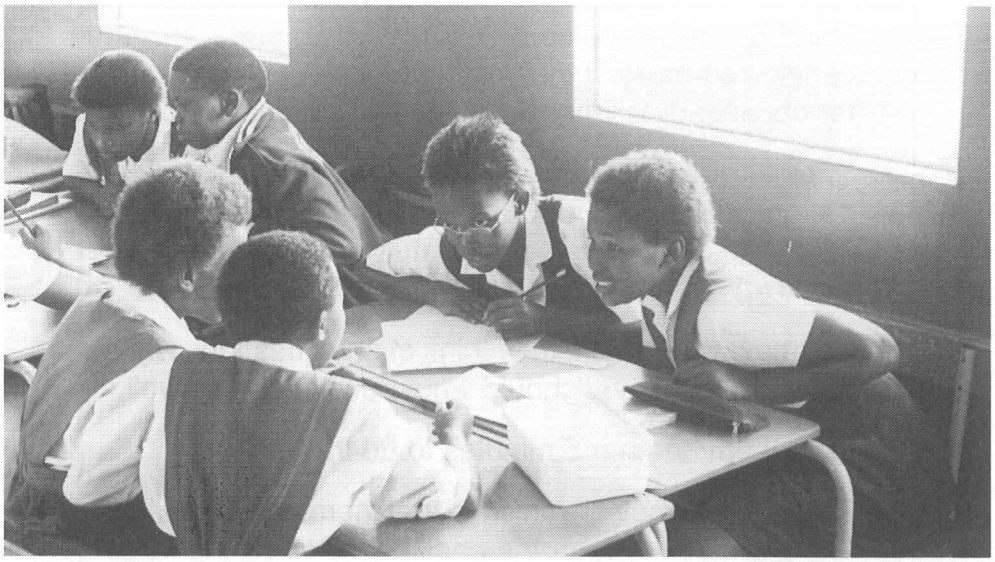
If you are working with children who can write for themselves, then we suggest that you let them do this activity in pairs or in threes. We also suggest that you encourage them to work in more than one language for this task.

- Give each pair (or three) a clean sheet of paper to work on. Tell them to write the name of the language that they speak at home in the top left-hand corner.
- Tell them to write the language of their Science text books in the top right hand corner. This will probably be English. If the language of the text book is the same as the language of their home, then let them choose another language for the right-hand side.

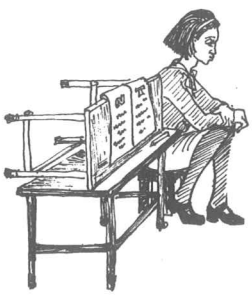


- Now tell them to do a quick, large, clear drawing of a candle burning, right in the centre of the page.
- Then tell them to work quickly and to label the drawing with all the details that they can remember from having **observed** candles burning in the past. They must label in one language on the one side of the page and in the other language on the other side. They must not repeat a label. They can choose for themselves in which language they want to record something.
- Tell them that you will give them about 5 minutes to do this part of the activity

When the five minutes are up, ask your learners to share what they have done with the whole class. As they do this, you can make a record of this on the chalkboard, or on a large sheet of paper.



A group of Grade 7s sharing and recording what they remember about candles burning.



If you are working with Pre-schoolers, or Foundation Phase learners who are not yet confident, independent writers, you will need to work with the whole class or a large group, and do the writing for them.

Gather the children around you and settle them comfortably before you begin.

- Tell them to shut their eyes.
- Then tell them to think of a candle burning.
- Tell them to look at that candle carefully. Tell them to make a picture in their head of a candle burning. What can they see?
- After a little while tell them to open their eyes
- Ask them to help you to draw a candle on the piece of paper.
- Draw the candle as they give you instructions.
- Then tell them that you want to label the drawing.
- Write down all the things that they tell you.
- If necessary, ask them for more details. What colour is the flame? What colour is the wick? What is used to make the wick? What do we see above the flame?

Part 2 - Observing and recording a candle burning

If the learners have worked in pairs or threes, what you do next depends on the number of candles that you have. If you don't have enough candles for each pair, then you can group the pairs into groups of 6 or 8 learners. When they are ready, but ***before*** you hand out the candles, remind your learners to be careful and to make sure that everything is safe.

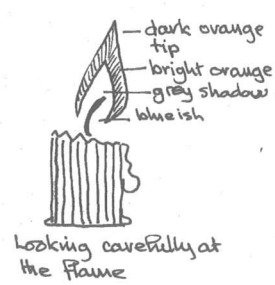
- Hand out the candles and tell them to **observe** the candles carefully. If they have more things to write after observing, tell them to use a different colour pen.
- Then tell them that you are going to light their candles. As you go from group to group, lighting the candles, tell them to **observe** very carefully and to note down **(record)** everything they see.
- Tell the groups that if they think of any questions while they are busy, they should write down these as well.
- Give them another 5 minutes to do this task.
- Again, when they are finished, get them to report back. Record their work on the chalkboard or on the large piece of paper. Also, remember to use another colour. This will help you to see clearly what was already known, and what has been more recently observed.
- When you are satisfied, praise your learners and move on to the next part.

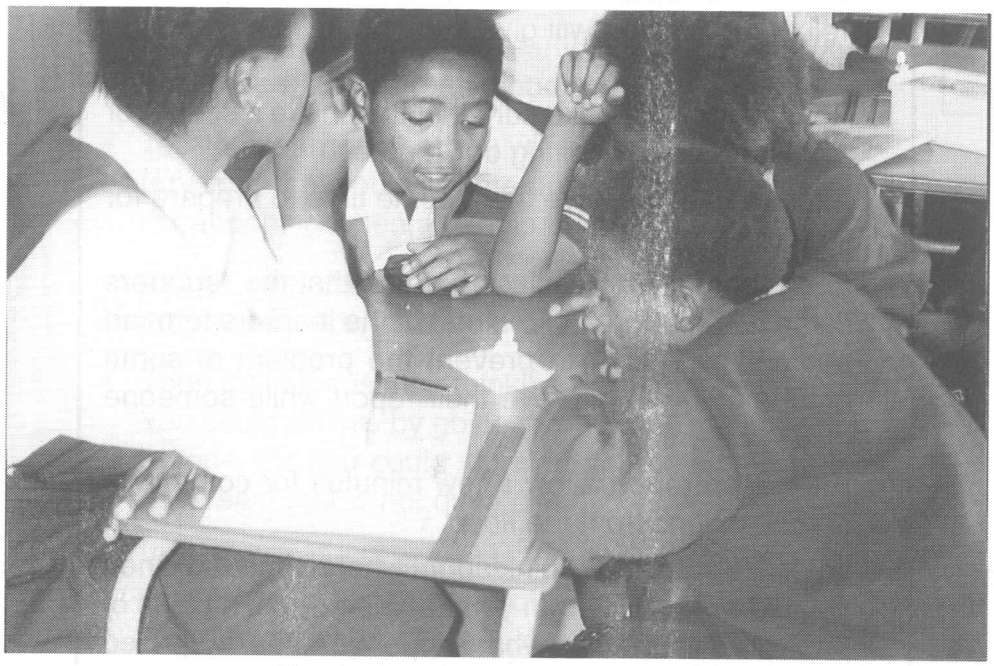
What about those of you working with Pre-schoolers, or Foundation Phase classes? If you were working with a large group, or the whole class, you will have a decision to make. Will you **observe** a candle burning as a whole class? Or will you let your learners **observe** candles burning, in smaller groups?

Whatever you decide, you need to make sure that everything is safe. You need to make sure that nobody pushes, that candles do not get knocked over and that no-one burns her or himself.

- Get your learners to look at the candle carefully before it is lit. What extra information can they add to what has already been written?
- Can they describe what the candle feels like? What substance is it made of?
- Now light the candle/candles and let the learners look at the burning candle very carefully. Can your learners give you more detail to add to the first information?
- You may need to ask a few guiding questions to help your learners make a more detailed **observation.** Is the flame only one colour? What other colours can you see? Where exactly are the colours different?
- When you are satisfied, praise the learners and move on to the next part.

This will mean that you can asses and compare what has been recalled, and what has been observed when you take in their work to look at.





Closely observing a candle as it burns.

Part 3 - Explanation of what happens when a candle burns

In this part of the activity, we want learners to think for themselves. We want to give them a chance to try and explain what they *think* is happening when a candle burns. This means that they will have to answer the following questions in order to work out their explanation.

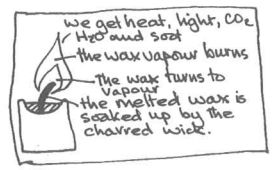
You might need to write the questions on the board. Or you may want to have them written clearly on strips of paper ready to stick up and display.

- What is needed for a candle to burn?
- What is actually burning?
- What is happening when the candle burns?
- What is produced/given off by the burning candle?

Make it clear to your learners that we are not interested in *one* right answer. We are really interested in finding out what *they think* is happening. There is no right or wrong answer at this stage. We want to think of *possible* answers. We want to consider each others' ideas, and we want to compare them. We want to know what our learners think.

Older Learners

If you work with older learners, you can ask them to work in groups. They need to try to answer the questions as a group. And they need to come up with their *own theory* of what is happening when a candle burns.



- Tell them that you will give them about 10 minutes to do this.
- Remind them to make sure that they have a scribe (or secretary) who is writing down notes.
- After 10 minutes, give them some time to prepare for their reports.
- Then reorganise the classroom so that the reporters come to the front, and the rest of the learners form an audience. (This is to prevent the problem of some groups trying to improve their report while someone else is reporting.)
- After each report allow a few minutes for comments and questions from the floor.
- Later the same day, think about what happened when you did this activity with your learners. Take a piece of paper and write down what happened. What surprised you? What did you learn?

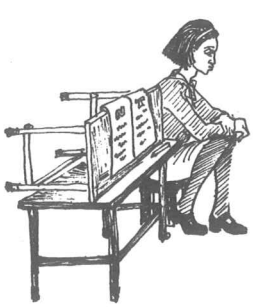
Collect your learners' work. Make sure that the groups have written their names on their work so that you can use this work for continuous assessment. Store this work in your Concertina File, together with your own notes and reflections. You will use this material for the **Key Activity** Report that you hand in for this umthamo. Be prepared to share and talk about your learners' ideas at the next face-to-face session.

Younger Learners

If you are working with younger learners, you will need to lead a general discussion with the large group, or with the whole class. Do it in the same way that Vivian Gussin Paley modelled in the Reading from the first Natural Science umthamo. Remember the Reading entitled '*Pulley*'? You may want to go back and re-read the chapter to refresh your memory.

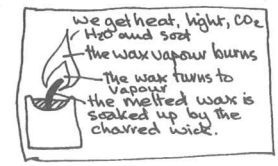
By now you are probably more used to getting your learners to tell you what they think or know. (That is, if you weren't already doing this before you started this Distance Education Project degree course.)

- Get your learners settled around you. When they are ready, remind them about what they have done so far. They have told you what they *remember* about candles and candles burning. Then they looked carefully at candles burning, and told you about the extra things that they had *observed*. They may even have thought about some questions about candles and the burning of candles.



- Now show them the questions that you have written. Read each question out clearly (pointing to the words in phrases, as you read aloud).
- Tell your learners that you will be their scribe or secretary, and that you will write up their ideas about what is happening when a candle burns.
- At first, give them a chance to voice out *anything* that they want to say about candles burning.
- Then try to focus their thinking if you feel you need to. You could do this by going through the questions one by one. Or you could start with something that they have said that is not quite clear.
- You don't need to spend too long on this activity. Use your common sense and professional judgment to help you decide when to stop. You want your learners to give you an explanation of what they think happens when something is burning. As a product of this activity, all you want is a written record or some kind of statement.

We suggest that you have question strips ready to show your learners, one by one.



- Later the same day, think about what happened when you did this activity with your learners. Take a piece of paper and write down what happened. What surprised you? What did you learn?

Keep a copy of this work in your Concertina File. You will use this for the **Key Activity** Report that you hand in for this umthamo. Be prepared to share and talk about your learners' ideas at the next face-to-face session.

Note from the writers

We, the writers, would be very interested to hear what your learners came up with. We would be very glad if you could make a short summary, or a copy, of what you have done. Then give it to your umkhwezeli in an envelope addressed to

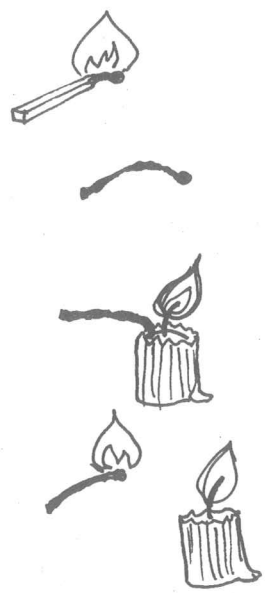
Alan and Winnie
c/o University of Fort Hare
Distance Education Project
All Saints Campus
Bisho

Part 4 - Testing a Theory

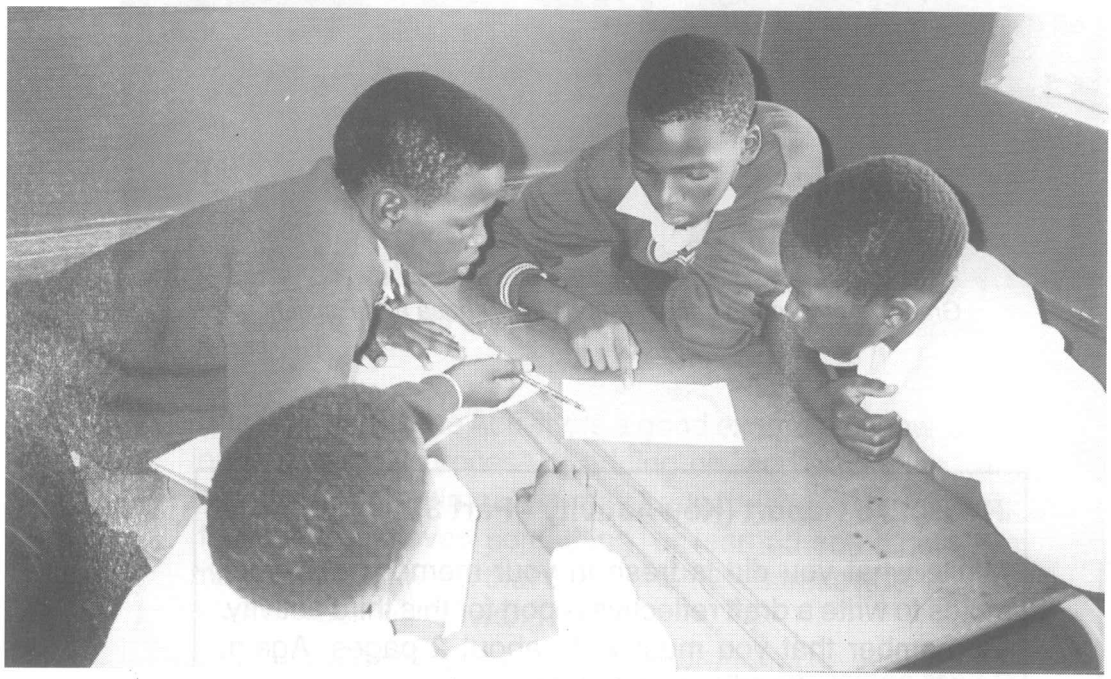
We have found that, in most cases, primary school learners (and most adults as well) are quite convinced that it is *the wick* of the candle that is burning. Is this theory or idea in fact true? What do you believe? When your children explained what was happening in a burning candle, did *they* think it was the wick that was burning?

Here is something straightforward that you can do that will challenge, or test, the view that it is *the wick* which is burning.

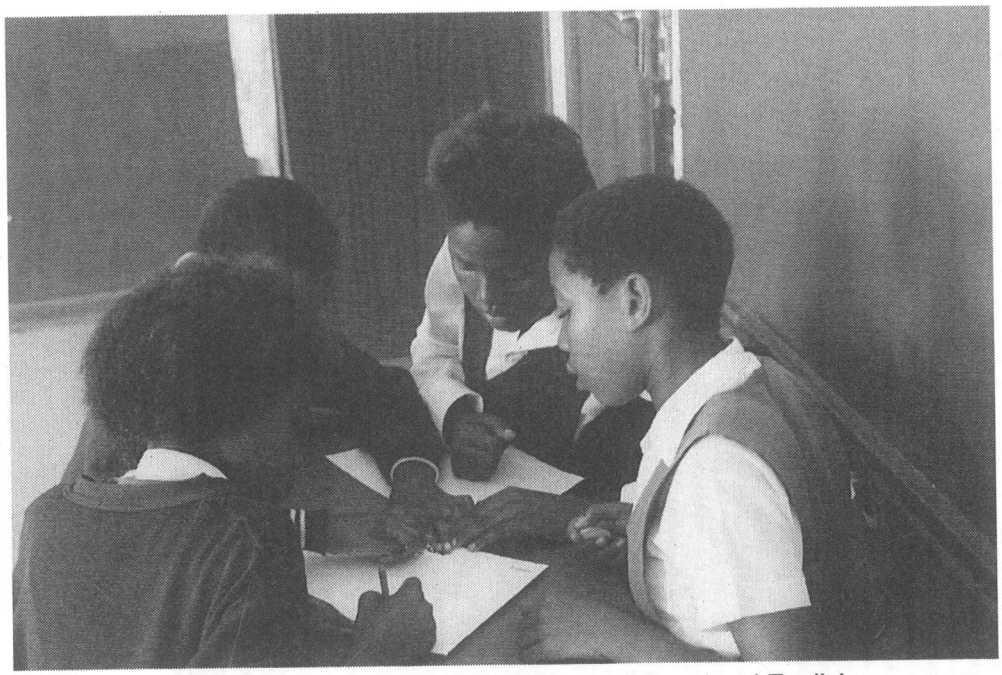
- Make sure that you have a candle, burning, in front of the class.
- First survey the class to check who believes that it is the wick that is burning. From our experience, most of the children will support the theory that it is the wick which burns, to produce the heat, light and smoke etc. One or two may think it might be the wax.
- Tell them that we need to **test** the **theory.** We need to think of a way to **investigate** burning, to see whether the theory of the majority is a good one. Is it the *wick* that is burning?
- Remind them that they have told you that the candle is made of wax, and that it has cotton string for a wick.
- Remind them that the string is white, but that when it burns it turns black.
- Take a match and light it. Tell the class that you are going to let the match burn completely until it is all black just like the wick.
- Let the match burn to near the end, and blow out the flame. Now hold the match at the burnt end, when it is cool. Re-light the other end and let it burn till the whole match is a skeleton of black carbon.
- Explain to your learners that the burnt match is now a just a skeleton of ash or soot.
- Ask them if it will burn if we put it back into the flame? Some will say "yes" and some will say "no". Let a learner try this to see what happens.
- Now ask if anyone knows of a way to get the match to burn. Usually there is a child who knows what to do.
- Get that learner to demonstrate. The learner will probably dip the tip of the burnt match into the melted wax at the top of the candle. The dry burnt match will suck up (absorb) the melted wax in the same way that a dry cloth or tissue paper will suck up (absorb) a spilt liquid.



- Now if the burnt match is put into the flame, it catches light and burns easily.
- Next, you can ask the children, 'Is it the *wick* that is burning, or is it the *wax*?'
- You can finish this off with a short discussion about fuels. Tell your learners that they will find out more and more about burning and energy (light and heating) as they learn more about Science in the years to come.



Grade 7s discuss what they remember about candles burning.



Grade 7s record their observations in isiXhosa and English.

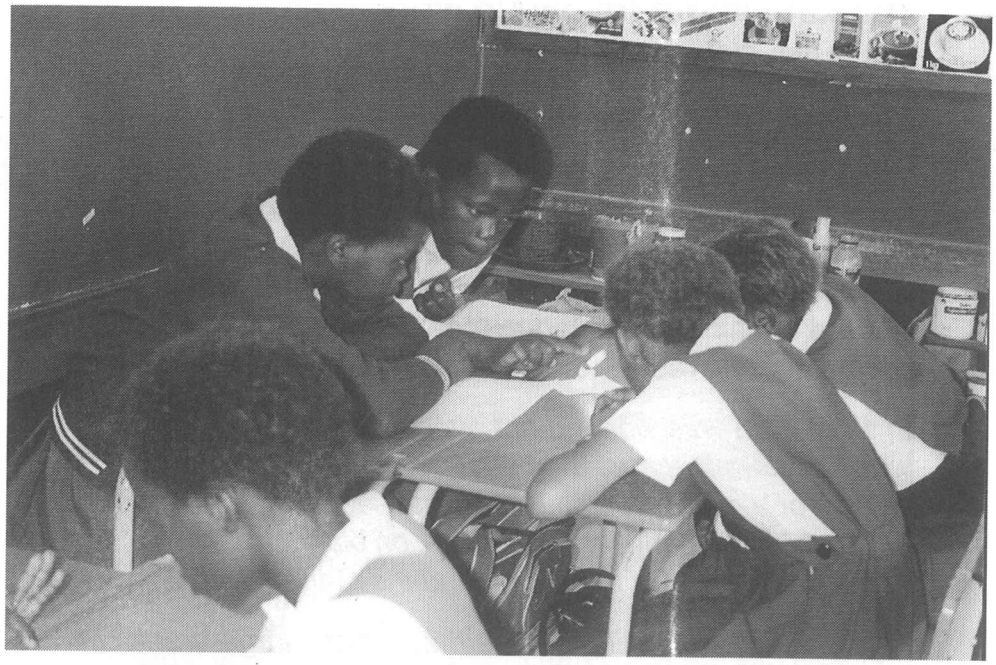
Reflective Report (Key Activity - Part 3)

While what you did is fresh in your memory, use your notes to write a draft reflective report for this third activity. Remember that you must write about 2 pages. Again, use the same headings as before.

- What I did, and how the learners responded.
- Examples of learners' work on candles.
- Discussion of the learners' inferences, observations, and theories.
- What I learned, and what I felt.

You might want to re-read this a day or two later and make changes and improvements. Is what you have written clear? Are you satisfied with the quality? Can you think of any ways to improve the report?

Compare it to the previous two reports. Do they make sense if you read them in order? Do you need to make any changes to them? You might want to ask a friend or colleague to read them for you and comment. Ask the person what they liked and where they think you need to make things clearer, or where you need to make changes.



Grade 7s compare what they remember with what they observe.

This final part of the Activity, is a good example of how learning is not just a process of adding on, and adding on, and adding on. Sometimes, we may have to *unlearn* something. If we have believed something, or learned something, we may have to *unlearn* that thing when we meet evidence that what we believe is wrong.

'Unlearning' is not an easy thing. We human beings tend to resist change. And changing our ideas is not an easy thing to do. Some educational psychologists talk about something called **cognitive conflict.** This is when a new idea has to battle with an old idea in the brain.

Piaget explains that we can do two things when we learn. We **assimilate** new information. That means we take it into our head. But we also have to **accommodate** the new information with the old.

This means that we have to rearrange how we think and reorganise, or even discard, some of our ideas.

Sometimes when we are surprised by something that we did not expect to see, we shake our head in disbelief. It is almost as if our body language is telling us something. Now we have to re-arrange our thinking, shake up our ideas, and even throw some out.

Did any of your learners do this when they realised that it was the wax, and not the wick, that was burning?

UNIT 4

Thinking about follow-up work

In this Unit we will ask you to *start* thinking about the way in which you can take work like this further with your learners.

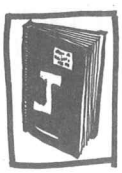
In the past we were asked to follow a prescribed syllabus, like slaves. This often meant that teachers were encouraged to work methodically through the text-book, page by page, with their learners. This led to very dull and boring text-book centred learning. And it led to meaningless rote-memorisation as the one recipe for success.

In 1974 Alan was working at Lovedale College. He and Viv went for a walk across the fields near their home at Domira in front of Victoria Hospital. They passed many college students studying alone, and in groups, on blankets in the fields, at the confluence of the Tyumi and the Gaga rivers.

One student was sitting astride the end of a large branch of an old gum tree that had blown down. He had his text-book open in front of him and was gently bouncing up and down on the branch. As we passed he called out to us, "Rote Memorisation is the route to a PTC!" He knew what the system required.

But did he respect the qualification he was getting? Alan once found some graffiti written on a classroom wall. 'We came to train as TEACHERS, and we have been taught to be CHEATERS'.

In many parts of the world, primary school teachers have some choice regarding the content of the curriculum for their learners. Of course there *are* clear guidelines that the teacher can work with. But the teacher is expected to make professional choices. And the main consideration, when making these choices, must be the **needs** and **interests** of the learners. The teacher must be accountable for the decisions s/he makes, and s/he must be responsible and keep good records.



Activity 4 - Thinking about Follow-up Work

Take out your Journal and spend a few minutes writing a response to what you have just read in this Unit.

Then spend a few more minutes jotting down brief notes of the things that you think your learners might be interested in; things that have something to do with candles and burning. How many points have you written down?

Next spend a few minutes thinking about the things that

you think your learners need to know about burning, candles, light etc. Jot down your points in your Journal.

Finally, think about combustion. (This is the Science term for burning.) Think about what you, yourself learned at school and at college. Think about the sections in the interim core curriculum that deal with combustion. Maybe you could look at a few Science text-books for the Intermediate and Senior phases. Just get a rough idea of what the conventional content is for this topic. Make brief notes. (You can concentrate on this in more detail and spend more time when you do the content audit in the Appendix of this umthamo.)

In your Journal you should now have some notes that remind you of

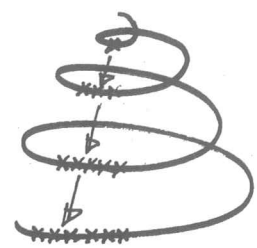
- what you think your learners might be interested in knowing and doing
- what you think your learners need to know and should be able to do
- what Science content knowledge could be covered.

Take this information with you to the face-to-face session where this umthamo is concluded. You will use it when you work with the other teacher-learners in your group.

At the final face-to-face session, we would like you to get into small groups. Try to work with other teachers who teach learners in the same Grade as your self, or a similar Grade. Perhaps some teachers who work with Pre-schoolers will choose to work with other teachers who work with Grade 1 learners. Other teachers who work with learners in Grade 5 may choose to work with teachers who work with learners in Grade 6.

Each group will then spend some time discussing ways to follow up on the work of this umthamo. Then each group will report back to the others, and there will be some general discussion. You will need to be thinking of *what* gets dealt with, *when*, and *in what detail.*

In this way you will be developing ideas of how a topic or theme can work through the whole range of Grades in a primary school. In the education field of **Curriculum Studies,** this is known as thinking about the **Scope and Sequence** of work.



*It also fits in with something that you may have heard of called the **Spiral Curriculum.** When we think of the spiral curriculum, we think of how learners meet an aspect of learning a number of times, as they move through the school system. Each time they cover a bit more of the topic **(widening).** They can also go into more detail **(deepening).** So, if you think of a spiral curling round, you can think of the spirals getting wider and deeper.*

What children already know about candles burning

You will have found out something of what your learners already know from the work you have done in this umthamo. You will also have learned what children are interested in from your discussions with them. You can share what you have found with other teacher-learners, and you can see what is *common*.

What children might need to know

Here you need to think very carefully about issues like health and safety.

What are the dangers of candles?

What sort of safety precautions need to be taken when candles are used in our homes.

How do you prevent fires?

How do you fight fires?

How do you escape fires?

What first aid is best when someone has suffered burns?

If learners have had a chance to carefully discuss what action they would take if something goes seriously wrong, then they are less likely to panic and are more likely to take appropriate action.

You could discuss these things with your learners and they could help you make lists of safety precautions. They could even design and make safety posters of their own.

Newspaper cuttings of reports of shack fires are a very useful, if sad, resource for this aspect of the work. These reports describe a real event. They often explain the cause of the fire, and give evidence of the consequences.

In **Technology Education** your learners could investigate different candle holders people use. They could compare them for safety. Then they could try to design and make safer candle holders. This would be a really interesting Technology Education project.

What Science content is appropriate?

Here we need to think carefully about what needs to be dealt with or covered in Science teaching and learning. You might find the next anecdote from Alan interesting.

An anecdote is a little story from real life that often has a simple message.

After teaching for some years in a primary school here in South Africa, I spent a few years teaching in London. The primary school that I taught at in London, was quite progressive. We had multi-grade teaching (we called it vertical grouping). We had an integrated day (no time-table, no separate subjects, and we were team-teaching). The school was also open-plan, which meant that we worked in open areas and not behind the closed doors of separate classrooms. It was very exciting, challenging and rewarding.

At that school, there was a teacher, Nigel, who worked in a very interesting way with the Grade 1s learners, aged 5 to 6.

He had been reading a story book to his learners about a boy who

lost his shadow. So he did some work with his children about shadows. They made shadow puppets. They held shapes and objects in front of a torch in a darkened room and tried to guess which shadows belonged to which shapes and objects.

They also went outside one day, and traced the shadow of their partner, with chalk, onto large sheets of old newspaper. Then they each cut out their own life-size shadow and painted it bright colours. They very proudly displayed their shadows in their classroom and called the other children in the school to come and see their work.

A few weeks later when they were thinking of something to do, the children asked if they could trace their shadows again. Nigel agreed. But this time he did not take them out into the playground at 09h00, he took them out at about mid-day. *You* know what happened! No shadows! Half the children were in tears. They were so upset! Just like the boy in the story, they had all lost their shadows.

At lunch break the staff chatted about what had happened. We talked about all the different things that Nigel could do with his class now. They could talk about the sun, and the length of shadows. They could put out shadow sticks. They could do Maths and measure shadows at different times. They could make a sundial to tell the time.

But Nigel just said, "No!"

He told us that he didn't want to overburden his children with things to think about. He didn't believe in giving them quick and easy answers. He believed that in time, some of them would work things out for themselves, when they were ready to. For others, he believed that this experience would be very important when they were doing Geography, in high school. When they learned more about these things at that stage, they would have a real experience to relate to. This would help them make sense of what the teacher was dealing with.

So you see, one of the most important things that we can do, as primary school teachers, is to see that our learners' attitude of mind makes a fertile ground, open to new ideas. Then we can sow seeds that can lie dormant, ready to germinate and sprout when the conditions are right.

Some say that *discovery favours the prepared mind.* Gary Knamiller, of Leeds University, speaks of Jerome Bruner talking about the importance of having a *category of possibility* in one's mind. This *category of possibility* makes a person more receptive to learning something. That means that you learn something more readily when you know that there is something that you don't know.

In Unit 3, on page 27, we mentioned Piaget. You will remember that we said that he used the terms, *assimilate* and *accommodate*. High school Geography will be easier to assimilate and accommodate, if a learner can relate the information to an important earlier experience.

An important part of our work as primary school teachers, is to provide our learners with *rich* experiences, and challenges to their thinking. These experiences and challenges can make them receptive to further learning at a later stage.

Some Practical Suggestions for Follow-up Work

A teacher has to think very carefully about the plans that s/he makes to take work forward. There are a number of things that s/he needs to bear in mind.

- What are the learners ready for?
- What do the learners need to know?
- What will interest the learners and catch their attention?
- What will the learners be able to make sense of?
- What do I, as the teacher, feel confident to help them with?
- Is what I hope to do practical? Can I manage what I plan?
- Do I have the resources? Or can I get hold of things, or even improvise?

You have just tried some Science work on the topic *Candles Burning*. Here are some ideas for follow-up work for you to think about or even try. Remember that these ideas are completely optional. You don't have to try them.

But if you do try them with your learners, you are free to include samples of your learners' work, reflective comments of your own, and personal reports in your Portfolio at the end of the year. These materials will be evidence of work that you have done, which relates to the work of the course.

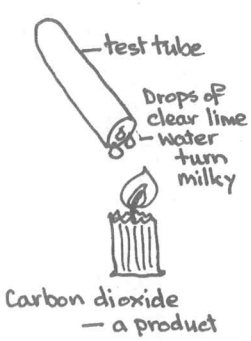
Idea 1 - Using a story

Winnie suggests that you can use a simple story. This would work well if you have younger learners and find that they don't seem to know that a candle needs air to burn.

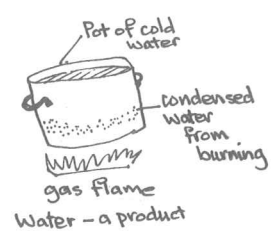
There is a good example in the book '*Teaching Primary Science*' by BL Young on page 116. He includes a story called, *Hamad's Candle.* He has written a good description of how you can use this story to get learners thinking about the idea that a candle needs air to burn. There is a copy of this book at each Centre.

Idea 2 - Some Experiments

Older learners know that a candle needs air (oxygen) to burn. But they only name **Heat, Light** and **Smoke** as the products of the burning candle. They don't mention carbon dioxide or water as products of burning (combustion).



There are some practical ideas on page 10 of the yellow booklet called *Products of Combustion*. These simple activities are ways to prove that carbon dioxide and water are in fact products of combustion. This means that when a candle burns, it also produces Light, Heat, Soot, *and* Carbon dioxide and Water. There are a number of copies of this booklet at each Distance Education Project Centre.



Idea 3 - Language work

You might want to try this idea as an English language activity for your learners. The idea is to see how much you can find out about candles from the packet that you buy them in. This is a reading activity, but it includes a lot of other language work as well. There is also a lot of Science, Maths, and even some Technology.

The idea is to give groups of learners a candle packet (or a good photocopy of a candle packet). The challenge is for the groups to find out as much information as they can by 'reading' all aspects of the packet.

- Who makes the candles and where are they made?
- What is the mass of 6 candles? What is the mass of one candle?
- Who can find out what the word 'fluted' means?
- Draft, and write a letter to the factory to find out where the wax comes from and how they make candles. If the address isn't on the packet, then looking it up in a phone book is a useful exercise

Idea 4 - The History of Candles

It might be interesting for learners to think about, and then try to find out about, what people used for light in earlier times. They could plan questions and then do some research amongst the older persons in their families and communities. Where did people find wax? Could bees' wax be used? What about fat or grease? They could also try to use reference books to research this, if any are available.

Idea 5 - Candle Art

Wax as a material has very special properties. One of them is that it *repels* water. Many insects have a thin, waxy outer covering to make them waterproof. So do certain plants such as Aloes.

Let learners use a piece of candle to draw or make patterns on old newspaper. You can't really see what has been drawn. Then let your learners paint over the paper with a dark, watery paint or ink. If you have no paint, improvise with Rickett's Blue, Potassium permanganate, or even very strong stale tea. Now the pattern or drawing is clearly revealed. Why?

Your learners might like to find out about Batik. In the art of Batik, melted wax is used on cloth before it is dyed (a traditional craft in Africa and Asia).

Conclusion

Have you enjoyed working through this umthamo? Do you feel you have gained? Do you feel that you have any advice for the writers about how to improve or change the umthamo? If you do, make a note and pass it on to us through your umkhwezeli. We would be really interested to hear from you.

We hope that this umthamo has encouraged you to continue working in a practical way with your learners as you have been encouraging them to use **Science Process Skills** in a learner-centred way. What do you feel about a process skills approach? How have your learners responded to the activities?

We hope that you feel that your own Science Literacy is developing informally as you read and think about the activities we have in this umthamo. Are you more comfortable with terms like **infer** and **hypothesis**?

What you can look forward to in the next umthamo for Science is a focus on **Investigation.** This will correlate with the coming Maths umthamo next term, which will deal with Investigative Mathematics.

Key Activity

To complete your work on this umthamo you need to write the last page of your report. We have asked you to write a brief one page summary to explain what you feel you have gained or learned from working through this umthamo.

One page gives you space for three or four paragraphs. You need to think what those paragraphs could be about. You could plan this page with a mind-map. Put the question, 'What do I want to say?' in the middle. Then think about *topic sentences* for paragraphs.

- Do you want to tell us about your relationship with your learners?
- What are your feelings about a process skills approach?
- Do you want to write about your own attitude to Science?
- Did this umthamo give you any special problems that you would like to share?

Add any other questions that you can think of. The answer to any of these questions can then be the *topic sentence* for a paragraph that you write in the final page of your report. Once you have a topic sentence, it is easy to add other sentences to support the main idea in the topic sentence.

Finally, you need to group your paragraphs in a way that makes logical sense. Then you might need to think of linking sentences. An example of a linking sentence might be ... *Although my learners seem to have gained confidence, I still don't feel very sure of myself when it comes to Science.*

Appendix

Content Audit

Remember that you need to take responsibility for checking that you are confident and sure about the relevant Science content knowledge.

The work of this umthamo touches on two important aspects of Science: **Matter and Materials,** and **Energy and Change.**

Matter and Materials

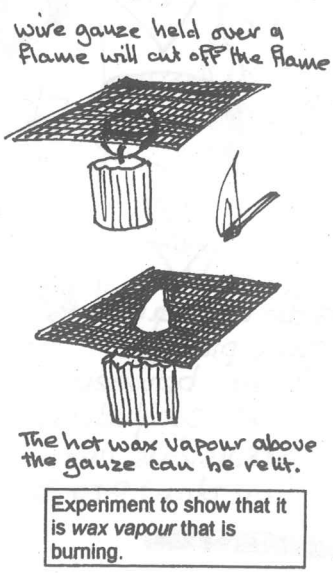
What kind of matter is wax? What are its properties? Where does it come from? Is it natural? Can it be manufactured? What uses do we have for wax? Can wax be dissolved? And so on.

Can you answer these questions? Can you think of other questions of your own?

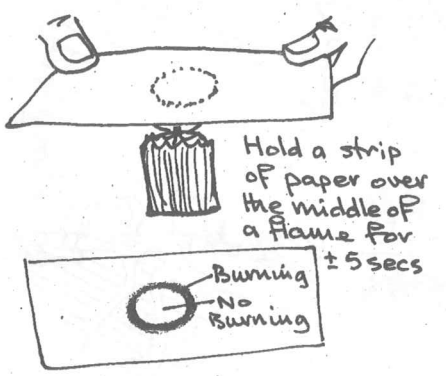
> There is a box file for each umthamo at your Distance Education Project Resource Centre. In the box file, there are photocopies, booklets, articles and other interesting resource materials that you can refer to, and gain confidence about the content aspects of Science.

Energy and Change

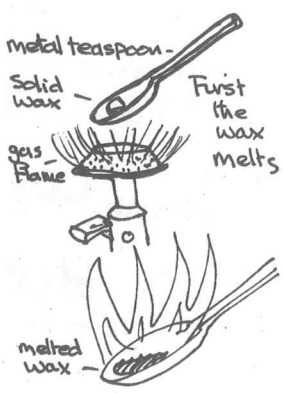
Burning and combustion are very much part of *Energy and Change*. We have included a selection of diagrams and mind-maps that deal with combustion and burning. Go through them carefully. Do they make sense to you? If not, then you need to do some further reading and more finding out. Remember, you can always ask your umKhwezelli or Centre Co-ordinator for help, if you are stuck.



Experiment to show that it is *wax vapour* that is burning.



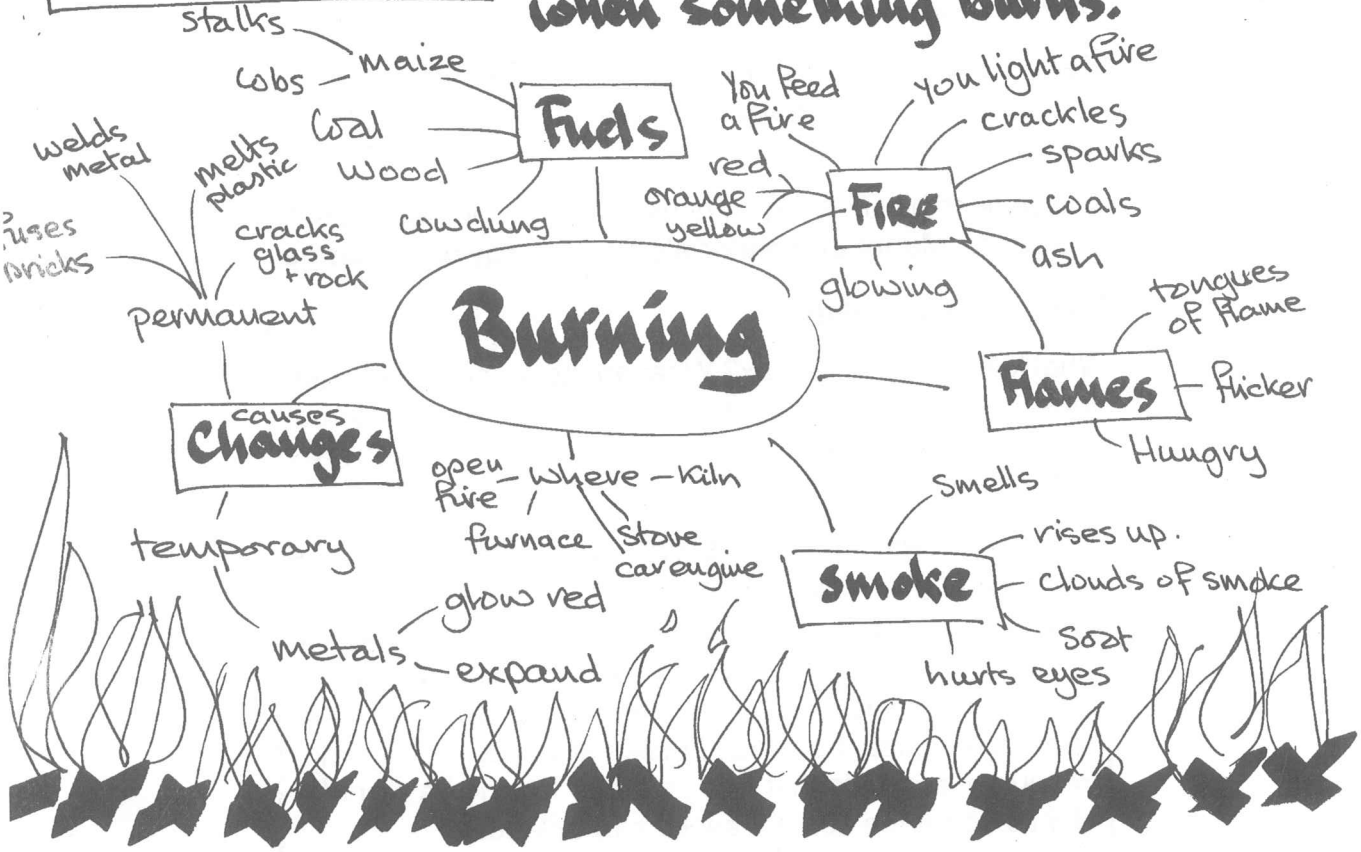
Experiment with piece of paper (Where is the flame actually burning?)



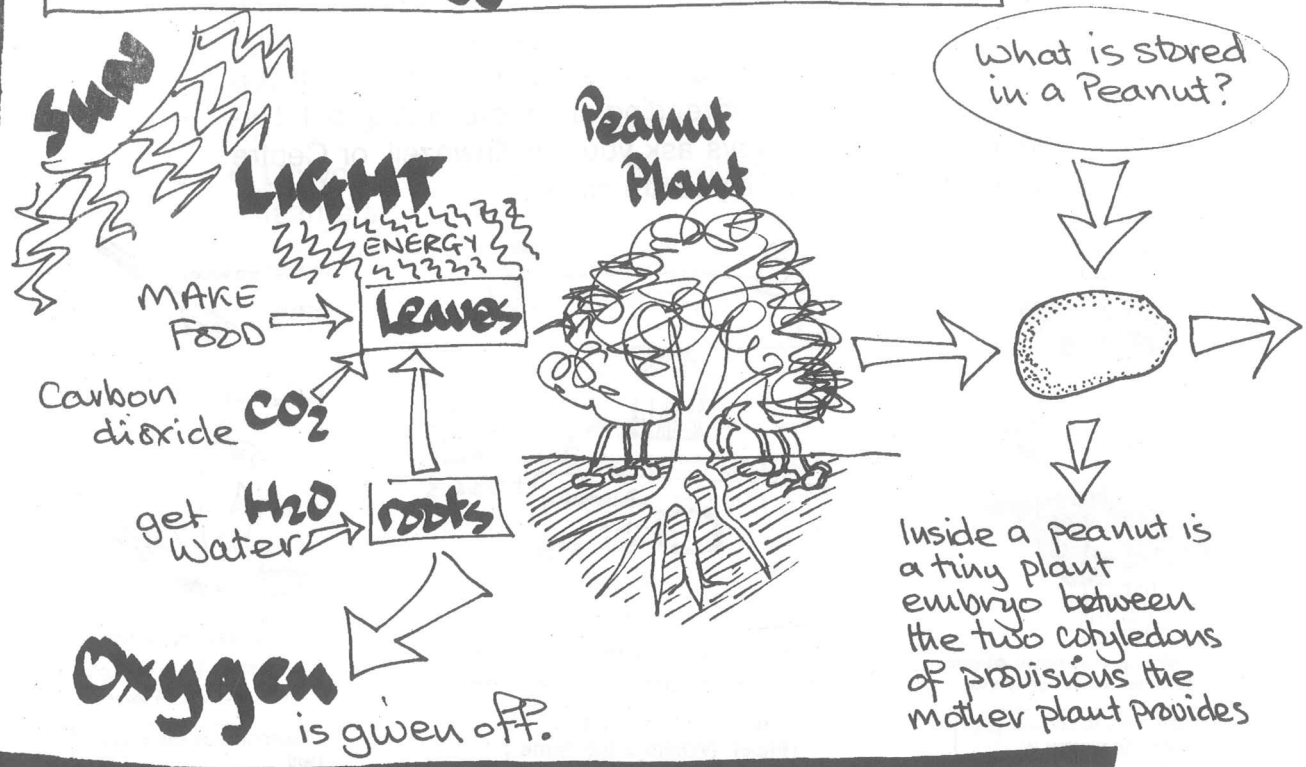
Experiment to see if wax will burn on its own

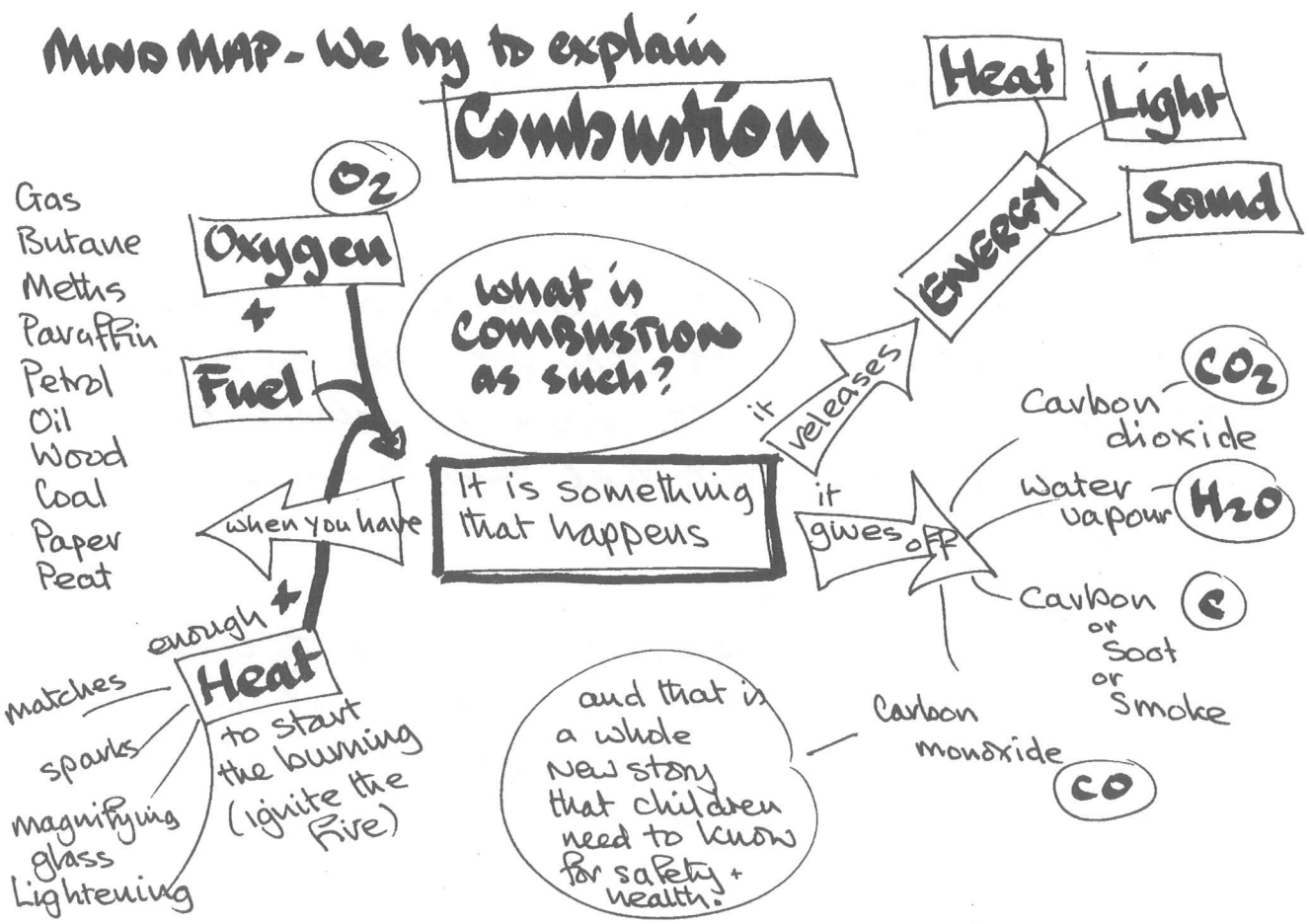
Combustion

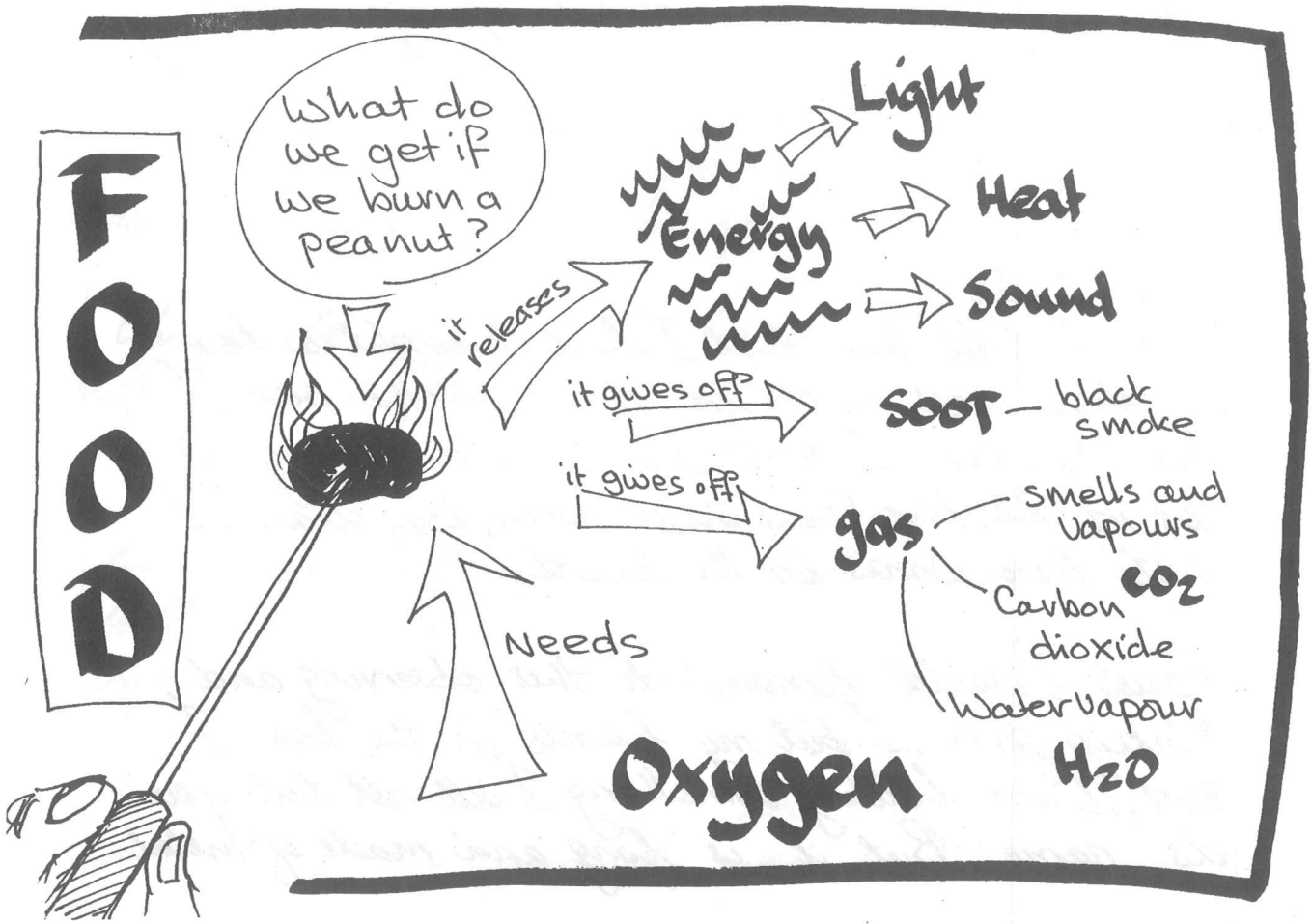
Thinking about what happens when something burns.



The Peanut - energy - food - burning story.




MIND MAP - We try to explain
Combustion
Heat
Light
Sound
ENERGY
it releases
What is combustion as such?
It is something that happens
it gives off
Carbon dioxide
CO2
Water vapour
H2O
Carbon or Soot or Smoke
C
Carbon monoxide
CO
and that is a whole new story that children need to know for safety + health.
O2
Oxygen
+
Fuel
Gas
Butane
Meths
Paraffin
Petrol
Oil
Wood
Coal
Paper
Peat
when you have
enough +
Heat
to start the burning (ignite the fire)
matches
sparks
magnifying glass
Lightening


FOOD
What do we get if we burn a peanut?
it releases
Energy
Light
Heat
Sound
it gives off
SOOT — black smoke
it gives off
gas
smells and vapours
Carbon dioxide
CO2
Water vapour
H2O
Needs
Oxygen

Report of Phatha-Phatha-Bokisi Activity
Sindiswa Peter

How I planned
I planned to try the Phatha-Phatha-Bokisi with my Grade 1 learners. They are new to school. [redacted] has only been three weeks in school for them. I was not sure that they could do this activity

I found a cardboard box and cut two holes on each side. The holes were somewhat big so I stuck some flaps of scrap cloth like a curtain over each hole

Inside the box, I put a comb, a tennis ball, a spoon, a fork, a large feather a sponge, a soap, apple, carrot, hard cooked egg, matchbox, and a bottle-top. I will do the lesson early while they are still fresh.

What I did
First I told them that I had brought a box to school and there were things in the box. I shook the box. I said what could they guess was in the box. They said spoon, key, chalk. I wrote these words on the board.

I said I would demonstrate this observing and thinking game. I put my hands in the box. I said, "I am holding something. I will not tell you its name. But it is long and made of metal

I asked can they think what it is. One said Nail, another Knife. Then I said, "The one end is flat, the other end is round. One said, "Is it a screw-driver? X said, "Icephe!" I showed them the spoon.
nandipha

Then Nandipha came. She took feather. I was very surprised at her observation. "This thing is long and flat. It has hard part and a soft part." She could not think of more observations. So I asked, Where is this found? She did not answer, I said "Where does it comes from? She said, "A bird" The other children thought a wing. She said, "Part of wing a wing." They said, "Feather." I told her to show the feather. I tried to record the observations and the inferences.

My observations
They really suprised me in this activity. They came with good words, mgutuwa, uthabilayo. They knew names like spanner, and tin-opener, even in English.

You could see from the body language that the learners at the box was really thinking hard. I remembered the last learning about learning umthamo and I praised them for thinking so hard and carfully. You could see that they feell felt proud and clever. I too was truly impressed.

The ones who were listening, too, they never got bored, They sat forward, even kneeling Some,

always, paying careful attention. Another thing I noticed was that some watched me very carefully when I wrote what they had said. I could see them thinking, "One day I will also write like that." Some children are hungry to learn.

I also realise that I underestimate the Grade 1s. They can easily surprise me and think of a few good observations of their own. But I also see that it needs a teacher to ask some careful questions to help them think of more things to say.

Eg Sipho - tennis ball
He was happy to always repeat just his first observation, "It is round". I asked how big it was. He said, "Like a apple" I asked how the outside felt like. He said, "Hairy". I asked what you can do with it. He said, "Bounce it". The children said, "Tennis ball!"

In conclusion I can truly say that these children can surprise us. As teachers we must first give them a chance to show what they can do and then help them to do more. I can also see ~~that~~ games can be serious for learning.

12 February 1999

UNIVERSITY OF FORT HARE
DISTANCE EDUCATION PROJECT

CORE LEARNING AREAS CORE COURSE
Natural Science

Umthamo 2 - What's happening here?
First Pilot Edition - 1999

Alan Kenyon
ME Winnie Vena

Co-ordinated, illustrated and edited by
Alan & Viv Kenyon

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