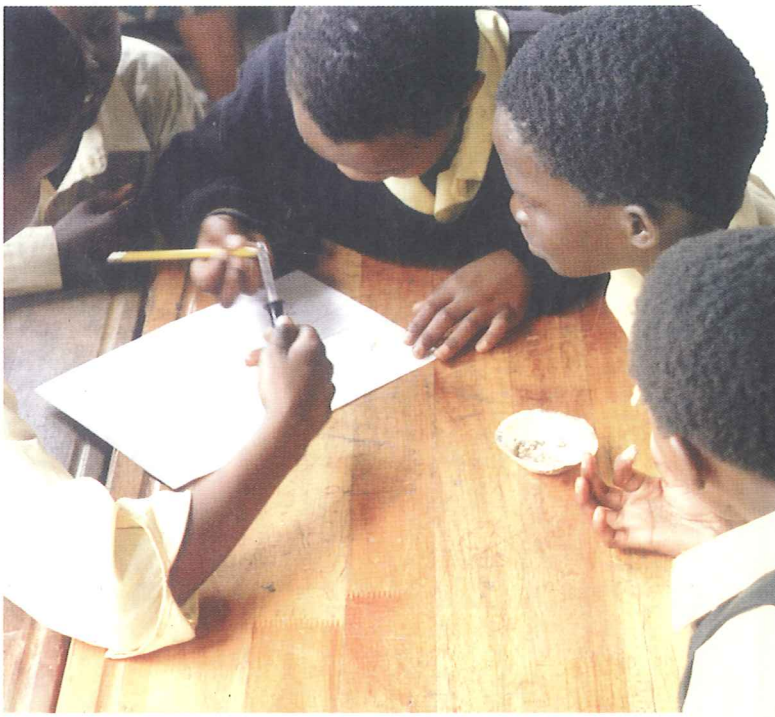
UNIVERSITY OF FORT HARE

Eastern Cape Education Department

Distance Education Project



Core Learning Areas Course

Natural Science

Umthamo 1

Process Skills

(Pilot Edition)

August 1998

Journal

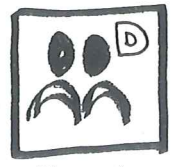
Thinking and Reflecting

Written Report

Classroom or School

Key Activity

Reading and Thinking

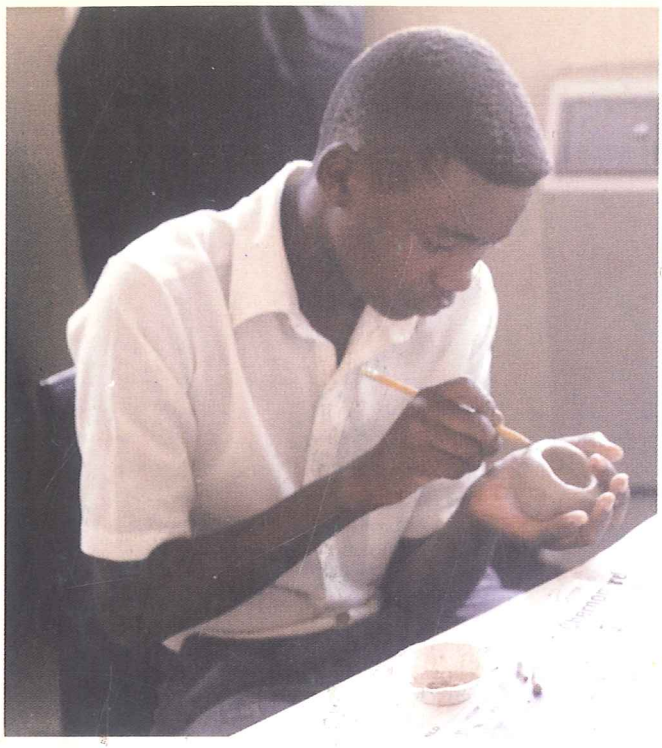


Discussion

Face-to-face umkhwezeli

Concertina File for Portfolio

Time



In many parts of Africa marriage involves the making of new pots and funerals the smashing of old. ***Smashing Pots*** *surveys the role of pottery in traditional and modern Africa, the technologies it calls into play and the extraordinary aesthetic effects it achieves. Nigel Barley shows how pottery is used in cultural thought and how it reflects, in Africa, important ways of thinking about human bodies and powers, time and change. Pottery enters into religion and medicine, the structuring of sexuality and the control of fertility and through it important differences emerge between European and African notions of gender.*

(Taken from the back cover of ***Smashing Pots*** *by Nigel Barley, 1994)*

Such technology has often been characterised as 'primitive'. It is striking, however, that it suffices to produce pots of more uniform thickness and with greater rapidity than could be made using a wheel. The compressed walls combine maximum strength with minimum weight. Like much else in Africa, it is just complicated enough.

*(****Smashing Pots****, p 32)*

CONTENTS

CORE LEARNING AREAS COURSE
Natural Science

Umthamo 1 - Process Skills

Introduction

Welcome to the first umthamo for the Learning Area Natural Science. In this umthamo you will be asked to think carefully about Science and Scientists.

You will have two readings to work with. The first reading is a chapter from a book written for Nigerian student teachers called **Teaching Primary Science** by B L Young. The second is a chapter from a book called **Wally's Stories** written by Vivian Gussin Paley, a very special pre-school teacher from America.

Thes two readings, and a small pink booklet, form part of the materials for this umthamo.

In this umthamo there are six activities for you to do. The thinking and reading that you do in the first five activities is preparation for Activity 6, which is the **key activity**. We want you to try a somewhat unusual lesson with your class for this Activity. This lesson is planned so that your children will have a chance to act like scientists. To do the tasks in this lesson they will need to use some of the very same skills that scientists use.

Outcomes

When you have worked through this umthamo you will have had the opportunity to…

- **develop your own *Science Literacy***
- **reconsider some ideas about the abilities of young children**
- **identify and describe *science process skills***
- **present a lesson that develops science process skills**

Assessment

When you have finished this umthamo

- You will have worked in your journal, and YOU will have referred back to that work.
- You will have made a list of Science Process Skills, and you will have found evidence of children using the process skills.
- You will also have written a brief, but careful report of a very *learner-centered* science lesson.
- Finally, you will have collected some evidence of the work of pupils when they use science process skills.

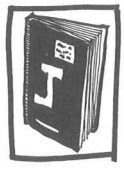
3:00

Unit 1

Thinking about Science and Scientists

In this first activity we will ask you to think a little about science and scientists.

Activity 1 - What does science mean to you?



0:15

The **modern** age we live in is sometimes called the **scientific** age or the **technological** age. What do the words mean? Modern. Scientific. Technological. Think about it a bit and then open your **journal** and write the date and the time. Then write down what **you** understand by each of those terms. What do these words mean to you? What does it mean to be **modern**? What makes something **modern**? You might want to make a little mini-mind map for each word in your **journal**, or you could write a short paragraph for each word.

The purpose of this little bit of thinking is to give you some practice at bringing your own understanding to the task of making sense of the things that you read. We are sure that you will meet these terms in other imithamo in the future. Then you may want to come back and change or add to what you have written in your journal.

From now on, in this activity, we are going to concentrate on the term, '**scientific**'. What **is** it to be **scientific**? What **does** a **scientist** do? What are the products of work in **science**?

*While you are working on this activity, you may want to be thinking about the way a **scientific** view compares with your own cultural, traditional and religious beliefs. This will be useful because we will be dealing with this quite carefully in Year 4 of this course.*

0:30

A picture

Now we want you to close your eyes for a few minutes. In your mind's eye, try to picture a scientist working. Ask yourself the following questions as you do this.

- What does this scientist look like?
- What clothes is this person wearing?
- What tools and equipment does the scientist use?
- Where is this person?
- What is available in the workplace of the person you see in your mind's eye?

When, and *only* when you have a **clear** picture in your mind's eye, draw the picture you have imagined. Don't worry about the quality of your drawing, but **do** try to include as much detail as you can. Label these details in your own language, and/or in English (whichever is quick and comfortable). You now have an image of your idea of a scientist to store in your concertina file. Write the date and your name on the back of your drawing.

You may want to do this same activity with your pupils. It would be interesting to see what they draw and what they label when they think of a scientist.

0:30

A list

Finally, after some careful thought or discussion with a fellow-student, colleague or friend, take a piece of paper and make a list of the things **you** think a scientist does. Again, write the date and your name on the back of this piece of work. Then put this list safely in your **concertina file**. You will need to refer to it in Activity 3.

The next activity is a matching activity. We have some pictures of people who may, or may not, be scientists. There are also brief descriptions of their life stories and the work that they do. You will be matching the pictures with the descriptions.

0:30

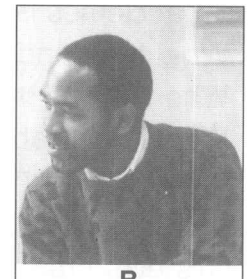
Activity 2 - Meeting some scientists

First of all, pick out and note down the numbers of the pictures of the people who work in science. Then, match the letter for the description of the life and work of the person to the picture that you think fits. Then see if you can match this to the name from the list.

Prince Nevhutalu, a biologist, now with the Foundation for Research and Development; Yaliwe Jiya, Prof of Maths and Science Education; George Washington Carver, inventor of peanut butter; Lindy Cele, a process engineer with Sasol; Marie Curie, a chemist; Hubert Dyasi, a scientist and science educator; Shadrack Mncedisi Ningiza, forestry scientist; Dr Zin Jiya, solid state physicist.

(Please note that we weren't able to get the life stories and pictures of all of the above in time for the pilot edition of this umthamo. We hope to have them for the next edition. But see if you can match up the ones that we have for you so far.)

A



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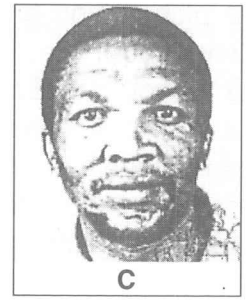

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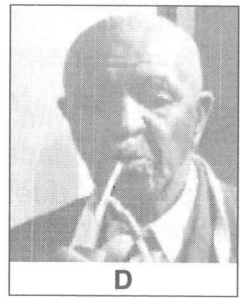

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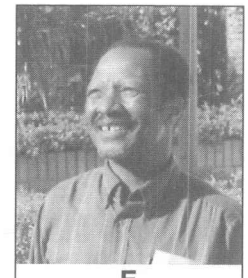


E

1. *I was born in a rural part of the Eastern Cape, near Tsolo, in fact. I completed my schooling in a township on the outskirts of Cape Town. I qualified in Science at two South African Universities: Fort Hare and Rhodes.*

I had to leave the country on an exit permit to further my studies in the USA, and was not allowed to return to my motherland for more than 30 years.

I have worked as a Scientist in other parts of Africa and in the USA. I was once executive director of the Science Education Programme for Africa. Now I am Professor of Science Education at the City University of New York, where I direct the Teacher Development Programme at local and State level. I have written many scientific and educational articles, and contributed chapters to books.

2. *I was born in Diamond Missouri, a child of American slaves. I lived on a farm until I was ten years old. I was fascinated by small creatures and plants as a boy.*

I worked my way through High School and College by taking in other people's laundry. I graduated in 1894. I went on to study bacteriology and botany.

But one of my greatest concerns was the daily diet of my fellow Americans who were poor. I spent a lot of time experimenting with peanuts, sweet potatoes and soybeans. People credit me with inventing Peanut Butter!

I eventually became the Director of Agricultural Research at what is known today as Tuskegee University, where I investigated ways to improve the quality of soil and farming methods.

3. *I was born in the rural village of Lower Didimana near Whittlesea. I did my primary education there. In 1969 I passed Standard Six with a first class. I completed my junior secondary school in 1973. In 1974 my mother sent me to Fort Cox College of Agriculture and Forestry to study agriculture, but I studied forestry. I completed my Forestry Diploma in 1976.*

After working for ten years with the Department of Agriculture and Forestry, with the support of my wife, I went to Mgcawezulu High School in Zwelitsha to study for the Senior Certificate. (I was thirty-two years of age!) In 1988 I went to the University of Stellenbosch to study for a B Sc in Forestry, which I completed in 1992.

In 1993 I took up a position as Forestry Scientist at the Bisho Forestry Head Office. When the new Department of Water Affairs and Forestry was created, I was appointed Deputy Director of Forestry Management. In 1997 I was awarded a full-time bursary to study a B Sc Honours degree in Forestry at Stellenbosch University.

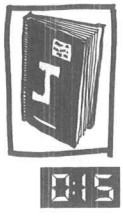
4. *My father was a scientist before me. My husband was a Physics lecturer at a well-known university, and I was a chemist. We worked together with a waste substance called pitchblende and discovered two new substances. The second substance was Radium, which is used today to successfully treat cancer. We won the Nobel prize for Physics one year.*

Then my husband was tragically killed in a road accident three years later and I had to continue alone with my scientific research. The thing I was most proud of was to be the very first woman ever to become a lecturer at a university in my country.

5. *I was born in Sibasa, a small town in the Northern Province, the second born in a family of seven children. My father died when I was about 10 years old. So my mother had to care for us on her own.*

I did well at school and wanted to study medicine. However, owing to a lack of funds, I studied for a BSc at the University of the North. After completing a Masters degree in immunology, I went to America where I completed a Ph D at the University of Northern Illinois.

On my return, I worked at the University of the North until I was recruited by the FRD. My charge is to ensure that Black people and women become researchers.



In your **journal**, write a note that compares your first drawing of a scientist with the people that you have met on these pages so far.

Well, you have thought a little about scientists, and you have met some real-life scientists. In the next unit we want you to read a chapter from **Teaching Primary Science** that looks at a different way to teach science. In this chapter the writer, Bev Young, outlines a way of teaching science that doesn't focus only on the **facts** of science (**facts** that are usually only found in text books). That is not to say that the **facts** of science are not important. But what this chapter does say is that memorizing the facts alone is not enough, if you want children to get the **big picture** of what science is about.

Unit 2

A 'New' Approach to Teaching Natural Science

In Activity 3, we are going to guide your reading of a chapter from a book about the teaching of primary science. This chapter is an introduction to an approach to teaching science that has 'been in fashion' (become popular) during the last twenty years.

Activity 3 - Reading about approaches to science teaching

Pre-Reading Task 1 - Scanning the Text

Before you read something, it is a good idea to first of all glance through the whole passage to get an idea of what it is all about. It's a bit like being a detective. You survey a scene quickly to get a rough idea of what has happened. Then you start to look more carefully. This is what we're going to do with this text. You will also need your journal to write down (record) what you think and what you find out. Open your journal and write the date and the title, "*Approaches to Primary Science*".

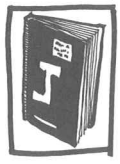
Turn to the *first page* of Bev Young's chapter, "Approaches to Primary Science".

- What is the first thing you notice? What does it make you think of? Write in your journal what you notice, and what it makes you think of.
- What does this tell you about the reading? Make a note of this in your **journal**.

What is the next thing that you see on the first page?

What does this tell you about the passage? Make a note of this as well.

Now look through *the whole reading*, and just look at the pictures. What do you notice about the pictures? Write down any clues they give that tell you what this chapter is about.



Next look for the **headings** and just read the headings. In the first umthamo of the Core Education Studies Course, *Learning about Learning,* the writers talked about headings. They said that headings are rather like 'signposts'. Look at the headings carefully so that you get an idea of the path BL Young is about to take you down. When you have gone right through the chapter, write in your **journal** anything else you have learned from the headings.

Now we have built-up some idea of the text we are going to read. Why do we want to read it? What do we want to draw or gain from the text?

1. We want to compare our own picture of a science person with that of Bev Young (a science educator who has worked as a teacher and a college lecturer in West Africa, and who was a university lecturer in Papua New Guinea).
2. We want to see how our list of the things scientists do (the skills), compares with the generally accepted set of science skills.

Pre-Reading Task 2 - Skimming for Information

We don't want to read the whole chapter in complete detail, word for word. We're just going to skim through quickly to find the things that we're looking for. We want to

- **make a list of science process skills**
- **understand what these science process skills are**.

So we don't need to read every word.

If we know about the science process skills then, when we teach science, we can make sure that our pupils do not simply memorise the **facts** of science. Instead, we can make sure that they get many chances to ***work*** like a science person (a scientist), to ***behave*** like a scientist, to ***practise*** science skills. This means that they will have the chance to meet and use the **facts** of science in a **meaningful** and **practical** situation or context.

0:30

Now turn to the text, **Teaching Primary Science** by BL Young *(Chapter Two - Approaches to Primary Science pp 7-34).* Go through the text in the way that we have suggested to find the **science process skills**.

8:00

When you have finished, copy the list of the science process skills that you have found into your **journal**. Then spend some time describing each **skill** briefly in your own words. You might want to start thinking about the signs or evidence which shows that a person is using a certain skill.

The next question is whether or not you can recognize a science process skill when you meet one. In the next unit, we will be looking for *evidence* of children using these science process skills.

5:00

Unit 3

Young Children and Science

Now we want you to draw on your *own* experience. We want you to use what you have observed, what you have discovered, and what you know. Forget about scientists. Forget about adults. Think of very young children. Think of Pre-schoolers. They don't do science, do they? Or, *do* they?

0:15

Activity 4 - Observing young children

Think of your own children when they were three, four, or five years of age. (If you don't have children of your own, think of your younger brothers or sisters, or the young children you know in your family.) Try to remember the things that interested them. Try to remember the things that they did. Were they curious? What evidence do you have of their curiosity? What questions did they ask? What sort of things caught their attention?

0:15

In your **journal**, write half a page or so about what young children do. Put down the evidence you can remember of the interests and activities (skills and abilities) of Pre-schoolers.

2:00

You could spend an hour or two at a local crèche or a Pre-school, or even at home, just watching youngsters at play. Make notes. Do some research to ensure that your memory of the abilities, skills and interests of young children is accurate. In other words, find out for yourself what young children do when they play. What do they do when they have a problem? How do you know when something really interests them?

- Make sure that you put a date at the top of your notes.
- Write down the name of the crèche or Pre-school.
- Include the first names and ages of the children you observe.
- Describe what you see the children actually doing.
- Write down what they say.
- Comment on what you have seen and heard.

This is what researchers do. Keep your research notes in your concertina file.

In the first umthamo of the Learning About Learning strand, the writers included some examples of conversations between young children and adults. Margaret Donaldson had collected the conversations as part of some research that she was doing. She noted the children's first names, and age.

In case you are not sure what it is that we expect of you for this activity, we are including some actual examples from some educational research. This research was done with young children more than sixty years ago in England by Susan Isaacs.

Susan Isaacs ran a small school called The Malting House School for young children at Cambridge. The school was run on progressive lines and children between 3 and 7 years and of age were together in the same class. She deliberately chose to group the children in this way so that they could learn from each other. (In South Africa these days we would call this way of grouping learners, 'multi-grade' grouping.)

Susan Isaacs watched and listened carefully as the young children played and investigated in a natural setting, which was child-centred. She recorded what she saw and heard. Then she used her findings as the basis of her research and went on to become one of the leading educational psychologists of her time. Here are some examples from her book, **Intellectual Growth in Young Children**.

19.7.26 When Mrs I lifted up the smouldering rubbish in the bonfire to put more paper under it and make it flame, Dan said, 'Oh, you *are* brave!' Later on, Jessica used the word 'brave' without appearing to understand it, and Dan (5:2) corrected her, telling her, '"Brave" is when you stand close to something you don't like, and don't go away.' (1930:112)

18.3.27 Phineas (4:0) was blowing through a rubber tube in water, and watching the bubbles rise and break. Miss C asked, 'What's making the bubbles?' He said, 'The wind in here' (pointing to the tube). 'Where does the wind come from?' 'From my mouth, because I'm blowing.' (1930:113)

19.10.25 The children were in the garden watching an aeroplane. They shouted up to it, as they often do, 'Come down, come down'; but Dan (4:5) said, 'The man can't hear us when we shout, because of the noise of the engines'.

Christopher took one of the paper bags to burst, and he and Priscilla called it "fireworks". They looked for more bags to burst, and as there weren't any, decided to make some. Mrs I asked, 'How will you make them?' 'We'll sew them,' said Christopher. Frank (5:11) remarked at once, 'That won't do. They won't burst, because the air will come out of the holes you make'. They decided to gum them, and spent some time trying to make this satisfactory. (1930:114)

Now we are going to read another article or chapter. This one comes from a book called **Wally's Stories**, written by a kindergarten (Pre-school) teacher in Chicago, Vivian Gussin Paley.

In this book, Vivian Gussin Paley describes the things that happen in her class during the course of a year. The book also focuses on one child in particular, Wally.

Activity 5 - Young children problem solving

Pre-Reading Task

First of all, we are going to **glance** through the whole reading to build up a picture of what it will be about, **before** we read it carefully. You will need to make notes in your journal. Open your journal and write the date and the heading, *Pulley*.

Look at the *first* page. What do you notice about the reading? Make a note of this in your **journal**.

Now look through the *whole* passage. In your **journal**, write down what you notice. There are no pictures this time, but there are interesting variations in the way the text is presented. The text doesn't look the same throughout the passage.

Next read the *first paragraph*. What clues does this give you about the reading? Make a note of these clues in your **journal**.

Do the same with the *last* paragraph of the passage.

Then quickly write down what **you** hope to learn from this reading. (What do you think that you might gain from reading this chapter?)

Now read the text from **Wally's Stories** by Vivian Gussin Paley, *Pulley (pp 95-101).*

Post-Reading Task

- In your **journal**, write down as quickly as you can what you discovered in the passage. What impression did it make on you? What 'message' did you get from the chapter? Isn't it interesting that Pre-schoolers can think like this when they are given the opportunity to do so?
- How did the reading compare with your expectations? Were you surprised by what you read? Why?

0:15

0:30

0:30

Reading Between the Lines

Think about the chapter we read from Bev Young's book about children learning science. Do you remember the science process skills he mentioned? Remind yourself of these skills. It may help you to turn back to that passage and skip through it looking for the process skills he mentions. You can also go back to the notes and the list that you made in your **journal** during Activity 3.

Now re-read the passage about Vivian Gussin Paley's kindergarten children. This time as you read, skim through, but stop and read more carefully wherever you think you have found **evidence** of a *Science Process Skill.*

Make a list in your **journal** of all the examples you can find of these children using the science process skills. Each time you find an example of one of these skills, make a note of the page, the child's name, and the skill that they are demonstrating. Remember, you *don't* need to read every word. Just read carefully where you notice a particular skill.

Make sure that you take a record of this work with you to your next face-to-face session. Your umKhwezeli will ask you to give feedback on how many process skills you found. You will be able to compare what you have found with what the other teacher-learners in your group have found.

How many of the process skills did you find evidence of? We think that these young children give evidence of using most of the process skills that Bev Young lists in his chapter

> In school we often forget just how alert, sharp and curious young children are. We often tend to underestimate them. Then we don't challenge them and school becomes boring. The children start to look dull and disinterested. And we feel uncomfortable. In school we should be finding ways to celebrate the natural skills of young children.

Outcomes so far

What have you shown us that you can do?

- By revisiting your own ideas, you can construct your own view of what science is.
- You can build up a visual picture in your head, and represent that picture on paper as a labelled drawing.

- You can read a dense text selectively, to pull out specific information. You can make your own notes of this process.
- You can list and describe the science process skills.
- You can read a text analytically to find evidence and information that lies beneath the actual words (reading between the lines and finding more than the author intended).
- You will have thought quite carefully about young children and science.
- You will have written down some anecdotes (little stories) from your experience, that show how young children think. You may even have documented direct observations of young children doing things. You will have been doing what an educational researcher would do.

Unit 4

Preparing and Teaching a Process Skills Lesson

The next activity will form the **key activity** of this umthamo. In this activity, we want to help you *plan*, *prepare*, *predict* how your children will cope, and then *try out* a rather different kind of lesson. You will do this with your class.

Finally, we'd like you to *reflect on* and *write* your own notes on how things went. We would also like you to keep a record of your pupils' responses and work, together with your own comments in your **concertina file.** Then at the end of the year you can decide if you want to include some of this work in your **portfolio presentation.**

Activity 6 - Process skills as a focus, not facts

The first specific outcome for Natural Science is that "Children should use process skills to investigate". We thought it would be an interesting thing to try and plan work with primary children that is based on encouraging the use of certain **process skills**.

What we'd like you to do is to try and repeat some work with children that was planned by teachers in the central region of the Eastern Cape. This was initially tried out with Grade 4s, but we feel that it could work equally well at a number of levels. What do you think?

We are providing you with a copy of the Primary Science Programme (PSP) report of some workshops from April 1997 for you to work from. There is a detailed description of what we would like you to try on pages 6 and 7. We think that the information in the booklet is sufficient for you to try the lesson on your own.

We suggest that you read through the whole booklet carefully **two** or even **three** times. Then re-read page 6 and 7 carefully.

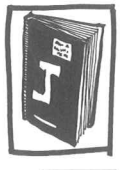
Will you be able to find some clay, to dry it and grind it to a powder? You will need to do this **before** you teach the lesson. You could ask some older pupils in the school if they would get some for you from a nearby river or dam. If you really can't find any clay, see if the Centre Co-ordinator can help you with some.

When you are clear about the lesson, and you have some dry powdered clay, you are ready to write your *own* brief lesson notes. Make sure that you have everything that you will need.

There are many ways to write planning notes for a lesson. When you write notes for a lesson, do this in the way that you personally find most useful.

If you are working with very young children, then you might plan to let them do this orally, and you could write down their responses on a large sheet of paper. If you have a multi-grade class then you could plan so that the children are paired so that there is a child who can write with one who is less confident.

Another thing that you could do *before* you try the lesson, is to think carefully about the responses that you think your pupils will give when they try each step. As a teacher, try to predict the things that your pupils will come up with for each step of the lesson. Spend a few minutes with your **journal** and write down your predictions of the answers your pupils are likely to give you for each step of the lesson.



- What observations do you expect from them. What will they notice when they investigate the dry powder without knowing what it is? (step 1)
- What predictions do you think they will make when they think of adding water to the powder? (step 2)
- What observations do you expect them to make for step 3?
- For step 4, what do you think they will know about the uses of clay?

When you try the lesson, make careful notes so that you can write a **detailed** report of how the lesson went. You need to describe

what the children did,

how they did things,

what they said and what they wrote.

You should also write notes about what **you** did as a teacher. For example, you may want to comment on your non-verbal communication, or body language (ie things that you became aware of when you did the first Communication umthamo in the Core Learning Areas Course).

Your report should be about two pages long and can be stored in your **concertina file** along with any samples of your pupils' work from the lesson.

One of the critical readers who read a draft of this umthamo gave us some good advice. She said that you might want to give the children a chance to **explain** their observations. In other words you could give them a chance to say why they think what they think. Can they give reasons for their **observations** and **predictions**? You may plan to try to fit this in during the lesson, or you may want to do this on another day as a follow-up lesson. Try to note down their explanations for later discussion.

The next activity is *optional*. You can choose whether you want to try it with your class or not. Although it is related to the previous activity which is a science investigation, this is activity is an integrated one. It provides an ideal opportunity for a teacher to use English. As you tell the children what you want them to do, you demonstrate each action with your own lump of clay. In this way you are using **language tied to action**.

An Optional Activity - Making thumb-pots

You could also try the follow-up lesson that we suggest on pages 8 and 9 of the PSP booklet. You can make your own adjustments and improvements. *You* are the real expert when it comes to knowing your own situation and your learners.

If you do decide to try the second part of the lesson, and to let the children make little thumb pots, you can also report on how this went.

You might even want to develop a little more follow-up work and let the children do some research. They can go home and find out if there is anyone in the community who can teach them about making things from clay. This would make an interesting link to the learning areas of Human and Social Sciences and Culture, Arts and Artistic Crafts.

For this second lesson you will see at the bottom of page 7 of the booklet that you need to find at least 10 kg of soft moldable clay. Here are some tips on preparing clay.

First remove any larger bits of stone, grass or sticks.

If the clay is too watery, you can spread it out in the shade on a rock in the open to dry a little.

If it is too dry, then the best thing is to let it dry out completely and then to crush it.

Then you can add water and mix it until it is firm and dough-like.

All clay needs to be worked or kneaded like dough before you use it. This is known as 'wedging' the clay This removes any bubbles of air.

If you are very flexible, you may want to ask your pupils if they have any ideas of follow-up work they would like to do with Clay and Water as a topic. What happens when a teacher is prepared to give children the freedom to suggest their own activities?

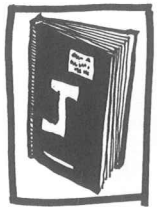
We would be very interested to find out how all of this goes.

- How good are your children at observing?
- Did they surprise you with some of their observations?
- How good were their predictions?
- Did they come up with anything you didn't expect?
- Did they raise any questions of their own?
- Did they take the work further and make their own pots?
- And did they manage to find out anything about the use of clay from people in their own community?
- What did you find out yourself as a teacher?

You can either write about this in your **journal**, or you can write on separate sheets of paper for storage in your **concertina** file. Whichever you choose to do, make sure that you write your the date on your work and the title, *Making Thumb Pots: a lesson in which language is tied to action.* (If you write on separate sheets of paper, make sure that you write you name on your work.)

Conclusion

Well, how did the first lesson go? Did the pupils enjoy **observing, predicting** and **investigating**? Did this work lead to any new questions?



We would like you to finish off this umthamo by doing a short **journal** write comparing different approaches to teaching and learning science. Perhaps you could make a table where you compare a more traditional type of science lesson based on learning *Facts* from a text book, and a more progressive type of lesson based on *Process Skills* and *real experiences*. Your table might look something like this:

	Trad. Facts based	Prog.Process Skills
Teacher	gives info	guides activity
Pupils		
Group work		
Written work		
etc.		

Remember that there is no **one right way** to teach. A good teacher is aware of a number of approaches. She knows her learners and her situation and she chooses the **most appropriate way.**

There's a time for telling and explaining

A time for letting children investigate on their own

A time for discussion and sharing what we know

A time for recording and writing

A time for working alone and a time for group work

A time to think of questions

And a time to think of ways to find answers to the questions.

Outcomes

In this umthamo you have started to think about making Process Skills the basis of the way science can be taught.

You have tried a lesson that is based on a process skills approach. The next umthamo in this Learning Area will have a similar focus.

This umthamo dealt with the way **water** can change the properties of a substance. It is only one small aspect of a use of Water. It is very important that you as a teacher take responsibility for seeing to it that you have mastered the content that relates to a topic like **Water.** This is a very central science topic in any Primary School curriculum.

We will include an appendix that helps you to do your own **content audit**. Then if you feel that there is content knowledge that you are lacking, you will be able to get advice from your umKhwezeli, or Centre Co-ordinator about ways to catch up on content knowledge.

We hope that you and the children you teach have gained from the experiences presented in this module. We would be very interested to hear if you are able to **transfer** any of these ideas and approaches to your other work as a teacher. You can record this in your **journal**, or keep a record to include with your **portfolio**, or even just send us a report through your umKhwezeli or Centre Co-ordinator.

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Appendix - Content Audit

For Natural Science topics, **water** and **soil** (clay is a type of soil).

This content audit should help you take responsibility for your own professional development as a teacher. What if you feel that there are gaps in your own background knowledge, or that you are uncertain about some aspects of content? If you are serious, you must do something about it yourself. You will need to consciously take some action to develop confidence and gain knowledge where necessary.

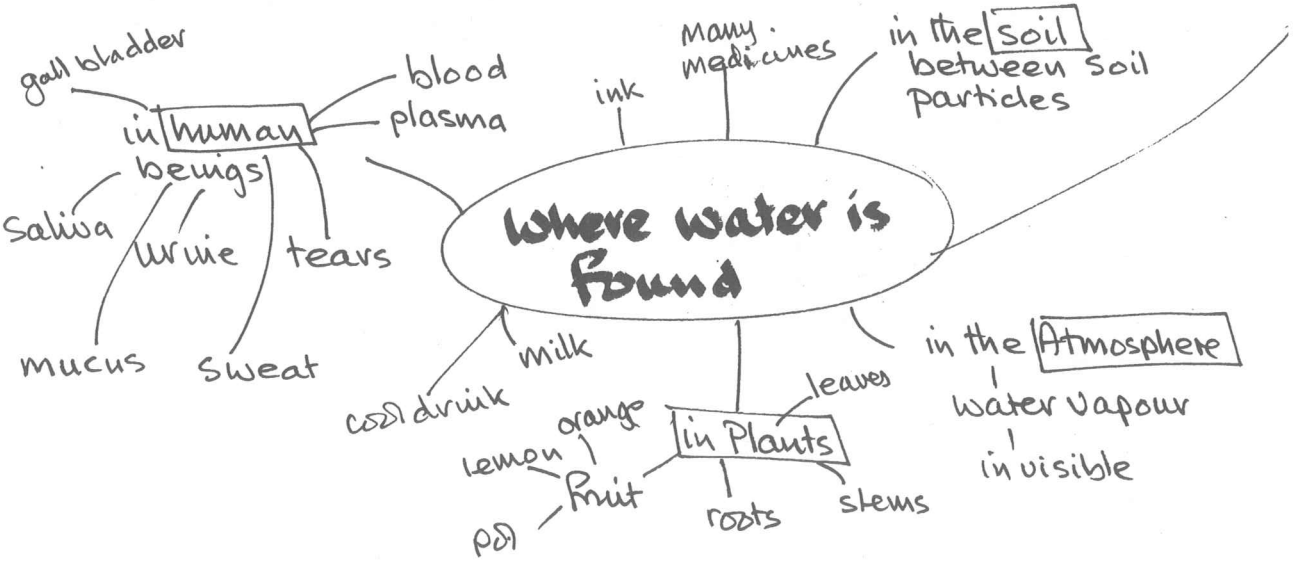
You need to think about what it is that a primary school teacher needs to know about **water** and **soil** to support the work and learning of primary school pupils in an effective way.

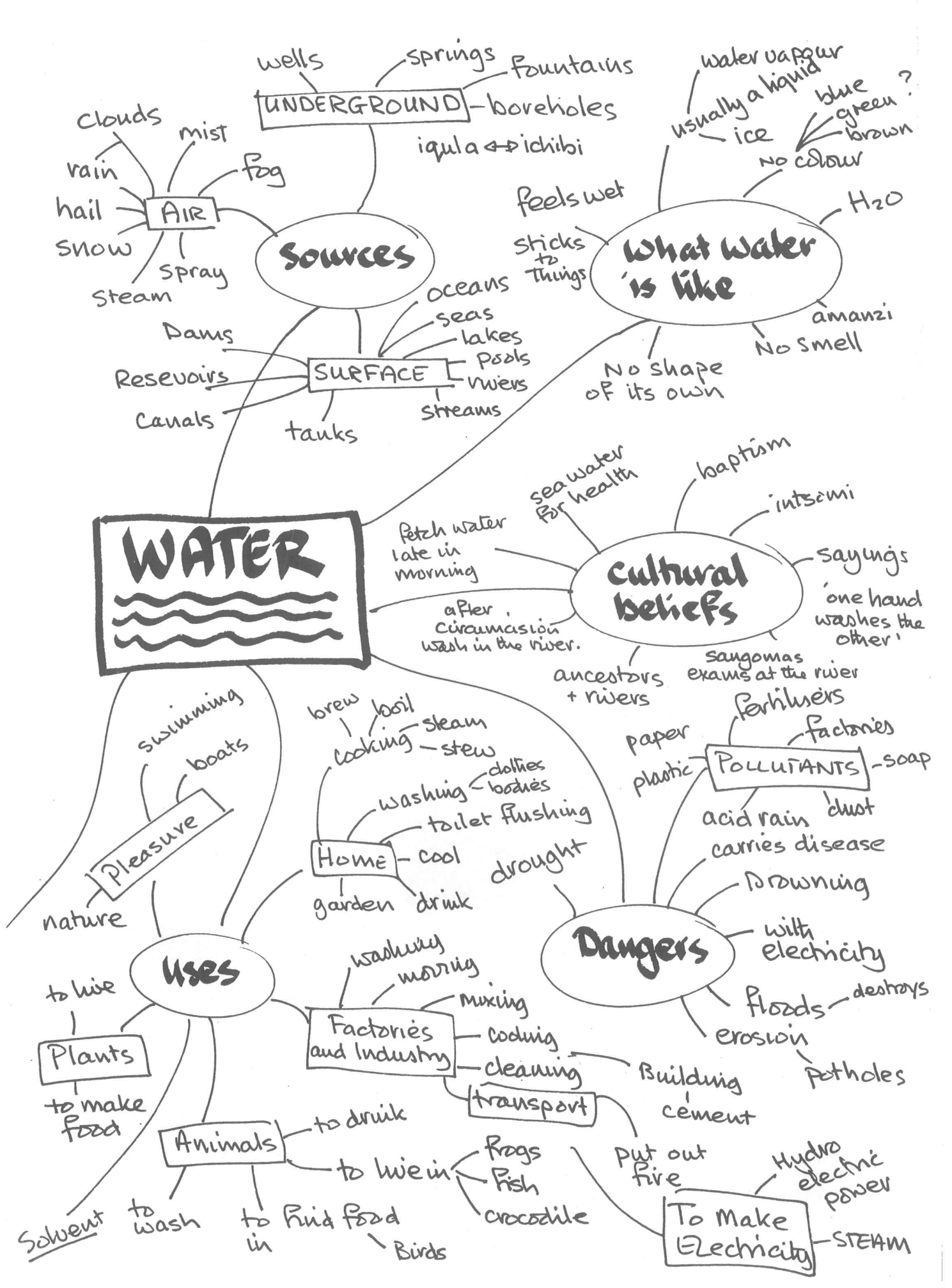
The new OBE curriculum for natural science has a framework that is made up of four strands. You can read about these on pages 4 and 5 of the PSP booklet that came with this umthamo. You can see that topics such as water and soil fit into all four strands in some way.

Mind Map - Water

Using or making your own mind map is one way to start a content audit for a specific topic. Here is a mind map that primary school teachers constructed for the topic water. Go over it carefully.

- Tick any item where you are confident of your knowledge
- Put a question mark next to any item where you know something, but are not completely clear
- Then make a list on a separate sheet of paper of the things that do not have a tick or a question mark.




WATER
Sources
AIR
Clouds
mist
rain
fog
hail
snow
Spray
Steam
UNDERGROUND
wells
springs
fountains
boreholes
iqula ↔ ichibi
SURFACE
Dams
oceans
seas
lakes
pools
rivers
streams
Reservoirs
Canals
tanks
What water is like
water vapour
usually a liquid
ice
blue
green ?
brown
No colour
feels wet
H2O
sticks to Things
amanzi
No smell
No shape of its own
cultural beliefs
sea water for health
baptism
intsomi
fetch water late in morning
sayings
'one hand washes the other'
after circumcision wash in the river.
ancestors + rivers
sangomas exams at the river
Uses
swimming
boats
Pleasure
nature
brew
boil
steam
cooking
stew
washing
clothes
bodies
toilet flushing
Home
cool
garden
drink
to live
Plants
to make food
Animals
to drink
to live in
Frogs
Fish
crocodile
Solvent
to wash
to fluid food in
Birds
washing
morning
mixing
Factories and Industry
cooling
cleaning
transport
Building
cement
put out fire
To Make Electricity
Hydro electric power
STEAM
Dangers
drought
POLLUTANTS
fertilisers
factories
paper
plastic
soap
acid rain
dust
carries disease
Drowning
with electricity
floods
destroys
erosion
potholes

- If you have ticked most items on the water mind map then you have nothing to worry about.
- If you have many question marks, then you need to be reading extra material to find out more about water and to gain confidence with the topic. Each Distance Education Project regional centre will have a set of relevant reference material on the topic water for you to consult and work with or borrow.
- If you find that you have a long list of things that you don't know and are not at all confident about the topic, then you **MUST** do something about it.
- Firstly, find out if there are any other teacher/learners at your centre who are in the same position. Then see if you can find an umKhwezeli or a fellow teacher who is prepared to help you or your group.
- If not, approach the Centre Co-ordinator to see if something can be arranged to enable you and the others to catch up and gain the 'content confidence' that you need. The OSF *Key Teacher Network Initiative* may be operating in your region and there may be an experienced teacher who can provide some help. If there is sufficient demand, if enough teacher-learners want some help in this area, then the Distance Education Project has a special programme that may be able to provide a special topic-based content workshop that you may be able to attend.

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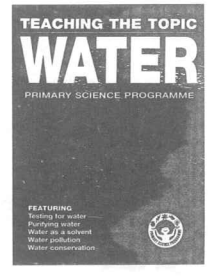
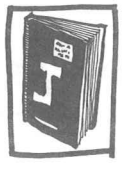


These are some of the materials on WATER that you will find at your centre.

Soil

We have not included a specific content audit for the topic **soil**. It is a very important topic here in South Africa. And it was rather neglected in the old curriculum. We will see to it that the librarian provides each regional centre with support materials that provide background on the topic **soil** and related aspects. Have a look at these materials when you get a chance.



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We will also be on the lookout for interesting ways to deal with the topic, **soil,** so that we can begin to redress the neglect of the past. It is very important that you also share any good ideas that you come across. We will try to deal with the topic in some way in future imithamo.

UNIVERSITY OF FORT HARE
DISTANCE EDUCATION PROJECT

CORE LEARNING AREAS COURSE
Natural Science

Umthamo 1 - Process Skills
First Pilot Edition - 1998

Alan Kenyon
Winnie Vena

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

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