RHODES UNIVERSITY

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An investigation of the indigenous ways of knowing about wild food plants (*imifino*): A case study

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by

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and has not previously in its entirety or in part been submitted at any university for a degree.

Signature

Date

Abstract

This study was conducted in Grahamstown in the Eastern Cape, South Africa. It is a qualitative case study located within the interpretive paradigm and was carried out over a period of a year. The theory implicit in the interpretive paradigm is of human beings as interpreters and constructors of a meaningful world. Thus, the focus of this study was on investigating the benefits of indigenous ways of knowing about wild food plants (*imifino*) in conjunction with hands-on activity-based lessons. This was done with the view to promote a conceptual understanding of nutrition and conservation in the Natural Sciences.

The transformation of the school curriculum in South Africa called Curriculum 2005 (C2005) underpinned by the outcomes-based education (OBE) philosophy also triggered this study. The C2005 and OBE emphasise that learners' prior everyday knowledge should be taken into account during the teaching and learning processes. The intention of the curriculum is to promote the idea of grounding knowledge in local contexts, while being sensitive to global imperatives. Although the acquisition of western knowledge has been and still is invaluable to all, on its own, it has been incapable of responding adequately to modern society in the face of massive and intensifying disparities, untrammeled exploitation of resources, and rapid depletion of the earth's natural resources.

Essentially, indigenous knowledge systems represent both a heritage and resource that should be protected, promoted, developed and, where appropriate, conserved. It is a resource that should serve the present and succeeding generations as many people's cultural practices still rely on the use of wild plants. Within this context it should be borne in mind that the over-exploitation of natural resources threatens not only biodiversity but also local traditional knowledge systems and ultimately cultural heritage; and research has a role to play in this regard.

The research process in this study evolved into two main phases. The initial phase involved mobilising Grade 7 learners' prior everyday knowledge on wild food plants (*imifino*). This led to the second phase of the research project, which was aimed at developing concepts

through three hands-on activity-based lessons. I invited a community member to give a lesson on what *imifino* is and how to collect and prepare it, with the belief that the involvement of parents and community members in learners' education can help bridge the gap between everyday life and school science. It is for these reasons that I believe that the constructive perspective can provide an appropriate methodological framework, conceptual structure and terminology for analysis of teaching and learning activities on the use of wild food plants in this study.

The data generation techniques used in this study were *questionnaires*, *observations* and *interviews* (semi-structured and focus group). A wide range of data generation techniques were employed to crystallise and validate the data generated using triangulation. The results from the analysed data revealed that consideration of indigenous ways of knowing in conjuction with hands-on practical activities enhanced interaction and learning among the learners. Also, linking of scientific knowledge to learners' everyday lives was useful in fostering meaning-making and conceptual development.

Dedication

This thesis is dedicated to my wife Ncediswa and my son Viwe who offered me unconditional love and support throughout this entire venture.

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
AM	Albany Museum
BCE	Before Christian Era
BLT	Behaviourist Learning Theories
CCD	Centralised Curriculum Development
CLT	Constructivist Learning Theories
CCFO	Critical cross-field outcomes
C2005	Curriculum 2005
DoE	Department of Education
DET	Department of Education and Training
EC	Eastern Cape
HIV	Human Immune Virus
IK	Indigenous Knowledge
IKS	Indigenous Knowledge System
IWK	Indigenous Ways of Knowing
LPEK	Learners' prior everyday knowledge
LTSMs	Learning and Teaching Support Materials
LT	Learning Theories
LL	Lifelong Learning
MBL	Mobile Biology Laboratory
NCS	National Curriculum Statement
NQF	National Qualifications Framework
NRF	National Research Foundation
NSTA	National Science Teachers' Association
OBE	Outcomes-based education
PK	Prior Knowledge
QASA	Quadriplegic Association of South Africa
RNCS	Revised National Curriculum Statement
RU	Rhodes University

SBCD	School Based Curriculum Development
SA	South Africa
SAQA	South African Qualification Association
SO	Specific Outcomes
SO1	Specific Outcomes 1
SO2	Specific Outcomes 2
SO3	Specific Outcomes 3
WFP	Wild Food Plants

Chapter 1

> Provide learners with science they can use in their everyday lives and build on their experiences, interests and prior knowledge (Duit & Treagust, 1998: 3).

1.1 Introduction

This chapter provides information about what triggered my interest to conduct the study on the importance of learners' prior everyday knowledge as reflected in the epigraph above. My historical background in section 1.2 below gives more details. It also provides an outline of the context of this research. This includes the research site and participants and the research goals. Finally, a brief overview of the chapters is provided.

1.2 Historical background of the research study

Growing up as South African child from South African schools and a village boy in the evergreen coastal environment of the Eastern Cape, and herding cattle in the veld of the rural areas of kuGatyana has raised many questions about the way in which science has been taught to us at school. The science we received was not about the interest of our societies and how societies could better understand their environment. Instead, it was more about textbook knowledge which was not always relevant to our daily life experiences.

Odora-Hoppers (2001), blames colonialism for this. She argues that the consistent attempts in Western scholarship to give a negative cognitive and ontological status to everything African, and especially to explain everything in terms of concepts belonging to Western cosmology is directly part of this strategy which puts more value on western knowledge over learners' everyday prior knowledge. This argument gained support from the government of the time who promoted centralised curriculum development (CCD) (Kruger, 1991). The CCD has been challenged by Keiny and Weiss (1986) who call for collaboration between CCD and school-based curriculum development (SBCD). The articles by Keiny and Weiss (1986) and Kruger

(1991) were both steps towards the recognition of the need to make school science relevant to the everyday life experiences of learners.

Since there is a strong move towards consideration of everyday knowledge in the new curriculum in South Africa (DoE, 2002), pursuing a study of this nature seems appropriate. I also had an opportunity to be a teacher and a parent in South Africa which allowed me to see, observe and experience the gap between the knowledge I had in my school days and the one I have from my home and the society I live in. For example, I grew up eating wild/indigenous food plants (*imifino)* such as *utyuthu, ihlaba, umhlabangubo, imbhikicane* and so on as well as wild/indigenous fruit (*iziqhamo)* such as *iingwenye, iintongwane, isiphingo* and so on. Yet, in my school days these were not mentioned during nutrition lessons. We were instead taught about cabbages, spinach, carrots, apples, oranges, bananas and so on, while *imifino* was often referred to as weeds.

I have also noticed as a teacher that the science we teach in schools is well organised and well designed in a textbook. It accompanies the syllabus, which presents guidelines on concepts to be taught. This appears to be making things simple and straightforward for teachers. However, for the learner that comes from a different environment to that of the organisers and designers of the science curriculum this might become a challenge, as the learner may be unable to see its relevance to his/her daily life experience. I also believe that to fully understand and appreciate the society and effectively use all these developments for meaningful learning, scientific culture must permeate the society and the every-day thoughts and actions of ordinary people as recommended by Jegede (1997).

1.3 The research rationale

In my view, the thinking above is in line with the new curriculum of South Africa called Curriculum 2005 (C2005). The C2005 with its constructivist approach to learning, among other things, shifted the focus to the recognition of learners' everyday experiences, interests and prior knowledge (DoE, 1995). Stears, Malcolm and Kowlas (2003) in their research on a Cape flats community found that learners related more to what was relevant to their lives in the townships and informal settlements. In essence, as far as they are concerned, these are the

issues of concern to these learners which affect them directly. The above findings are in line with the thinking of some social constructivists such as Vygotsky (1978), who stated that learners are more likely to learn when learning involves them. Therefore it became a necessity in South Africa to have a curriculum that could meet these demands.

The South African Department of Education (DoE) has thus made attempts to implement C2005 from Grade R to Grade 9. However, even though this curriculum has been criticised by teachers, mostly from rural areas because of lack of learning and teaching support materials (LTSMs) and lack of qualified teachers, the DoE has been busy with its implementation process up to Grade 10 by 2006. It is also believed that C2005 could help solve the continuous poor performance in science for learners from historically disadvantaged schools.

As Urevbu (1984) observed, learners who do not originally come from the west perform poorly in western science. The fact that the Revised National Curriculum Statement (RNCS) includes local intergenerational ways of knowing and indigenous ways of knowing (O'Donoghue, 2006) means that it is up to science teachers to find out ways and means to incorporate it in science lessons.The RNCS, however, does not clearly say how it should be incorporated during teaching and learning. This is a challenge for some teachers who may lack the capacity to do this. Yet, one of the requirements of C2005 is that science teachers should adapt and develop LTSMs that are user-friendly and relevant to their learners' everyday lives.

This research project is thus an attempt to critically explore the inclusion of local intergenerational ways of knowing as proposed by O'Donoghue (2006) through a teaching and learning unit of work on wild food plants (*imifino*) (Appendix F).

In choosing this topic, it is hoped that learners would be encouraged to share their experiences and beliefs of their communities about the use of wild food plants (*imifino*). In essence, the relationship between wild food plants (*imifino*) and their nutritional value will be explored taking into consideration the three Natural Sciences Learning Outcomes outlined in the RNCS document of the DoE (2005).

- Learning outcome 1: scientific investigations

- Learning outcome 2: constructing scientific knowledge
- Learning outcome 3: science, society and the environment

The potential value of this study is thus to provide some ways and means of developing learning and teaching support materials (LTSMs) that foster the promotion of the inclusion of indigenous knowledge (IK) in school science so that science could be made relevant to the learners' everyday lives.

1.4 Overview of the study

This thesis is composed of six chapters.

Chapter 1: Provides information about what triggered my interest to conduct the study. It also provides an outline of the context of this study, the research site and participants, the research goals and finally a brief overview of the chapters provided.

Chapter 2: Gives a detailed literature review as it looks at the curriculum and its role in the school and community. It further looks at the manner in which transformation has impacted on the curriculum. Specifically, it looks at the South African curriculum before and after the democratisation of the country in 1994 and also looks at Curriculum 2005 and outcomes based education (OBE) as an approach to it. Thereafter, it discusses a shift from the behaviourist approach to a constructivist approach in terms of learning theories with more focus on the constructivist approach. This leads to the recognition of prior knowledge of learners and as a result this chapter provides detailed information on indigenous ways of knowing that exist within a society directly attached to the culture. It also provides the historical background of the use of wild food plants *(imifino)*.

Chapter 3: Provides an outline of the research methodology used in this study. It also deals with the rationale for the choices I have made and decisions taken during the design of the research. Here I have explained what is being researched, for what purpose and how this research was conducted. I have also explained the reasons for choosing the data generation techniques that I have used during this study. I have also discussed the ways in which

generated data was analysed, interpreted and validated for its trustworthiness and for ethical considerations.

Chapter 4: This chapter informs us about what to expect in the next chapter. Here I have explained and defined terms that are used in Chapter 5. I have defined brainstorming session, the herbarium, and mobile biology laboratory unit and parent or community member involvement in learners' education. I have also explained their respective roles.

Chapter 5: Presents the manner in which data has been generated and on learners' responses. It demonstrates how integrated ways of knowing can be used to benefit a lesson. This is observed when a herbarium assistant, a mobile biology laboratory member and a community member shared the topic on nutrition from different perspectives.

Chapter 6: In this chapter I have looked at learners' responses, community member's responses, teacher's responses on observation schedules and on semi-structured interviews and focus group interviews and analysed them.

Chapter 7: Discusses limitations and challenges of the study and makes some recommendations. Finally, some conclusions on the overall findings based on research goals and research framework are provided.

In the next chapter I have discussed a literature review in reporting the primary or original scholarships.

Chapter 2

Literature review

> A literature review uses as its database reports of primary or original scholarship, and does not report new primary scholarship itself. The primary reports used in the literature may be verbal, but in the vast majority of cases reports are written documents. The types of scholarship may be empirical, theoretical, critical/analytic, or methodological in nature. Second a literature review seeks to describe, summarize, evaluate, clarify and/or integrate the content of primary reports (Cooper, 1998: 201).

2.1 Introduction

In this chapter literature was reviewed with the aim to describe, summarize, evaluate, clarify and integrate the content of primary reports on this study as suggested by Cooper (1998) as highlighted in the above epigraph. This was done by looking at the critical points of current knowledge in the curriculum and its role in the community. This suggests that finding out the relevance of the curriculum to the community's needs was of great importance. Further an investigation into the manner in which change or transformation impacts on the curriculum was also reviewed. This change includes both one in the curriculum and the other one on the country as a whole. In fact, this approach specifically looked at the South African curriculum before and after the democratisation of the country in 1994. However, more emphasis was put on Curriculum 2005 (C2005) and outcomes based education (OBE) as an approach to learning and teaching.

This triggered me to look at the shift from the behaviourist approach to the constructivist approach in terms of learning theories. I also found out through the use of a community member that I invited the importance of cultural and historical activities. I am saying this because she was doing and telling according to her culture. It was this which led to the recognition of learners' prior everyday knowledge. I have also looked at indigenous ways of knowing which are attached to the culture within a society. In my view, learners' prior everyday knowledge needs to be considered before a learner can be bombarded with new

information. I have also looked at the historical background of the use of wild food plants (*imifino*).

The chapter includes the following:

- the curriculum and its role in the school and community
- the impact of transformation on the curriculum
- transformation in the school curriculum in South Africa
- Curriculum 2005 and outcomes based education
- learning outcomes
- learning theories
- constructivist learning theories
- learners' prior everyday knowledge
- indigenous ways of knowing and school science
- the historical background of the use of indigenous plants as food (nutrition)

2.2. The curriculum and its role in school and community

A curriculum is everything planned by educators which will help develop the learner (C 2005). According to the RNCS, this can be an extra-mural sporting activity, a debate, or even a visit to the library. When the curriculum is being planned human resources, physical resources, work programmes, assessment criteria and extra-mural programmes should all be taken into account. The curriculum is to be planned by parents, teachers, education authorities and learners. The fact that a curriculum is influenced by the needs and wants of a specific community means it should vary from community to community and be relevant and flexible in its response to these needs and wants.

In my view a good curriculum should produce thinking individuals as knowledge is integrated and teaching and learning are not sharply divided. This means that a person's intelligence, attitudes, knowledge and values can be easily developed.

2.3 The impact of change or transformation on the curriculum

The community is living in an environment that has life which is not static but rather dynamic. However, there are other reasons that can lead to the change of a curriculum such as social, economic priorities and political conditions of the community. These have both a direct and an indirect impact and influence which can lead to change of the curriculum. According to Young (1998), existing knowledge has to be reviewed, revised and applied in new contexts. The new contexts must see to it that social, economic priorities and political conditions of the community are well taken care of.

Social conditions are influenced by high interest in the use of advanced technology, introduction of incurable diseases such human immune virus (HIV) and acquired immune deficiency syndrome (AIDS), malaria, poverty, urbanisation, industrialisation and so on. All these need the attention of the curriculum.

The curriculum must be capable of changing economic conditions such that poverty is alleviated and the community is able to compete globally with proper use and management of its resources. According to Galbraith, Carss, Endean and Warry (1997), science and technology are considered in relation to national agendas and (Chisman, 1984) emphasise that their cultural values should not be forgotten in the search for technical competence.

Therefore, the government must implement education polices that allow the curriculum to develop learners' intelligence, attitudes, knowledge and values regardless of colour, race, religion, disability and gender (Kings, 1990).

2.4 Transformation in school curriculum in South Africa

Before 1994 the curriculum was designed such that education in South Africa not only reflected the nation's racial discrimination but served directly to enforce and promote the existing social system of that time (Sloan & Kitchen, 1962). As the Inter-departmental Committee on Native Education of 1935-36 noted, "the education of the white child prepares him for life in a dominant society and the education of the black child for life in a subordinate

society." Sloan and Kitchen (1962) also observed that since 1948, under the Nationalist Party's apartheid policy to achieve the physical, cultural, and psychological separation of the races while maintaining European economic and political domination, the education of the non-European population has become an increasingly significant means of perpetuating the South African way of life. For this reason the government in its programme for African development was giving top priority to the reformation of the education system.

The South African school curriculum was left with no option but to change after the democratisation of the country in 1994. This affected the curriculum to the extent that it had to be reviewed, revised and applied in new contexts. This resulted in a new curriculum being introduced known as Curriculum 2005 (C2005). The underlying philosophy of C2005 is outcomes-based education (OBE).

This new C2005 triggered a move from behaviourism to constructivism which is centred on the outcomes-based education approach. However, behaviourism cannot be ruled out completely. This is so because a few of its aspects are valuable and of great importance, for example, the use of chalk boards and the presence of teachers even though their role might have changed. This change has been explained in the paragraphs below. The previous approach helped the government of that time to be in control of what was taking place at community level or local level. This system promoted the teacher centred approach where the teacher was the sole provider of information. This is called traditional approach or top down approach and Jegede (1997) discourages the continuous use of a teacher-centred approach. In contrast, C2005 is learner-centred which means that the learner is playing an active role in the learning process.

2.5 Curriculum 2005 and outcomes based education

Manganyi (1997) argued that the past curriculum had perpetuated race, class, gender and ethnic divisions and emphasised separateness, rather than common citizenship and nationhood. This is in agreement with Sloan's and Kitchen's (1962) comments on the education of South Africa. He further said, curriculum is at the heart of the education process and it is important that the curriculum be restructured to reflect the values and principles of South Africa's new democratic society.

The new curriculum is based on the principles of co-operation, critical thinking and social responsibility, and should empower individuals to participate in all aspects of society. This could best be achieved by a national curriculum which provides a general education as a platform for lifelong learning. Lifelong learning means education resulting from the integration of formal, non-formal and informal education so as to create ability for continuous lifelong development of learners (DoE, 1997).

Manganyi (1997) further suggests that human resource development programmes must expand the way in which South African people are able to acquire learning and qualifications of high quality. Owing to the growing concern about the effectiveness of traditional methods of teaching and training, which are currently still content based, standards will in future be defined in terms of learning outcomes. New, flexible and appropriate curricula are needed that cut across traditional divisions of skills and knowledge. The emphasis will be on what the learners should know and can do at the end of a course of learning and teaching, instead of the means which are to be used to achieve those results.

Manganyi (1997) also unpacked what was in the C2005 which covers the following issues such as outcomes based learning, learning outcomes, critical cross-field outcomes, cross-curricular, unit standards, continuous assessment model, formative assessment model, learning programmes, language in education policy, and gender equity.

However, for the purposes of this study I have looked more closely at the learning outcome 3 which deals with science, society and the environment as I have tried to promote the inclusion of indigenous knowledge with the view to enhance conceptual development. This is also in line with the Revised National Curriculum Statement (RNCS) for C2005 (DoE, 2002).

An outcomes-based education and training system requires a shift from focusing on teacher input (instructional offerings or syllabuses expressed in terms of content) to focusing on the outcomes of the learning process. Outcomes-based learning focuses on the achievement in terms of clearly defined outcomes, rather than teacher input in terms of syllabus content. In the national qualification framework (NQF) proposals, these outcomes are expressed in balanced

and integrated national standards which demand the holistic development of competence, and encompass knowledge, skills, and attitudes.

In outcomes-based learning, a learner's progress is measured against agreed assessment criteria. This implies that formal assessment will employ criterion-referencing and will be conducted in a transparent manner. All learners who meet the criteria for specified learning outcomes receive the appropriate credit/s. Those who do not meet the criteria could receive clear feedback, indicating areas which need further work in order for them to reach the required standard. They are thus given support to try again. The concept of pass/fail is radically altered to credit/try again.

It is recognised that this has its advantages and disadvantages. Its advantages are the fact that it enables the learner to clearly demonstrate his/her full understanding of the learning outcomes. It also develops learner's confidence on concepts taught before moving to the next unit of work. The disadvantages are the fact that this approach can be time consuming.

2.6 Learning outcomes

According to the RNCS, outcomes are of two kinds, namely critical cross-field outcomes and specific outcomes. These differ in the breadth of the context to which they apply. Critical cross-field outcomes express the intended results of education and training in a broad sense whereas specific outcomes express the results of more narrowly defined aspects of the education process and are context-linked (DoE, 2002).

2.6.1 Critical cross-field outcomes

This section included information that is also available in the South African Qualification Association (SAQA), Bulletin volume 5, number 1. I have done this so that the reader could easily see the correlation as required by SAQA. The role of critical cross-field outcomes (CCFO) in the context of an integrated South African education and training system includes:

- bolstering the spirit and letter of the Constitution by focusing on transforming South African society from one based on major inequities to one which is fundamentally egalitarian;
- acting as a conduit and playing a facilitative role in generating a sense of South African nationhood and solidarity within a Pan-African and international dynamic;
- individuating the person within learning collectives and releasing the person's potential. Education and training should therefore serve in a pre-figurative and strategic way in releasing human resources potential in South Africa, in order to redress the imbalances created by the apartheid system (Todd & Mark, 2004).

In the South African context, CCFO are underpinned by transformational mechanisms which are driven by instruments such as the judicial (relating to the law and judgments); political (relating to the State, its government and policy); economic (relating to the development and regulation of material resources, especially the financial); social (being a part of a larger social structure; in association with or relating to others, especially in terms of their needs); transformational and developmental (changing the character or condition of a society, especially in relation to empowering previously marginalised groups and, equally, the marginalising or eliminating of irrelevant practices; responding positively to the needs of a repressed group or an underclass. For example, the poorest of the poor; using resources in a sustainable and renewable way in carrying out any projects or missions); and knowledge production (addressing the needs of a new society through the creation of new learning structures and processes, or by addressing issues for more social and personal relevance and contextual impact), vested in the Constitution of the Republic of South Africa (Todd & Mark, 2004).

CCFO are generic and cross-curricular. They underpin the learning process in all its facets. They are not restricted to any specific learning context, but they inform the formulation of specific outcomes in individual areas of learning for all learners at all levels on the National Qualifications Framework (NQF). They are not generated in one sector of education and training but across sectors in a process of consultation among stakeholders (Todd & Mark, 2004).

It is important to remember that CCFO are working principles, and as such they should direct teaching, training and education practices and the development of learning programmes and materials. It follows then that curriculum development should begin with the formulation and agreement of critical outcomes and that these should inform all subsequent curriculum development processes, and that whatever critical cross-field outcomes are selected for curriculum development, should be informed by the mutually agreed principles for education, training and development (Todd & Mark, 2004).

2.6.2 Critical cross-field outcomes adopted by SAQA:

- identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made;
- work effectively with others as a member of a team, group, organisation, community;
- organise and manage oneself and one's activities responsibly and effectively;
- collect, analyse, organise and critically evaluate information;
- communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation;
- use science and technology effectively and critically, showing responsibility towards the environment and health of others; and
- demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation;

In order to contribute to the full personal development of each learner and the social and economic development of the society at large, learners should be made aware of the importance of:

- reflecting on and exploring a variety of strategies to learn more effectively;
- participating as responsible citizens in the life of local, national and global communities;
- being culturally and aesthetically sensitive across a range of social contexts;
- exploring education and career opportunities; and

- developing entrepreneurial abilities.

2.6.3 Specific outcomes

Specific outcomes are context-specific. They are informed by the CCFO but formulated within the context in which they are to be demonstrated. They describe the competence which learners should be able to demonstrate in specific contexts and particular areas of learning at certain levels. It is these outcomes and not the CCFO, which should serve as the basis for assessing the progress of learners and thus, indirectly the effectiveness of learning processes and learning programmes. The details concerning level of complexity, scope and learning context included in the formulation of specific outcomes, is therefore, crucial if assessment is to be transparent, fair and effective (Todd & Mark, 2004).

2.7 Learning theories

Learning theories play a very important role in the way teaching and learning is conducted in science. According to Norman (2002), learning theories affect the way a person uses any particular device and it should affect the design of the item. These range from behaviourist learning theories to constructivist learning theories.

In the past decades many countries including South Africa used the behaviourist learning theory. The behaviourist learning theory fitted well in the curriculum development system, which I will call the top down approach because curriculum was designed and developed by the officials from head office excluding teachers and community. Teachers were implementers of curriculum. In this top down approach system curriculum development is centralised. Information comes from the centralised curriculum development centre to the support system e.g. subject advisers, superintendents to support system e.g. teachers' centre to schools. The schools were expected to accept and implement this information regardless of their different environments (Kruger, 1991).

As the time progressed, theorists such as Dewey (1933/1998), Vygotsky (1978), Piaget (1972) and Bruner (1990) challenged the behaviourist learning theories on the basis that the design of instruction must be undertaken with suitable attention to the conditions under which learning occurs. With reference to the learner, learning conditions according to constructivists are both external and internal. These conditions are in turn dependent upon what is being learned as opposed to behaviourists who believe that these basic ideas be used to design instructions and can be applied to the design of single lessons, of courses and of entire systems of instructions. This idea was, however, questioned by Gagne and Briggs (1974) as cited in Hedberg (2003). This led to a shift from behaviourist approaches to constructivist approaches.

2.7.1 The constructivist learning theories

Constructivism is recognised as a unique learning theory in itself. However it may be associated with cognitive psychology because as a theory of learning it focuses on the learner's ability to mentally construct meaning of their own environment and to create their own learning. As a teaching practice it is associated with different degrees of non-directed learning (Forrester & Jantzie, 1998.). According to Vygotsky (1978), the constructivist approach to teaching and learning is based on a combination of a subset of research within cognitive psychology and a subset of research within social psychology. This information shows that the term constructivism is linked to cognitive and social constructivism.

According to Good (1993) and Geelan (1997), the term constructivism encompasses a wide variety of theoretical positions and has been variously used to refer to views about learning, teaching, curriculum development and teacher development. However, it is important to note that constructivist theories of learning do not necessarily entail constructivist approaches to teaching (Hodson & Hodson, 1998). Constructivist learning theory also promotes the bottom top approach. Kruger (1991) called this school based curriculum development (SBCD) as opposed to centred curriculum development (CCD). According to him, school based curriculum development implies that the classroom where curriculum content is taught must also become a place of inquiry where systematic observations are made and conclusions are

drawn. From being simply a traditional classroom where certain things are taught (and hopefully learned) the classroom also becomes the venue for curriculum review.

2.7.2 Learners' prior everyday knowledge

According to the constructivists, there are features of a constructivist perspective that could have an impact on the teaching and learning situations in schools. One of them is that learners are not viewed as passive but are seen as purposeful and ultimately responsible for their own learning. They bring their prior conceptions to the learning situation (Caper & Leask, 1993). This was also observed by Ausubel (1968) as he said the most important single factor influencing learning is what the learner already knows and teachers need to ascertain this and teach from that accordingly.

Vygotsky (1978) explored the theory about activity in what he termed the external social plane is gradually internalised by the child as he develops until it forms his intellectual processes, a view also echoed by Wood (1998). This suggests that prior everyday knowledge is directly affected by a learner's socio-cultural background. The new South African C2005 currently known as NCS with its constructivist approach to learning has followed this as it shifted the focus to learners' everyday experience, interest and prior everyday knowledge (DoE, 1995). Stears, Malcolm and Kowlas (2003) in their research on a Cape flats community also found that learners relate to what deals with their lives in the townships and informal settlements, which is basically prior everyday knowledge. In fact they claim that taking learner's everyday knowledge promoted learning.

The National Science Teachers Association (1978) once said science cannot be divorced from the critical realities of contemporary life and society. Neither can science continue to be seen as value free. Science must be studied in the context of the time and relevant society.

The existing knowledge also known as learners' prior everyday knowledge plays an important role when the learner is trying to understand the new information given to him (Taber, 2001). It is therefore necessary that prior everyday knowledge must be taken into consideration when

planning a unit of work to avoid the conflict that (Dzama & Osborne, 1999) claim exists between traditional beliefs and science in some other learning areas. However, the approach differs from school to school. This might also solve the continuous poor performance of African learners in science as this is also observed by Urevbu (1984).

2.7.3 Indigenous ways of knowing and school science

There is a growing global interest in the inclusion of indigenous ways of knowing in school science. This was observed by Odora-Hoppers (2001) who described it as the move of all the agencies of the United Nations to seek to promote paradigms of sustainable human development that build on knowledge resources that exist in communities. However, as a continent, Africa is seeking its own renaissance and is seeking to establish the terms of its development. She also argues that knowledge is a universal heritage and resource that is diverse and varied. Acquisition of western knowledge has been and still is invaluable to all, but on its own, it has been incapable of responding adequately in the face of massive and intensifying disparities, untrammeled exploitation of pharmacological and other genetic resources, and rapid depletion of the earth's natural resources. For its part, the indigenous knowledge system (IKS) represents both a national heritage and national resource that should be protected, promoted, developed and, where appropriate, conserved. It is also a resource that should be put at the service of the present and succeeding generations. IKS was also advocated by Ostile (2005) in his African indigenous knowledge-an academic and socio-cultural exploration of indigenisation.

Gough (2002) believes that before we can address global issues we must address local issues. For example, school science relating to understanding and resolving environmental problems might be enhanced by seeing it as one among many local knowledge traditions. The production of a 'global knowledge economy' in/for environmental education can be performed together, rather creating a 'space' in which local knowledge traditions can be performed together, than creating a 'common market' in which representations of local knowledge must be translated into (or exchanged for) the terms of a universal discourse.

According to Emeagwali (2003), Indigenous African Science and Technology has been in use for years. Yet, I am of the view that the traditional approach of curriculum design and development that is teacher centred and textbook based seem to have undermined the inclusion of indigenous knowledge. A socially oriented approach of curriculum design and development that is learner centred will promote the inclusion of indigenous knowledge because learners will be able to share their prior everyday knowledge.

I believe that the introduction of learning and teaching strategies that are learner centred will help to utilise learner centred resources. This model also aims at developing the mind and the intellect in the context of rigorous intellectual activity and community-oriented research (Emeagwali, 2003). There is a keen awareness that knowledge production is socially derived as Vygotsky (1978) argued that the culture we live in influences our social and cognitive development (Forrester & Jantzie, 1998).

Warren (1992) in his presentation provides an overview of studies that clearly portrays the active role that rural communities in Africa and other parts of the world have played in (a) generating knowledge based on a sophisticated understanding of their environment, (b) devising mechanisms to conserve and sustain their natural resources, and (c) establishing community-based organisations that serve as forums for identifying problems and dealing with them through local-level experimentation, innovation, and exchange of information with other societies.

Indigenous knowledge, particularly in the African context, has long been ignored and maligned by outsiders. Today, however, a growing number of African governments and international development agencies are recognising that local-level knowledge and organisations provide the foundation to development that are both cost-effective and sustainable (Warren, 1992).

Michie and Linkson (1999) also discovered that it is apparent in preparing curriculum and resource materials for students that there are three factors which need to be taken into consideration:

Firstly, they discovered that a curriculum based on conceptual development and with learning outcomes provides a sound basis for indigenous learners. Concepts allow for development in either worldview and for movement between worldviews, whereas content is contextualised in its own culture. The content needs to be appropriate to the learner, both in terms of its context and cultural considerations. Michie and Linkson (1999) also feel that standards and benchmarks, as impositions from western culture, are inappropriate for indigenous learners, whereas profiles may be useful to a point (which is where they diverge to another context).

Secondly, they discovered that the learning needs to be within the context of the learner and this becomes more important for learners. They believe that some resource materials we have examined start by focusing on an indigenous technology but move too quickly to western ideas without scaffolding the knowledge adequately.

Thirdly, they discovered that indigenous ways of learning, ownership of knowledge and learners' world views all need to be considered specifically; for western science these considerations are all assumptions of the dominant culture. The experience elsewhere in identifying culturally responsive guidelines provides curriculum and resource developers a framework that they can work within.

In my own opinion, these three factors are the key to success as we continue developing and implementing the RNCS in South Africa. These are in fact in line with constructivism (section 2.7.8), a theory which is the basis for the RNCS. The RNCS seeks to ensure that learners acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes the idea of grounding knowledge in local contexts, while being sensitive to global imperatives (DoE, 2004). Examining the revised Curriculum 2005 document it has specifically cited the importance of the inclusion of indigenous knowledge in the context of learning outcome 3, which is stated as science, society and environment (DoE, 2004).

Countries such as Australia have already made attempts such as a curriculum which places a higher value on indigenous knowledge other than simply ‘enriched’ Western science; resource materials which parallel the experiences of indigenous learners with Western understandings

and which are inclusive of indigenous cultural considerations; and an attempt to facilitate profiling of Western science learning outcomes in the context of a holistic indigenous curriculum, to value indigenous knowledge alongside Western science learning (Michie & Linkson, 1999).

Kimbugwe (2001) has done a study on an investigation of factors, which influence integrating indigenous knowledge of medicinal plants into the learning programme for Grade 9 Natural Sciences. This has left debate about integrating indigenous knowledge in the school science curriculum on a more positive note because he successfully integrated indigenous knowledge of medicinal plants into the learning programme for Grade 9 Natural Sciences though it may have opened up some research areas around the issue of indigenous knowledge.

2.7.4 The historical background of the use of wild food plants (*imifino*)

Before colonisation there were no shops to go to in order to get food. Through trial and error people managed to select nutritional plants as food. There were no hospitals and surgeons to go to when people were sick. People depended entirely on wild indigenous plants that were available in their environment. According to Fox and Norwood-Young (1982), some of this information has been documented but is still scattered while much remains undocumented. Some information is only available through word of mouth of the elderly people of the community to the young people of the same community. Fox and Norwood-Young (1982) thus suggested that this information should be brought together. O'Donoghue (2006) also calls this knowledge an intergenerational knowledge.

According to Asafo-Adjei (2003), Mtshali (1994) and Isichei (1997), women are more knowledgeable than men when it comes to wild food plants (*imifino*). The research done by Shava (2000), in the Eastern Cape Province of South Africa, showed that people still know and use wild plants as food regardless of the fact that past government educational policy did not give recognition to indigenous ways of knowing in the curriculum design and development. I had an opportunity to edit a booklet compiled by Husselman and Sizane (2006) with some recipes on how to cook these wild food plants (*imifino*) (both females). This confirms the claim made about women being more knowledgeable in *imifino*.

Kruger, Sayed, Langenhoven and Hoing (1998) have provided some scientific evidence which shows that some of these wild food plants (*imifino*) have higher contents of nutrients than vegetables such as cabbages which we buy in the market.

Table 2.1 Nutrient content per boiled leaves of selected *imifino* species

	Protein (g)	Vitamin C (mg)	Vitamin A (µg re)	Carotenoids (µg)	Vitamin E (mg)	Iron (mg)	Zinc (mg)	Selenium (µg)
Utyuthu Amaranth *Amaranthus spp*	1.9	1	399	2 394	0.26	4.6	0.81	0.3
Umhlabangulo Blackjack *Bidens pilosa*	3*	12	934	5 605	2.39*	5.7	0.86	1.71*
Amakhasi kabhatata Sweet potato leaves *Ipomoea batatas*	2.3	2	92	552	0.96	0.6	0.26	1.3
Imbikicane Goosefoot *Chenopodium album*	3.3	14	643	3 859	2.31	4.3	0.3	1.9
Imitwane Pumpkin leaves *Cucurbita maxima*	2.7	1	249	1494	0.96	3.2	0.2	0
Ikabishi Cabbage *Brassica oleracea*	1.0	20	2	10	0.2	0.4	0.17	0.6

* estimates

**Source: M. Kruger *et al.* (1998) "Composition of South African Foods. Vegetables and fruits" Tygerberg: Medical Research Council

2.8 Conclusion

In my literature review, I have observed that change is directly proportional to time and change is influenced by time. This suggests that as time goes by the way people think might change. Different approaches used in dealing with change show how people respond to change. My everyday life experience shows that as we advance toward the future, our entire society is changing in a changing global context. This is observable when you look at major institutions, such as government, industry and finance. These are seeking ways to restructure that will increase their flexibility and effectiveness in this climate of change. Since education is often pointed to as the key sector of our society that can prepare us for this new world and ensure our success it has to play a leading role in dealing with change.All this requires a certain method.

The next chapter discusses the methodology and methods used in this study to promote and deal with these changes.

Chapter 3

Qualitative research methodology and design decisions

> The model of qualitative reseach design does not begin from a fixed starting point or proceed through a determinate sequence of steps. It is an interconnection and interaction among the different design components (Maxwell, 1996: 1)

3.1 Introduction

This chapter provides an outline of the research methodology used in this study. It deals with the rationale for the choices I have made and decisions taken during the design of the research. I have identified the key components in a design and the relationships among these components. I have also presented a strategy for creating coherent and workable relationships among these components as suggested by Maxwell (1996) in the epigraph above. Here I have explained what is being researched, for what purpose and how this research is being conducted. I have also explained the reason for choosing the data generation techniques that I have used in this study. I have discussed the ways in which generated data was analysed, interpreted and validated for its trustworthiness and ethical considerations.

3.2. Methodology

3.2.1 Interpretive paradigm

This study is situated within the interpretive paradigm. According to Burrell and Morgan (1979), the interpretive paradigm views the social world as an emergent social process, which is created by the individuals concerned. This paradigm seeks to explain the stability of behaviour from the individual's viewpoint. Consequently, researchers in this paradigm try to observe on-going processes to better understand individual behaviour and the spiritual nature of the world. I believe that this paradigm has allowed me to understand the situation and to interpret meaning within the social and cultural context of the natural setting as proposed by Cantrell (1993).

Within this paradigm, a case study as a research strategy was used. According to Yin (2003), a case study is defined as the study that tries to illuminate a decision or set of decisions: why

they were taken, how they were implemented, and with what result. In essence, this is a qualitative case study research on promoting the inclusion of indigenous knowledge in the school science curriculum with the aim to improve learners' conceptual development and understanding in science.

Qualitative research, broadly defined, means "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990:17). There are several considerations when deciding to adopt a qualitative research methodology. Strauss and Corbin (1990) claim that qualitative methods can be used to better understand any phenomenon about which little is yet known. It can also be used to gain new perspectives on things about which much is already known, or to gain more in-depth information that may be difficult to convey quantitatively. Thus, qualitative methods are appropriate in situations where one needs to first identify the variables that might later be tested quantitatively, or where the researcher has determined that quantitative measures cannot adequately describe or interpret a situation.

3.2.2 Research framework

Constructivism seems most appropriate in this study as it involves cognition and socialisation (Vygotsky, 1978). In the beginning of 1997, the Department of Education (DoE) published Curriculum 2005 in which it looked explicitly towards constructivism to provide the teaching and learning solutions underpinned by outcomes based education (OBE) (Moll, 2002). Constructivist orthodoxy claims that learners learn science best by 'making sense of their own worlds' (Hodson & Hodson, 1998).

It is also important to note that scientific understanding is more than personal beliefs, held for personally convincing reasons, and that learning science, learning about science and learning to do science for oneself requires understanding of, and an ability to use appropriately, a set of culturally defined methods for conducting inquiries and a set of conventions and modes of discourse for presenting the results (Hodson & Hodson, 1998).

In constructivist learning theories (CLT) the fact that learners can work as groups and share their experiences shows its learner-centredness. Furthermore, from the constructivist perspective learners are viewed as being actively involved in making sense of what they learn. I contend that, while most everyday learning occurs spontaneously in the context of everyday experience, the learning of science has to be organised. Learners left to their own devices will not construct the necessary understanding for themselves. Therefore teachers will always be needed to provide the necessary guidance as proposed by Hodson and Hodson (1998). In this study that was done by facilitators.

In my own personal experience, learners come to a science classroom with their own interpretation of the way in which things are happening around them. This becomes a challenge in teaching and learning if the learning theory applied ignores learners' prior everyday knowledge. This becomes worse when prescribed textbooks themselves provide examples that are not related to learners' everyday experiences as Jegede (1997) argued.

Now that South Africa has joined the global move from (BLT) to (CLT) commonly known as transformation in South Africa, there is hope for a change in the teaching and learning of science.

However, the South African schools are still faced with challenges as follows: there is a need for more workshops to transform teachers from BLT to CLT; teachers need to be learners and researchers, who at all times strive to be aware of the environment and their learners in the teaching and learning situation; teachers need to be curriculum developers rather than implementers; availability of resource material to all schools; constructivism needs to be clarified as its misunderstanding is evident in the implementation of C2005 and these are likely to have serious consequences in the development of teachers and learning of children (Moll, 2002).

Even though in South Africa the Department of Education has started to look explicitly towards constructivism to provide the teaching and learning solutions using OBE, it should be

considered that there are a variety of principles from operant conditioning and information processing learning theories that can be utilised within the constructivist approach.

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In South Africa the Department of Education has started to look explicitly towards constructivism to provide the teaching and learning solutions using OBE.

It is for the above reasons that constructivism was used as a theoretical framework in this study as I believe that it can provide an appropriate "methodological approach, conceptual structure and terminology for analysis of teaching and learning activities" (Popov, 1998:2). In this study learners' everyday prior knowledge and the way communities share knowledge were regarded as important in enhancing learning.

3.2.3 Goal of research

The main goal of this research was to:
Investigate the benefits of indigenous ways of knowing about wild food plants (*imifino*) in conjunction with hands-on activity-based lessons. To realise this goal I investigated

- the benefits of mobilising learners' prior everyday knowledge of wild food plants (*imifino*) and how it helped with the facilitation of conceptual development and understanding in science; and
- the implementation of three hands-on activity-based lessons on wild food plants.

3.2.4 Research questions

1. How and in what ways does the mobilisation of learners' prior everyday knowledge of wild food plants help with the facilitation of conceptual development and understanding of nutrition in the Natural Sciences?
2. To what extent would learners be able to demonstrate an understanding of the interrelationship between nutrition and wild food plants used as food at their homes?
3. What are benefits of engaging learners in hands-on activity-based lessons utilising wild food plants?

3.2.5 Research site and participants

I have chosen Good Shepherd Primary School as my research site since it consists of a diverse group of learners from the township, town (urban) and some from farm areas around Grahamstown. The advantage of this diversity was that I was able to obtain information from different perspectives. Since I am in a wheelchair and volunteering at the Albany Museum as a herbarium assistant, this school seemed to be more convenient for me as it is just a stone's throw away from the Albany Museum. Table 3.1 below showed more detailed information about participants in this study.

Table 3.1: Participants

Herbarium staff	Nomiki	Herbarium Assistant	Research interview: Herbarium and its contribution to C2005
Learners	16 learners whole class	Grade 7 learners	Administered questionnaires to mobilise learners' prior everyday knowledge about wild food plants (*imifino*)
	Whole class	Grade 7 learners	Questionnaires to parents and community members Brainstorming session
			Lesson 1: Identification and classification of wild food plants.
			Lesson 2: Food tests (finding out nutrients in *imifino*)
			Lesson 3: Presentation by a parent on how to prepare and cook *imifino* and sharing some stories about *imifino.*
	6 learners	Grade 7 learners	Focus group interview on the lessons.
Science Educator from Good Shepherd	Diliza	GET educator	Research interview

3.3 Data generation techniques

The main data generation techniques that I have used in this study were document analysis; questionnaires; interviews (*semi-structured* and *focus group interviews*); and observation.

3.3.1 Document analysis

I have examined the documents on plants and their uses kept at the Herbarium. This information has enhanced my lesson on identification and classification of wild food plants (*imifino*). I also accessed information on malnutrition from documents from the Linda Hospital

(pseudonym). This helped me to compare the number of people coming to hospital for malnutrition from townships, farm areas and town.

3.3.2 Questionnaires

Questionnaires have been used to mobilise learners' prior everyday knowledge on wild food plants (*imifino*). Learners answered a series of questions in writing as Irwin (2002) suggested. However, Worker (1993) warns that questionnaires may suffer some problems of mass production and lack of interpretive opportunities. Thus, questionnaires could be misunderstood and that could result in undesirable responses.

I have administered and monitored the process of answering the questionnaires by the learners to ensure that they were able to ask for clarification. This also helped in making sure that all questionnaires were returned. Questionnaires were written in English though learners were allowed to ask in *isiXhosa* for clarifications and answer in their language of choice. Learners used questionnaires as interview schedules to get information from their parents and community members on wild food plants (*imifino*).

I made sure that learners understood the questions in the questionnaires before they engaged in this information gathering activity and I also encouraged their teacher to assist them but not to answer the questionnaires. Even though learners needed to be clear about the questions, only parents and community members should answer the questions.

3.3.3 Interviews

Interviews have been used to complement the questionnaires due to weaknesses which might possibly be encountered during the process of answering the questionnaires. One of the strengths of the interviews is that I was able to probe deeper for clarifications in order to obtain in-depth information from the interviewees. Merriam (2001) also regards interviews as the best technique to use when conducting intensive case studies of a few selected individuals. For the

purposes of this study, two types of interviews were employed, *semi-structured interviews* and focus group interviews.

Semi-structured interviews

Semi-structured interviews are flexible, which allows the researcher to change the sequence of questions, even the wording, to probe the unexpected. According to Merriam (2001), this is where the interview being the primary instrument of data generation has its advantages. You make adjustments in your interviewing as you go along. This type of interview ensures that a specific question does not loose its purpose (Sanders, 1999). According to Brighton and Deny (1997), the data obtained from interviews is qualitative.

A tape recorder was used during this process. Interviewees were allowed to ask the interviewer to switch off the tape recorder if they wanted to. I interviewed the Herbarium staff member and a science teacher from Good Shepherd primary school. I had hoped to understand their perspectives towards C2005 more especially when it came to the inclusion of indigenous knowledge (IK) in the curriculum.

Focus group interviews

A focus group of six learners was chosen based on their responses on the questionnaires and also with the help of their science teacher. Wilkinson (2000) notes that learners in a small group environment might be more relaxed and might be able to express and support each other's views. I have also used focus group interviews because it can be effective and inexpensive (O'Brien, 1993). In my own experience, however, some weaknesses are inherent in deciding the size of the group because if it is too small intra-group dynamics exert a disproportionate effect. On the other hand, too large groups become unwieldy and hard to manage (Cohen, Manion & Morrison, 2000) with some participants dominating the discussions. Focus group interviews were tape recorded with the permission of the interviewees. This helped me to probe deeply into what the learners' prior knowledge on wild food plants (*imifino*) was.

3.3.4 Observation

I have used the observation technique to capture behavioural reaction towards the questions to supplement the data generated through questionnaires and interviews. I decided to use the observation because it is a purposeful, systematic and a selective way of watching and listening to an interaction phenomenon as it takes place (Kumar, 1996:105). I asked the science teacher from Good Shepherd primary school to join me as an observer during the implementation of the lessons at the Herbarium. I requested him to document whatever he had observed during these lessons and also to provide some reflections on this process. This helped to recall observations, as we had some informal interviews about what they observed after the session. An observation schedule was provided as a guideline (Appendix H). Videotapes were also used during the implementation of the lessons so that I could use such information to supplement and complement my report.

3.4 Data analysis

Qualitative analysis required me to be creative as the challenge was to place the raw data into logical and meaningful categories. I therefore organised data into manageable units, which I have called analytic statements (Section 6.2), synthesised it and searched for patterns as proposed by Bogdan and Biklen (1982), Strauss and Corbin (1990), Bassey (1999) and Cohen et al. (2000). The analystic statements also enabled me to communicate my interpretation.

Data generated using the questionnaires helped in understanding learners' experiences and prior everyday knowledge. I have looked at the use of wild plants as food with a view to relating this to conceptual development in nutrition in general. Data from the observations and interviews were useful in illuminating the learning processes involved when indigenous ways of knowing are considered in conjunction with ativity-based learning.

I hope this research report will be a rich, tightly woven account that "closely approximates the reality it represents" as Strauss and Corbin (1990:57) suggest.

3.5 Ethical considerations

I asked for permission from the principal of the school and from learners, parents and educators through the school principal. I asked permission from the director of the Albany Museum and from the staff involved, in this case the herbarium curator and the education officer. I also asked permission for the use of Linda Hospital's monthly report files on malnutrition in Grahamstown. An official letter from my supervisor accompanied all of these documents. Even though I am a board member with access to the Linda Hospital malnutrition report files I had to ask for permission if I wanted to use this information for my research purposes.

All participants have been informed about the objectives of the research. Confidentiality and anonymity as well as the right to withdraw were guaranteed during the study. Information generated during the study was taken back to participants, in particular, the science teacher and the museum's staff before any form of report writing was undertaken. I assumed it might be difficult for Grade 7 learners to take decisions as far as this is concerned, because of their age. I therefore used their principal and parents to take binding decisions on their behalf.

3.6 Validity and trustworthiness

As a means of data validation I used triangulation to support validity as suggested by Merriam (2002). Also I used the triangulation technique to help me to minimise and reduce the risks of biasness (Maxwell, 1996:75). Triangulation of data has been used to minimise subjectivity and biasness (Cohen & Manion, 1994). According to Cohen et al. (2000), triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research. I regard validity and reliability to be important components of this research because the quality of qualitative research relies on it and this is also Merriam's (2002) suggestion.

I used Merriam's (2002:72) approach to deal with reliability. Also, I used Bassey's (1999) approach to explain the concept of trustworthiness of my research findings. All the above information has helped to give a clear, detailed and in-depth description of context and findings.

3.7 Reflections on the methodology

Challenges

Time and availability of learners was a challenge and a limiting factor in conducting this research. After discussing with the science teacher it became clear to me that access to the learners was going to be at about 12 noon. The science teacher told me that this was the time that did not clash with the school programmes. However, he promised me that he was going to let me know of any changes that the school encountered. The time limitations in terms of learners' availability affected the organisation of research. I had to meet with learners at 12 noon for a period of one hour as some of them had their transport collecting after this. Nonetheless, we managed to negotiate with their transport for the community member lesson as it was going to take longer than one hour.

The involvement of a community member also became a challenge as she preferred to use her mother tongue. However, even though this school is using English as a medium of teaching and learning many learners speak *isiXhosa*. Therefore both the learners and the community member welcomed the idea. This is also in line with the DoE (2002:5) which insists that 'the learner's home language be used for learning and teaching wherever possible' and, as though to clarify this, Section 29 of the South African Constitution affirms that everyone has the right to receive education in the official language(s) of their choice.

The fact that I am in a wheelchair was also a challenge as the school was not wheelchair friendly. I had to take these learners to the Albany Museum for all the lessons.

3.8 Conclusion

The methodology used in this chapter has enabled me to fulfil the investigation into the benefits of indigenous ways of knowing of wild food plants (*imifino*) used in Grade 7 learners' homes. The data generated worked well in the sense that I was able to show how indigenous ways of knowing and intergenerational ways of knowing could be used. This was observed

during the mobilisation of learners' prior everyday knowledge. In addition to this, activity-based hands-on practical activities were conducted to further learners' conceptual understanding.

In the next chapter the explanations and descriptions of the terms used in Chapter 5 are provided.

Chapter 4

Explanations and descriptions

> A formal definition is based upon a concise, logical pattern that includes as much information as it can within a minimum amount of space. The primary reason to include definitions in your writing is to avoid misunderstanding. A formal definition consists of three parts, such as the term (word or phrase) to be defined, the class of object or concept to which the term belongs and the differentiating characteristics that distinguish it from all others of its class (Driscoll, 2006)

4.1 Introduction

Here I have explained and defined terms that are used in Chapter 5. I have described brainstorming session, the herbarium, the mobile biology laboratory unit and parent or community member involvement in learners' education. I have also explained their roles. This chapter thus informs us about what is to be expected in the next chapter.

4.2 Teaching and learning

The brainstorming, the herbarium, mobile biology unit and community member being clearly explained and defined have been jointly used to promote teaching and learning in school respectively.

4.2.1 The brainstorming session

During brainstorming sessions there should be no criticism of ideas as one is trying to open up possibilities and break down incorrect assumptions about the delineations of the problem. Judgements and analysis at this stage are discouraged because they will stimulate idea generation. Therefore, ideas should only be evaluated at the end of the brainstorming session and thereafter you can then explore solutions further using conventional approaches.

16 learners between 12 and 13 years old, together with their science teacher, were taken to the herbarium at the Albany Museum (AM). I chose AM because I volunteered there when I started this study. It was easier to liaise with their staff and I also noticed that the AM had all the necessary equipment for this session.

Learners were randomly asked how much they knew about wild food plants (*imifino)*. This was done to find out what they already knew about wild food plants (*imifino*) which are eaten at their homes and also known as *isigwamba*. In other words, it was necessary to ascertain learners' prior everyday knowledge and experiences regarding wild food plants (*imifino*). This also helped to identify some of the preconceptions they had about *imifino*. For example, one learner mentioned that her mother usually cooked and ate *imifino* when she was with her female friends or community members. This learner added that when she asked her mother about eating *imifino* with other female friends, she was told that it was quick and easy to cook.

4.2.2 The herbarium and its role in wild food plants' (*imifino*) identification

The herbarium is an organised and catalogued collection of dried, pressed and preserved archival plant specimens. It has a room dedicated to plant samples stored in specially designated storage facilities in large light and insect-proof cabinets. Specimens can be consulted by scientist and the public alike with guidance given by the herbarium staff.

The value of the herbarium is therefore that it allows for correct scientific identification of plant species and provides additional information such as whether plants are poisonous or edible.

Interviews with the herbarium assistant

During this interview, the herbarium assistant also explained how valuable this institution is to all plant information seekers. She also mentioned that they document ethno-botanical information which includes plant use as medicine, food and poisoning ability which made it more relevant to the planning of the lesson.

4.2.3 Mobile Biology Laboratory and its role in testing of wild food plants (*imifino*)

The Mobile Biology Laboratory (MBL) unit travels on a daily basis in the afternoons to seven local high schools delivering hands-on practical experience to an average of about 450 Grade 12 learners a year. The aim of the programme is to address a serious imbalance endemic to the township schools and to spark a renewed interest in the Sciences.

I decided to invite the Mobile Biology Laboratory unit member to perform food tests on wild food plants (*imifino*) used as food (Appendix H).

4.2.4 Parents and community members: Role in learners' education

Dulac (2006) regarded parents as the first teachers of their children. Certainly, in the case of food, children learn how, what, when and where to eat from their parents. The South African Act of 1996 provides formal powers in education to parents as well as communities (Singh, Mbokodi & Msila, 2004) to enable parents and community members to take full responsibility in making sure that learning and teaching does take place. It is through statements like this legislation that motivated me to invite a community member to participate in this research study.

Questionnaires which were given to learners, for parents and community members played a very big role in guiding us (the community member and I) during the planning of a lesson. This information was gathered by the learners from their parents and community members. I did this so as to find out how much knowledge parents and community members have on these wild food plants (*imifino*). In the process learners were equipped with research skills.

The responses from these questionnaires assisted me in assessing learners' parents and community members' background knowledge on wild food plants (*imifino*). Parents and community members were able to demonstrate their knowledge of wild food plants (*imifino*) and mentioned their local names such as *utyuthu*, *imbhikicane*, *ihlaba* and *umhlabangubo*. Regarding the use of *imifino* in some cultural activities they denied its compulsory use but they could not rule out its use. On the question of who collects these plants it was stated that these

wild food plants (*imifino*) were collected by females. I found this information very useful and as a result I decided to invite one community member to present a lesson to these learners.

4.3 Conclusion.

According to Wikipedia, the computer-based, encyclopaedia brainstorming is a useful and popular tool that can be used to develop highly creative solutions to a problem. It is a lateral thinking process and requires that people come up with ideas and thoughts that at first seem to be unorthodox but often result in novel and original possibilities.

Herbarium assistant interviews were intended to probe and document information about the herbarium itself and also probe how the herbarium could be of use as an available resource in learners' education. Based on these interviews the herbarium assistant and I could collaboratively plan a lesson about plants.

The Mobile Biology Laboratory (MBL) is a Rhodes University outreach project that was initiated to address the lack of laboratories and equipment at disadvantaged high schools in Grahamstown. Supported by the Rhodes University Education Department, the fully equipped Laboratory was developed by a former teacher Rhona Duncan.

I believe that the involvement of parents and community members in learners' education can help bridge the gap between everyday life and school science. In fact, parents are the first persons who are likely to make an impact in their children's development.

In the next chapter I have reported the findings on the data generated.

Chapter 5

Reporting the findings on the data generated

> To generate data, you must create and run a data generation plan. The data generation plan contains the information about which tables and columns you want to fill with data. It also contains details about what kind of data you want to put in each column, and how much. A brief written report is a valuable record of the evaluation and its findings. Key points from the report should also be shared with the students, parents and staff who were involved in the study (Microsoft Visual Studio 2005 / .NET Framwork 2.0)

5.1 Introduction

This chapter presents the manner in which data was generated and reported as findings. The observations from the brainstorming session, the herbarium assistant lesson, a member of the mobile biology laboratory unit lesson and the community member lesson who discussed the topic of nutrition, possibly reflect the perceptions of a majority of *amaXhosa*. This chapter demonstrates how integrated ways of knowing and indigenous ways of knowing can be used to investigate learners' perceptions and conceptions on wild food plant (*imifino*) with a view to enhance conceptual development on nutrition.

The Revised National Curriculum Statement (RNCS) DoE (2002), states that science cannot be divorced from society and its environment. This is reflected in learning outcome 3 (LO3) of the Grade 7 Natural Sciences curriculum. This chapter, therefore, looks at the benefits of the use of locally available resource institutions such as the herbarium (natural history collections), the mobile biology laboratory (University outreach programme for schools) and the community member with local knowledge on wild food plants (*imifino*).

The design, development and implementation of lessons from a learning unit based on indigenous ways of knowing, was a developmental process beginning with a brainstorming session, followed by a visit to the herbarium at the Albany Museum, a lesson for Grade 7

learners facilitated by the mobile biology laboratory and lastly, discussions and interaction with a community member as suggested in the above epigraph.

5.2 Findings from the lessons

Below are the findings from learners' reponses to questions, during brainstorming session, the herbarium assistant lesson presentation, the mobile biology laboratory member demonstrations and the community member activities respectively.

5.2.1 Findings as learners' responses to questions during brainstorming session

Some of the the questions asked were the following:

What is *imifino*?

Where do we get these plants?

Can everybody eat *imifino*? (Appendix E1)

Eating

Learners' responses during this session showed that they knew *imifino* to be food, but there were still some misconceptions about it. For example, one boy mentioned that his older brother and father do not eat *imifino* because it is a female meal. Some learners who are boys said they were only eating it because they are still young but when they grow older and become older boys or men they will stop as elders do.

Other learners said that they eat *imifino* as a meal that is given to them by their parents without realising or knowing its nutritional value. Some learners, however, said that their parents told them that they need something to eat to grow and *imifino* was something that was easily available.

Collection

Learners mentioned that wild food plants (*imifino*) are collected and cooked by females, though boys in this study also demonstrated some knowledge which is more or less the same as that of

girls. Boys said that at their age there were no strict cultural rules that limit them from doing what girls do. They added by saying that they are closer to their mothers than to their fathers at their age who happen to be main *imifino* collectors as it emerged from this study.

Learners therefore demonstrated an awareness of these wild food plants (*imifino*). Those that were from farm and rural areas were however; better off in their understanding of *imifino* compared to those learners from the townships and town suburbs. This boosted the ego of learners from farm and rural areas as they contributed to the lesson more than the township and suburbs learners for a change as far as their science teacher was concerned. He told me he was very impressed by the fact that learners from farm and rural areas felt proud of themselves and where they came from. This suggests that by taking learners' prior everyday knowledge the teacher can boost their self-esteem.

Identification

Learners said that they were not allowed to put any collection in the basket before they can show it to an older person they were with in the field or garden. They were told that at their age it was easier to confuse some poisonous plants which look like *imifino* with those they were collecting. This shows the important role played by indigenous ways of identification during plant collection.

The above paragraph shows how valuable the presence of an older and knowledgeable person is. The reason was that these plants were going to be cooked and eaten without being taken to the herbarium for scientific identification.

The herbarium assistant told me that she was able to identify learners' prior everyday knowledge through questions and answers given during the brainstorming session, which subsequently informed her lesson plan. It would be of interest, therefore, to see how preconceived perceptions had changed. In other words, will these lessons change learners' pre-perceptions and pre-conceptions on wild food plants (*imifino*)?

The first lesson was about plant identification and was conducted at the herbarium. The information on plant identification was given to assist the learners to differentiate between poisonous and edible plants as far as the herbarium assistant was concerned. The second lesson was on food testing done by the mobile biology member. This provides learners with information about the nutrients *imifino* have. The last lesson was done by the community member who showed how these plants were collected and how the meal called *imifino* was prepared. The community member also shared some cultural stories in relation to *imifino*. This reminded me of when I was seven years old and my grandmother used to tell me stories about the relationship between food and our culture. I therefore believe that stories are the medium through which we can communicate meaningfully with each other. Storytelling is the oldest form of communication. Our wisdom, our intuitive knowing is imbedded in the stories we tell. Just after our need for food and even before our need for love, we have a need for story (Gabriel, 1999).

In the next section I will discuss the three lessons taught. Their sequence is as follows:

- The herbarium and its role in wild food plants' (*imifino*) identification
- Mobile biology laboratory and its role in testing of wild food plants (*imifino*) and
- Lesson on wild food plant *(imifino)* collection and its preparation

5.2.2 Lesson on plant identification

The herbarium assistant took the learners, their science teacher and myself to the herbarium and gave a brief summary of what the herbarium does and how it helps us gain the correct identification of wild food plants. She informed us about all the necessary procedures that are required for a person who would like to use the herbarium. Thereafter, the herbarium assistant presented step-by-step information about how the herbarium operates.

She also introduced us to the preparation room where all specimens are dried in preparation for mounting and then taken to the freezer to kill all the insects that might have infected the plants. Thereafter, specimens were taken to the oven before going to the pressing machine to keep up

their original shape before they can be mounted. After mounting, these specimens were filed and put into the cupboards. Specimens could stay for hundreds of years in the cupboards if correct procedures were followed.

Learners continuously asked questions as they were allowed to do so during the lesson. They asked questions such as how herbarium can be of assistance when they want information about plants. Most of the questions were answered through practical demonstrations. The MBL member said her experience has taught her that answers through practical demostrations are best understood by learners. Learners were also given a chance to have hands on experience of plant identification. They were given wild food plants (*imifino*) such as those given in fig. 5.1 below to identify but they had no name labels on them. Booklets which would help them recall the information required in plant identification was given to learners. Since the booklets were written in English with scientific names the herbarium assistant was there to assist the learners. They asked to see, and were shown, the oldest specimen in the herbarium. Learners were so impressed to see a specimen as old as a hundred years still in good condition.

5.1.1 *Amaranthus hybridus* - Utyuthu

5.1.2 *Bidens pilosa* – umhlabangubo

5.1.3 *Solanum nigrum* (s.l.) - umsobosobo

5.1.4 *Sonchus oleraceus* - ihlaba

5.1.5 *Chenopodium murale* - imbikicane

5.1.6 *Raphanus raphanistrum* - Isiqwashumbe

5.1.7 *Cucurbita pepo* – imithwane

5.1.8 *Urtica urens* – irhawu

Figure 5.1 Wild food plants - *Imifino*

Discussion of assessment

After every step the herbarium assistant kept on pausing for questions and at times she would ask learners some questions. Her presentation was in English; however learners were allowed to ask questions in *isiXhosa*. This was made possible due to the fact that the herbarium assistant could also speak *isiXhosa*. There was not much difficulty experienced in understanding the language except in pronouncing the botanical names. She had no problem code switching (that is moving from English to *isiXhosa*) whenever there was a need to do so during her presentation. This enabled us to assess whether we were still moving together. Learners' were given a worksheet to complete at the end of the lesson which also tests the learners' understanding on what was discussed with them.

In addition to the worksheet, learners were given some unlabelled plant specimens to identify. 80% of them correctly identified their given specimens and 20% were still struggling (explanation of percentage is given below table 5.1). It was at this point that learners were able to demonstrate their understanding and the importance of using the herbarium for the

identification of plants. Learners showed some enthusiasm during the identification process. They were able to demonstrate an understanding of some key scientific concepts and processes such as specimen, plant identification, mounting of a specimen and filing of a specimen. The herbarium assistant decided to spend some extra time explaining to the 20% of learners who struggled during hands on plant identification practical.

5.2.3 Lesson on food tests

The mobile biology laboratory (MBL) member prepared the identified wild food plant (*imifino*) for testing the presence of some nutrients required by our bodies to grow healthy. Learners were divided into 3 groups of 5 learners each except for one group which had 6 learners. Boys and girls were mixed in these groups. Each group had the required equipment. Three wild food plant specimens were provided to each group.

At the beginning of the lesson, the MBL member randomly asked learners to give local names of these plants and their use. Learners had to pick up the plant such that everybody could see it as the learner named it. Learners were able to identify these plants. They also knew that these are used as *imifino*. However, they showed no knowledge of how to go about testing nutrients in these plants. The MBL member told learners that these tests would help them know how nutritious these plants were. Learners were able to perform the test themselves after the MBL member had demonstrated it practically.

Figure 5.2 Food tests demonstration and learners' hands on experience.

During testing of wild food plants (*imifino*), learners were able to observe results which showed that these plants have the nutrients required by the body for its healthy growth and development. The food testing has thus helped the learners to realise that they do not have to buy very expensive vegetables to get the nutrients required by the body.

Due to time limitations, however, learners could not test any vegetables such as cabbages that they buy from the market or plant in their gardens at their homes. A table from Kruger, Sayed, Langenhoven and Hoing (1998) was given to the learners for comparison purposes instead. In support of the above practical information, this literature also gave more information on the nutrient content. Table 2.1 showed that some of these wild food plants (*imifino*) contain more nutrients than the ones we buy from supermarkets. A clear example can be observed as you look at the content of nutrients found from utyuthu (*Amaranthus sp*) and compare them with those of cabbages (*Brassica oleracea*). Learners were very excited about the results. They even promised that they would advise their parents and community members to take *imifino* very seriously because of their nutritional value.

It was also observed that plants that were collected before sunrise showed negative results (starch was absent) and those that were collected after sunrise showed positive results (starch was present). These results were interpreted as an indication that sunlight is very important in the production of starch. Therefore a plant collector must do so after sunrise. The MBL member further explained by showing learners that starch is the product of sunlight, carbon dioxide and water with mineral salts from the soil. If one of these components is missing results will always be negative as observed above. The MBL member also stated that these are the end products of the process of *photosynthesis* with oxygen being released as a by product and would deal with its details at their higher levels of learning such as Grade 12. This information explains why *imifino* were collected after sunrise. It thus answers the question which could not be explained by parents and community member as they responded to the questionnaire.

Assessment

I had the opportunity to move around from group to group asking questions on the observable changes that were taking place in the learners' experiments. It was during this period that learners were able to demonstrate some conceptual understanding when they were interpreting the changes which took place during the experiments and to associate them with the presence of starch, proteins, lipids and vitamins (Fig. 5.2). This was a demonstration of an understanding of key scientific concepts as the learners were able to identify, describe and define nutrients found in these plants. For example starch and some further evidence of this is available in the form of worksheets (Appendix G).

5.2.4 Lesson on wild food plant *(imifino)* collection and its preparation

This lesson was presented by a community member at the Albany Museum gallery. She brought fresh material of wild food plants (*imifino*). She explained in *isiXhosa* how she had collected the plants. She said she used hands to pick up *imifino* though she recommended that if you have gloves you can use them because plants such as *iRhawu* are itchy. She also mentioned that her mother in law used to check the collection before it could be cooked. Though she did not ask her why she thought maybe it was because elderly people still believe that they are the most knowledgeable people in the community. Checking for the presence of poisonous plants in wild food plants helps to prevent cooking plants that can harm people who eat *imifino*. Now that she has confidence in her she does not bother to check any more.

One learner asked, "Uyisile imifino eherbarium ukuze ufumane isiqinisekiso? Which means, did you take your *imifino* to the herbarium for identification?" This question was asked in *isiXhosa.* Maybe it was because the community member was presenting her lesson in *isiXhosa*. The community member reminded learners that she has been collecting *imifino* for years therefore she is quite sure about them.

In my view, the question could be interpreted as a threat to the community member's indigenous knowledge. However, the manner in which she handled it showed how confident she was about her indigenous knowledge. But she agreed that a sample can be taken to the

herbarium after learners explained to her about the importance of the herbarium and its use. This did not take us long since the herbarium was just on the first floor of the same building. The results came back confirming that these were indeed wild food plants good for consumption and not poisonous. Thereafter the presentation continued. This argument showed some possibility of indigenous ways of knowing being undermined compared to scientific knowledge.

The community member also mentioned the fact that plants must be collected after sunrise. However, she could not explain the reason why. She said that was how they were taught by their parents and according to their culture they were not allowed to cross question information given by elderly people. The lack of scientific explanation was also identified during brainstorming session with learners.

Fortunately, learners were already aware of the reason for this from the previous lesson on food testing for nutrients such as starch on these wild food plants (*imifino*). The community member thus gained some scientific knowledge as learners explained to her the reason for waiting for sunrise before collecting these wild food plants (*imifino*). However, they did not get into deep details of photosynthesis. I assumed this is because this topic is done in Grade 12 and they were still in Grade 7.

The community member also shared some stories about beliefs about eating *imifino,* such as; men were not expected to eat *imifino*. This is based on the belief that males would gossip like females if they ate it which was also mentioned during the brainstorming session by the learners. Nonetheless, most learners did not agree with the story as they indicated that everybody needed these nutrients which are in these wild food plants (*imifino*). Most said everybody ate *imifino* at their homes regardless of being male or female.

The community member also mentioned that over cooking can change the taste and must be avoided. She suggested that stove must be at low levels of heat because too much heat also leads to over cooking. She also suggested that food must be checked every 5 minutes until found ready.



Figure 5.3 Preparation, dishing and tasting of *imifino*

Learners were also provided by the community member with some pamphlets with information about each plant and the procedure that needs to be followed when one was preparing *imifino*. She got these from her recipe book which I had the opportunity of editing (Appendix F).

Assessment

Learners were able to show an understanding of scientific processes such as plant collection and plant preparation. They also demonstrated an understanding of the negative effects of over cooking as they stated that this could destroy the nutrients.

5.3 Designing and developing the learning activities and materials

All the shared information in the sections above can be used during the process of designing and developing learning activities and materials. I had a constructivist approach (Section 2.7.1) at the back of my mind, a theory underpinning Curriculum 2005 (C2005) which provided the learners with the necessary skills, knowledge, and experience required to meet the goals and outcomes of the work unit. To achieve this I had to provide information that could help with the following:

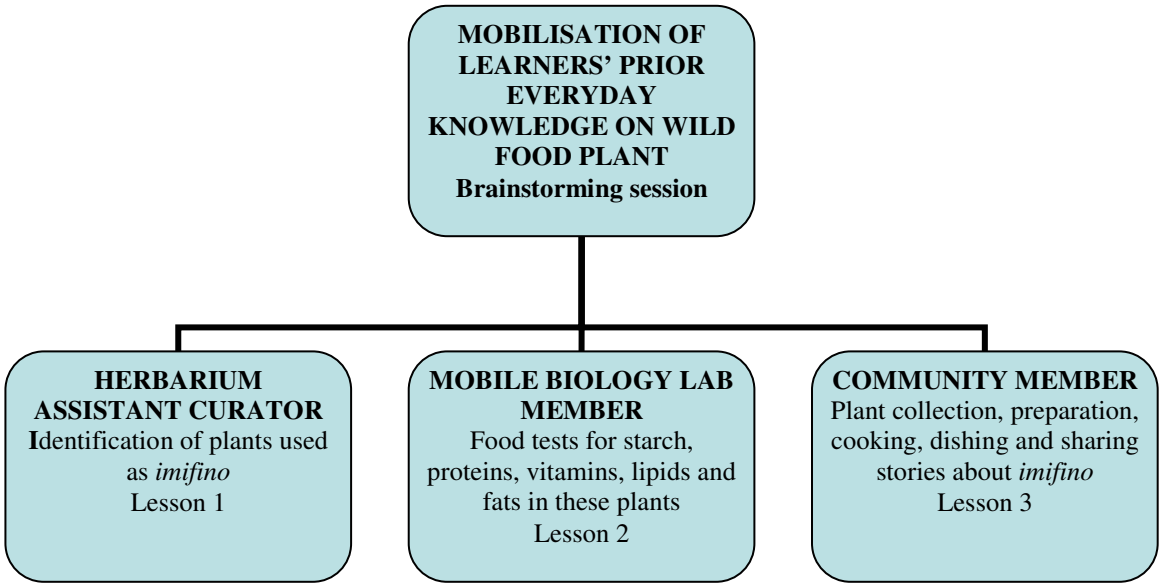
- Mobilisation of learner's prior everyday knowledge and engaging them in finding information.

- Design and utilise learning activities that engage learners in active learning. This was demonstrated when learners were testing the presence of nutrients such as starch in wild food plants (*imifino*) after the MBL member's practical demonstration.
- Provide meaningful and authentic learning experiences that help learners apply concepts and achieve learning outcomes. Learners' interpretation of colour change showed how these learners were able to demonstrate their conceptual understanding as it was explained in the procedure (Appendix F).
- Use strategies that consider the different learning styles of learners. The fact that learners were introduced to three different facilitators showed them that they can learn by visiting resourceful institutions, making use of practical activities to enhance conceptual development and taking into consideration their everyday life experiences as the community member had just demonstrated to them.
- Remember that active participation facilitates learning better than passive learning. Their active involvement made it easier to assess learners' understanding.

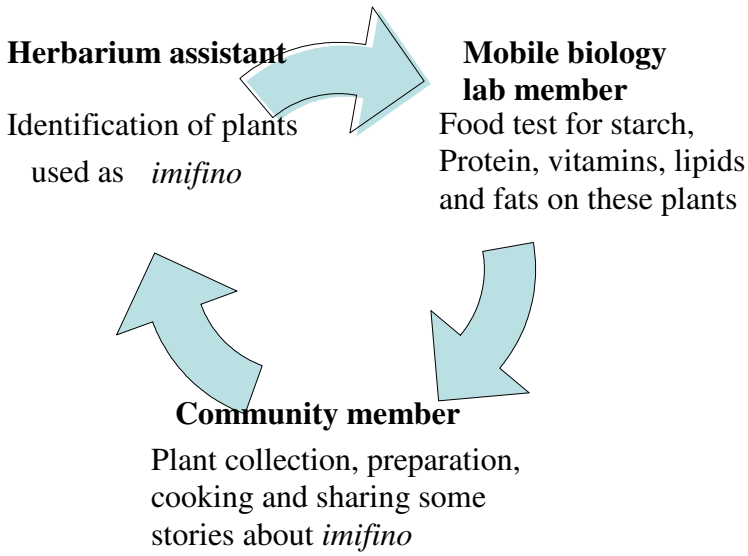
C2005 emphasises the importance of learners' prior everyday knowledge as the starting point of a lesson and throughout the lesson. This is also in agreement with Vygotsky's (1978) suggestion that learner's social and cultural backgrounds influence their learning.

I have tried to be creative and used several different activities to enhance the learning in this study. As a result, learners were interested and involved in the lessons through learning activities. During the community member's lesson some learners were helping the community member in the preparation of *imifino* and others were asking questions and writing the information down on the steps involved in the preparation of *imifino.*

5.4 Summary of lesson implementation



5.5 Summary of the facilitation process



The above facilitation process was done over a period of three days. Each facilitator had her day. On Monday the 21st of August 2007 it was the herbarium assistant. On Wednesday the 23rd of August 2007 it was the mobile biology laboratory member. On Friday the 25th of August 2007 it was the community member.

All the above facilitation processes were done between 12h00 and 13h00. This was the time agreed upon after the science teacher looked at his school timetable. When I asked him reasons for this suggestion he told me that this would not clash with the school programmes and this time was also fine for me.

5.6 Assessment procedure

I decided to give a full procedure of assessment even though this study is mostly looking at learning outcome 3. However, it became clear that these outcomes cannot be divorced from one another.

Learning outcome 1: Scientific Investigations

As required by learning outcome 1, in scientific investigations learners were able to act confidently on their curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

Assessment standards

These were demonstrated when the learners planned investigations on how to collect wild food plants, how to identify, how to get their nutrient content and how to prepare the meal.

Learning was evident when the learners identified wild food plants given to them by the herbarium assistant and when they were given the opportunity to perform the food test by the mobile biology laboratory member. They also contributed in ways that aided the investigation and also predicted reasons why a particular test was positive and the other was negative.

Learners conducted investigations and collected data. They organised and used questionnaires to gather and record information.

Learning Outcome 2: Constructing science knowledge

Learners were able to interpret and apply scientific, technological and environmental knowledge.

Assessment standards

These became evident when the learners recalled meaningful information. In the worksheet given to learners they were able to recall definitions and complex facts such as defining nutrition giving examples of nutrients found in wild food plants. They also gave local names of these plants used in making *imifino*.

Learning was evident when the learners distinguished wild food plants from poisonous plants that look alike through use of herbarium ways of identification. They made lists of the plants used in making *imifino* which explained how the identification process and the food tests were conducted.

Further learning was evident when the learners used a simple classification system to group types of familiar plants; compile a list of wild food plants based on common properties, and compare them with the list of another group.

Applied knowledge: Applied conceptual knowledge was evidenced by linking a taught concept to a variation of a familiar situation.

Learning was evident when the learners identified which plants could be used as *imifino,* applied the concept of plant identification to debate the question of whether these were edible or poisonous. They also used negative and positive results found during food tests due to differences in time of collecting the same specimens to substantiate the reason why wild food plants must always be collected after sunrise.

Learning Outcome 3: Science, society and the environment

The learners were able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

Assessment standards

This became evident when the learners understood science as a human endeavour as they compared differing interpretations of events.

Learning was evident when the learners identified and explained differences in the results of wild food plant nutrient tests of the same plant being investigated; described difficulties in observing certain phenomena especially during food tests (e.g. when a plant is collected before sunrise and the specimen collected after sunrise) and suggested ways of gaining better information. Learners demonstrated understanding of the necessity for sustainable use of the earth's resources**:** they analysed information about sustainable and unsustainable use of resources.

Learning was also evident when learners analysed data provided about collecting wild food plants. Each group leader presented the analysis as a report to the class at large as groups' recommendations.

5.7 Conclusion

In this chapter I have shared ways and means of utilising available resources including the use of the herbarium assistant for scientific plant identification, the MBL member for scientific testing of wild food plant (*imifino*) and the community member who used indigenous ways of knowing as she shared information on collection and preparation of wild food plants (*imifino*). The results and comments from learners and the science teacher demonstrated the value and the importance of this integrated approach towards learning and teaching which they had never thought of before.

This is also known as an intergenerational approach as proposed by O'Donoghue (2006). The use of indigenous ways of knowing has made learners and their science teacher see how culture can influence what we eat, as the community member narrated the story on who can eat *imifino* and who cannot. However, this confirms what Osseo-Asare (2005) once said as he was looking at people's culture and what they eat.

In the next chapter I critically look at the layout of data and analyse it.

Chapter 6

Data analysis

> Data analysis is a process of gathering, modeling, and transforming data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different business, science, and social science domains (Wikipedia, 2008)**.**

6.1 Introduction

This is a data analysis of social science domain with reference to indigenous ways of knowing about *imifino*. In this chapter I have looked at data obtained from the brainstorming session, learners', community member's and teacher's responses. I have labeled the analysis of these responses as analytic statements paying attention to what is proposed in the above epigraph.

I have also used tables to analyse some of the data. Questionnaires, observation schedules, semi-structured interviews and focus group interviews were also analysed.

All the responses were analysed according to the goals and questions raised in the research study. That is, during data analysis the achievement of goals and success of the methodology was used as a measure of success in this study.

6.2 Analytic statements

The number given to these analytic statements also suggests the order in which the data has been obtained. Analytic statement 1 was the first data obtained for the study after herbarium assistant and museum educator interviews (Appendix C 1 and 2).

6.2.1 Analytic statement 1

Analysis of learners' responses on brainstorming session

It was very interesting to find out that most of the information shared by the learners they obtained from their parents and some community members, and not from the school. In fact, to me this shows how important brainstorming is (Section 4.2.1). This suggests that getting learners' prior everyday knowledge can be used as an effective starting point during teaching and learning.

During mobilisation of learners' prior knowledge, the learners' limited understanding of nutrition as the study of nutrients came as no surprise because this involved some scientific concepts which needed to be formally taught. However, some of their responses such as for example "we eat *imifino* to grow healthy and strong" showed some understanding although they could not explain why.

Some of the information from learners' pre-perceptions during brainstorming session could be interpreted as misconception since *imifino* provides our bodies with the nutrients that are needed by people regardless of gender orientations. This can be correct when looked at from a scientific angle, culturally however, that may not be the case. I am saying this because in African culture food is influenced by culture and tradition and vice versa as observed by Osseo-Asare (2005:191).

Culture and the traditional background of learners may have contributed to their awareness of wild food plants (*imifino)* as they were all *Xhosas*, except for one coloured girl who seemed to share a lot in common with her classmates and she could even speak *isiXhosa*. This is also supported by their claim that *imifino* is their cultural food as in agreement with Shava (2000). However, the fact that some learners could not remember common names may be due to the fact that they live in different locations: some in town suburbs, townships and farm areas. Learners from farm and rural areas again as they did during brainstorming session (Section 5.2.1) felt proud of themselves and where they come from for a change. I am saying this

because the science teacher has told me that learners from rural and farm areas were being dominated by learners from township and urban areas in many science learning activities. This was an indication of the importance of the use of learners' prior everyday knowledge in teaching and learning activities.

In my analysis I have also categorised learners' responses and put them in a table form.

Table 6.1 Analysis of learners' responses from the brainstorming session

Categories	**Participants' responses**	**Participants' positive responses in percentage form %**
Knowledge of wild food plants As *imifino* Recall their local names	• Learners showed awareness of the existence of wild food plants which are known as *imifino.* • Learners also mentioned their local names. However not all were able to remember these local names.	100% 70%
Knowledge of nutrition The study of nutrients our body requires for growth and development	Learners showed some knowledge of nutrition in the brainstorming session.	30%
Relationship between *imifino* and nutrition You get nutrients from *imifino*	During the brainstorming session learners could not relate *imifino* with nutrition. Did not even mention any kind of nutrient found in *imifino.*	0%
Knowledge of plant identification	• Learners suggested use of parents	100% on indigenous

Both indigenous ways and scientific ways	and elderly community members for identification. • They knew nothing about scientific identification	ways of knowing. 0% on scientific ways.
Use of resources Such as herbarium, mobile biology laboratory and community member	Learners and their science teacher welcomed the idea of utilising these resources. Though they could not see how a community member can fit in.	100%
Indigenous knowledge	They welcomed the idea of including indigenous ways of knowing.	100%

* In the first column I have categorised these learners' responses.
* In the second column I have described these learners' responses from each category in words.
* In the third (last) column I looked at those responses which were correct and closer to the correct answer and gave them the % accordingly. Formula (x/16) X100 = …% x being the number of learners who responded correct and those who were more close the correct answer.

6.2.2 Analytic statement 2

Analysis of learners' responses on the herbarium lesson of plant identification

The fact that some learners were able to name these wild food plants (*imifino*) by their common local names was evidence that they were familiar with them. The use of parents and elderly community members for identification of these plants shows the importance of socio-cultural values as advocated by constructivist theory (Section 3.2.2). This also showed how knowledge is shared in communities.

Nonetheless, I found it disappointing that no one knew about the institution such as herbarium which gives correct plant identification free to the public. I regard this institution as of great

importance because some of the wild food plants are very similar to poisonous plants. The science teacher also confessed that even though he knew about the herbarium he could not fit it in the nutrition lessons. After this comfirmation I felt that is a need for intitutions such as herbarium and education to work out some plan whereby these institutions can market themselves to schools.

The response of learners after they looked at the oldest specimen boosted their confidence towards the value and importance of using the herbarium for plant identification. These benefits were demonstrated in the manner they responded to the worksheet given to them at the end of the presentation (Appendix G). There were questions on why it was important to correctly identify plants, where these plants could be correctly identified and steps involved in plant identification. They all wrote correct answers to these questions. Also the 80% correct responses of learners during hands on practical activities of plant identification was an indication of the success of the lesson presentation. The herbarium assistant decided to spend some extra time explaining some of the steps they missed during the plant identification practical.

Analysis of the science teacher's response on the herbarium lesson of plant identification

During the herbarium lesson of plant identification, which was presented by the herbarium assistant, the science teacher was given a classroom observation schedule as a guideline to respond to on his observation as an observer (Appendix H). This was done to show the importance of involving resources such as the herbarium for correct plant identification.

According to the science teacher, during the lesson the herbarium assistant elicited learners' prior everyday knowledge as she asked learners to share what they knew about the wild food plants (*imifino*). Learners were also kept active through sharing their experiences throughout the lesson.

He found the use of the question and answer method, touch and observation of specimens through microscopes as appropriate as they involved learners in the lesson. He believed that the

way learners listened and the positive responses given to questions showed that they were developing an understanding of the importance of the herbarium. They were also accommodating the new knowledge quite well as they seemed to be comfortable with the new concepts that were discussed.

He observed that the presenter was able to keep the relationship between her and the learners because she could code switch when realising that they did not understand. According to the observer, the use of code switching (*changing from English to Xhosa and back to English*) has helped the learners bridge the language barrier that could have affected learning.

This lesson has then depicted the teacher's view of the nature of science as he confirmed that he used to isolate science from our way of life but the lesson made him view science in relation to our indigenous knowledge and social understanding of life. According to the literature reviewed in this study (Section 2.7.1), it has become clear that for effective teaching and learning learners' everyday prior knowledge need to be considered (Jegede, 1997). This also forms part of the research framework of social constructivism (Section 3.2.2) as proposed by amongst others, Vygotsky (1978). This enables the teachers to understand learners' background.

It became evident that teachers are under utilising the educational institutions around them as the science teacher confirmed that he himself depends solely on a textbook for his planning of lessons. His comments showed that his mind was still occupied by the old approach to teaching. Therefore this kind of approach which was promoted by the C2005 (Section 2.5) was an eye opener to his way of planning of lessons.

The science teacher said that since the herbarium did not only keep scientific information on plants but also their cultural and traditional it stories has drawn more attention for learners and made the lesson very interesting to them. This comment is in agreement with Chisman (1984) and Crean (1990) as they emphasised the importance of cultural values in learning and teaching (Appendix H).

6.2.3 Analytic statement 3

Analysis of learners' responses on food testing lesson conducted by a mobile biology unit

In my own analysis the manner in which learners were responding and answering questions as I was moving around showed conceptual understanding of the new concept on *imifino* such as nutrients. According to the learners, this information did not only change their pre-perceptions and pre-conceptions about *imifino* but they also gained more knowledge in terms of value and importance of *imifino* in our bodies.

The success of this lesson was also demonstrated by the correct responses on answers written on a worksheet given to them (Appendix G). The fact that learners kept on asking questions as they were getting positive and negative results showed that these learners were enjoying the lesson. Positive means what has been tested can be detected and negative means what has been tested cannot be detected. This also helped them to understand the importance of sunlight in the formation of starch. However, I think it would be more interesting if they are also given a chance to test vegetables like cabbages and do their own comparative report. I was however satisfied by the manner in which they responded as they were given a table adopted from Kruger, Sayed, Langenhoven and Hoing (1998) (Table 2.1).

6.2.4 Analytic statement 4

Analysis of learners' responses on wild food plants (*imifino*) collection and its preparation conducted by a community member

The positive response on the use of parents and community members as human resources was evidence that they are willing to be part of their children's education. However, some did not see how they could fit in. They all supported the use of indigenous ways of knowing. They said it would help keep their culture alive because now their educated children are more westernised. The community member had an opportunity to demonstrate the relationship between gender and work.

The fact that females are the ones who collect and prepare *imifino* shows that in *Xhosa* culture some responsibilities are distributed according to gender. The community member also demnostrated the power of a language as she used *isiXhosa* when presenting her lesson in the sense that this made communication between her and the learners easier. This was observable as learners were continuously asking questions throughout the lesson.

I find it interesting to discover that community members collect these plants after sunrise because it further emphasises the importance of sunlight as once mentioned by the MBL member. This also showed how integration of school science knowledge can complement our cultural knowledge as it has done to learners' pre-perceptions and pre-conceptions about *imifino*. This gave learners an opportunity to demonstrate understanding and how their pre-perceptions have changed. Allowing the community member to do her presentation also gave the learners an opportunity to challenge some of the community member's presentation points.

To me this gave the community member an opportunity to learn something from the arguments and debates they had with the learners as the presentation continued. However, I could see that the community member was pleasantly surprised by this because in our culture children do not usually engage themselves in debates with elderly people. I believe that this did not only change the learners' and community member's pre-perceptions but also offered an opportunity to change the communities' pre-perceptions as the community member was also going to spread the news.

Learners' disagreement with some of the information provided by the community member in her story telling presentation was also an indication of how school science knowledge could be used to correct some perceptions about *imifino* in our communities due to cultural beliefs. I was very impressed by the confidence these learners demonstrated as they responded to the stories. In fact, this suggests that we have to try and question some of our cultural beliefs.

Table 6.2 Analysis of parents and community members' questionnaires responses

Categories	Participants' responses	Participants' responses in %
Knowledge of wild food plants As *imifino* Recall their local names	All responses showed clear understanding of WFP used as *imifino.* Some also mentioned their local names.	100%
Knowledge of time For collection and preparation	Most responses suggested after sunrise for collection and noon and afternoon for preparation.	90%
Relationship between *imifino* and nutrition Knowledge of nutrients you get from *imifino*	Some responses did relate *imifino* with growth and health. However they did not mention any nutrient found in *imifino.*	40%
Knowledge of plant identification Both scientific and indigenous ways	All responses suggested use of parents and elderly community members for identification.	50% and no scientific knowledge was demonstrated
Association of *imifino* with cultural activity Such as rituals, church or any family gathering.	They denied any knowledge on compulsory use of *imifino*. However they did not rule out its use.	100%
Gender involvement Who collects and prepares *imifino*? Who may eat *imifino*?	All responses said females collect and prepare *imifino.* They also suggested that everybody eats *imifino*. However they did reflect that there are stories that if men eat	100%

	imifino they may gossip like women.	
Use of parents and community members in this research study.	They welcomed the idea.	100%
Indigenous knowledge	All participants welcomed the idea.	100%

The report given by the science teacher on the observation schedules showed that this approach successfully enhanced learning and teaching. This was observable or seen in their enthusiasm as they continuously asked questions and also their responses on the practical demonstration. The science teacher said, "This lesson has influenced not only my learners' understanding but also mine too". These confirmations are indicators of the lessons' success. Also, as these continuously come from learners, teacher and community member clearly demonstrated how these lessons have succeeded in mobilising learners' prior everyday knowledge of wild food plants (*imifino*). These lessons also helped with the facilitation of perceptions and conceptual development and understanding of nutrients.

Learners' responses to questions, results of experiments they performed and comments were enough evidence to demonstrate an understanding of the interrelationship between nutrition and wild/indigenous nutritional plants (*imifino*) used as food at their homes.

Comments given by the science teacher and the community member above showed that it was very motivating and enhancing to engage learners in activities on wild food plants (*imifin*o).

6.2.5 Analytic statement 5

Analysis of focus group's responses during the semi-structured recorded interviews

Interviews with learners during the focus group were recorded and they said they enjoyed these lessons. They also said a lot has changed in the manner in which they looked at *imifino*. They

no longer look at them as just *imifino* but food with nutrients that their bodies needed. In other words, these lessons have helped in bridging the gaps between their everyday prior knowledge and school science because before these lessons they could not relate *imifino* to nutrition. Learners confirmed that they did not even know the different kinds of nutrients found in *imifino*. This supports the argument made by Gough (2002) that before we can address global issues we must address local issues.

The response I received on the belief issue showed that stories on *imifino* being a female meal only were something of the past. This was evident as learners showed knowledge of the story but said they all ate *imifino* in their homes regardless of their gender.

Hearing learners saying all this information in the above paragraph and that they wanted to take this information and share it with their communities, it could be argued that it was an indication of the effectiveness of the lesson. When I asked how they were going to approach their community members, they told me that some community members were not easily approachable when they wanted them to complete the questionnaire. However, after explaining what this was all about they finally did respond. Therefore they will make a similar approach with more confidence as they will be carrying evidence to enhance their contention. They even mentioned that they would also use those community members who were easily approachable in order to convince those who were not. They concluded by saying they saw that this was not just for research but their teacher would be able to continue from here and go on with this kind of approach.

6.2.6 Analytic statement 6

Analysis of Science teacher's responses during the semi-structured recorded interviews

During the semi-structured recorded interviews the science teacher showed support and appreciation, and recommended as good approaches to the challenges that teachers are faced with in the implementation of RNCS. He said he had been wondering how he could involve community members in learners' education. He also mentioned that this research has answered

so many questions and solved a lot of problems he had before he was involved in this study. He added that he had some difficulties thinking how he could include indigenous knowledge (IK) in his lessons as this is required by the current C2005. This is exarcebated by the fact that the Department of Education does not give any information on how to go about including IK during teaching and learning.

He thinks the involvement of the community member who made her presentation in *isiXhosa* stimulated the learners and he felt that the lesson was relevant to their everyday life activities.

A belief in *imifino* being a meal for females and for not males seemed to be very strong during the community member's and the science teacher's era. He mentioned that he had a practical experience of this belief just as the community member had. He confirmed that now that he is an educated person he takes this as a myth. However, he agreed that women do gather as a group when eating *imifino* and share some community news which could be assumed to be 'gossip'. He said "if you take your dish of *imifino* and decide not to join the gossiping group of women there is no way that you can gossip like them".

6.3 Conclusion

In the above analytic statements it was clear that learners' perceptions and conceptual development were influenced by these three lessons. These three lessons also demonstrated how integrated ways of knowing can be used to suit the demands of Learning Outcome 3 which looks at science, society and the environment, answering the research questions raised in Chapter 3 (Section 3.2.4).

It could be argued that learners were able to demonstrate an understanding of the interrelationships between science and technology, society and the environment. This was observed when learners explained to the community member why sunlight was important during plant collection. Learners clearly explained the fact that sunlight is responsible for the formation of starch one of the nutrients that our bodies need. Sharing stories played a very

important role during teaching and learning as this is how elders more especially *amaXhosa* commonly use it as a way of passing information from one generation to another.

In the next chapter, I respond to the limitations, challenges and make some recommendations before summarising in the form of a conclusion.

Chapter 7

Limitations, challenges, recommendations and conclusion

> The scope of a half thesis is narrow and the time available to generate data is limited. The effect is to limit the depth of its research. Therefore challenges were raised and recommendations were made. Developing countries lack quality science teachers and propgrammes of their own. This results in them importing teacher and programmes from outside and this raised concerns that these teachers and programmes are not responsive to the needs of developing countries (Kerrison, 1992: 248)

7.1 Introduction

In this chapter I have looked at and discussed the limitations and challenges of this research study. I have also provided some recommendations. In the conclusion, I have given a summary of the study and comments on the overall results based on my research goals and constructivist theory as a theoretical framework.

7.2 Limitations and challenges of this research study

This research was conducted using learners who are *Xhosas* except for one learner who was a coloured but she could speak *isiXhosa* and is familiar with some *Xhosa* cultural activities. This kind of approach to a lesson may not accommodate a multicultural class. Also this approach to a lesson poses a challenge to the manner in which our current timetables are designed in our schools at the moment.

Getting parents and community members involved in their children's education is quite a challenge more especially in black communities. This was observed by Singh, Mbokodi and Msila (2004). The science teacher of the school where this research was done also confirmed the difficulties they have in involving parents and community members. I regard this as a lack of educational awareness which needs to be looked at seriously by all the stake holders that are involved including education department, community members, teachers and learners.

I also noticed that the approach of first introducing learners to more scientific lessons such as MBL before a community member presentation created more critical challenges on the cultural practices. I therefore suggest that the community member could have started the lesson before learners were introduced to more scientific information.

The failure to test for vitamins and minerals such as iron from the wild food plants (*imifino*) and vegetables that the community buy from the market such as cabbages has limited learners to more practical hands on exposure. This could have strengthened and promoted the use of iron pots instead of aluminium pots. Iron pots were used in the traditional way of cooking and when changed to aluminium pots deficiency in iron was detected.

The fact that this study was done with GET learners also limited the learners from practical hands on use of sophisticated equipment that could be used to extract and analyse vitamins and minerals found in these wild food plants (*imifino*).

7.3 Recommendations

In preparation for recommendations I have decided to identify areas for improvement and suggest ways that this can be achieved. Here are examples of some questions I have asked myself:

What are the major areas of agreement?
What are the main differences in people's perceptions?
What can be done differently?
What aspects of the study have potential for development or change?
What changes are suggested and what improvement could be achieved?
What is the priority order for my recommendations?
These questions have guided my recommendation as shared in section 7.3.1 below.

7.3.1 Promoting school, community interaction and utilisation of available resources

I strongly recommend the promotion of school, community interaction and the utilisation of available resources such as the herbarium and MBL unit.

The research has demonstrated quite a lot of advantages and benefits coming from this interaction. In the beginning of this research it appeared that there was a misconception about who may eat *imifino* and who may not and why. The invitation of a community member to demonstrate her indigenous ways of knowing (O'Donoghue, 2006) and sharing stories about community beliefs on who may eat *imifino* and who may not has made us understand how this 'myth' has found its way into our communities. The reason for choosing a female community member was based on Mtshali's (1994) and Isichei's (1997) finding as they claim that women seem to be more knowledgeable than men when it comes to wild food plants (*imifino*).

I recommend the continuous use of MBL as these provided learners with information on food tests. Thus, the demonstration by the MBL member and learners' hands on practical experience of scientific evidence clearly showed us that these plants were rich in various kinds of nutrients which are needed by our bodies regardless of being male or female.

I also recommend the use of the herbarium for plant identification as this was highly appreciated by the community member. She described herbarium information as a good supplement to her knowledge of plants. However, this was after she initially resisted using the herbarium as she thought that this would undermine her knowledge of plants

These lessons have also helped in clearing up the misconceptions and 'myths' about *imifino*. The idea to have a community member and learners sharing the same stage had mutual benefits. This is because at the end of the lesson the community member was able to know why these plants should be collected after sunrise and not before. On the other hand, learners were more motivated to take this information to their communities themselves. This integrated approach deals with the effect of culture on the learning of science (Baker & Taylor, 1995).

I also recommend further research on the following:

The conservation, the preservation and the commercialisation of these wild food plants (*imifino*). This research has opened up some opportunities which are areas that challenge some further research. A similar idea was shared by Warren (1992) (Section 2.8.2). I am reflecting on these because as people realise how nutritious these food plants are there will be an increase in demand. This demand can lead to over collection, less availability and extinction and this threat is not a desired one in the plant kingdom.

Educational awareness campaigns should be introduced. These should include awareness on value and importance of these plants. These campaigns and programmes should be driven by local community members. I am recommending this because local people are the ones that benefit more from these plants and therefore will be the ones that will suffer most if these become extinct. Remember failure to involve them may mean lack of respect for them and results in the failure of campaigns as this was also observed by Potvin (2003).

These campaigns need to be advocated to community members who are already running community gardens and their own home gardens. They could collect and eat these wild food plants (*imifin*o) while waiting for their planted plants to grow instead of taking them as just weeds that need to be taken out and thrown away.

The DoE should promote projects that support indigenous ways of knowing. These should include inviting community members to demonstrate and present indigenous ways of knowing to learners and educators.

School timetables need to be revised in order to fit in this kind of lesson approach that uses resources which are available outside school premises such as the MBL members, herbarium assistant and community member who used indigenous ways of learning and teaching. There is a need for more workshops on getting parents and community members involved in their children's education. These workshops should include promotion of hands on activities done by community members just as this study has already done such as inviting community member to demonstrate and present indigenous ways of knowing to learners and educators (Section 4.2.5).

More workshops are also needed for educators to be knowledgeable about this kind of approach to learning and teaching. In other words, teachers need to be equipped with skills such that they are able to incorporate indigenous ways of knowing during teaching and learning. I highly recommend that teachers should take learners' everyday prior knowledge very seriously as also suggested by Caper and Leask (1993). This enables the teacher to assess the level of awareness of the topic his/her learners have. This is in agreement with Ausubel (1968).

7.4 Conclusion

This research study has practically demonstrated how indigenous ways of knowing can be integrated into school science such that they complement each other. It also demonstrated how important it is to always recognise learner's prior everyday knowledge in every lesson. The combination of the above mentioned resources in this study has successfully made it possible for learners to relate school science to their everyday activities. This approach is in line with cultural and historical activities as employed by Foot (2001). The results were observed at the end of the last lesson as learners were so eager to initiate steps that promoted the use of *imifino* by everybody in their communities. This was an indication that the facilitation process of these lessons successfully connected school science with learners' everyday life experiences.

As much as it was quite a challenging process to design, develop and implement these lesson plans, it was a worthwhile exercise and experience. The responses from learners, the community member and the science teacher explain how empowering this approach is. In fact, the community member said that this was an eye opener for her as it was for the first time that she played an active role in school activities. The science teacher agreed to the fact that as much as the current curriculum requires them to include indigenous ways of knowing this brilliant approach never crossed his mind. All these comments were a demonstration of the effectiveness of this approach to learning and teaching.

During interviews with the science teacher he mentioned a belief that existed in his life experience about *imifino*. However, during focus group interviews with the six learners this

belief seemed to be loosing its strength even though they had heard about it. They all agreed that everybody should eat *imifino* in their homes. These findings bring hope in the possible campaign to encourage people to eat *imifino* because of its nutritional value.

The fact that learners were more actively participating during the community member's presentation could be due to her using *isiXhosa*. This showed the power of language as a tool for communication. This is in agreement with Vygotsky (1978). It was acknowledged, however that everyday language might perpetuate misconceptions.

Inviting the community member did not just benefit learners, but she herself also benefited and it was at this point you could see how this kind of approach was able to change the pre-perceptions about *imifino* and at the same time enhance conceptual development. The ability of learners to demonstrate an understanding of the interrelationships between science and technology, society and the environment is in line with C2005 which uses a constructivism approach in the OBE. This also has emphasis on social factors and on interaction between agents and their environments as described by Bannon (1997).

The involvement of the community member promoted the expansion of opportunities for learning after school (Brown & Cole, 1997). The voluntary action of learners to share information to the community also showed how these lessons have transformed. This is in fact in line with the C2005 which promotes a learner centred approach. The topic of after school educational activity has been a major issue in rescent years (Belle, 1999).

The general responses encountered from the research participants showed the potential benefits of inclusion of IK in the curriculum. The mobilisation of learners' prior everyday knowledge of wild food plants *(imifino)* has helped with actively engaging them in the co-construction of knowledge, hence enhancing facilitation of learning and conceptual development in nutrition. The use of indigenous ways of knowing and learners' prior everyday knowledge in learning and teaching processes also helped to bridge the gap between everyday experience and school science as described by Foot (2001).

In sum, I have no doubt in my mind that this research study will play an effective and important role in the continuous development and implementation of the RNCS. The statement has the full support of all the research participants in this study.

References

Anderson, G. (2000). *Fundamentals of educational research* (2nd ed.). London: Falmer Press.

Asafo-Adjei, R. T. (2003). *From imifino to umfuno: A case study foregrounding indigenous agricultural knowledge in school-based curriculum development*. Unpublished Master's thesis, Rhodes University, Grahamstown.

Ausubel, D. (1968). *Educational psychology-A cognitive view*. New York: Holt, Rinehart and Winston.

Baker, D., & Taylor, P. C. S. (1995). The effect of culture on the learning of science in non-western countries: The results of an integrated research review. *International journal of science education*, 17(6), 695-704.

Bannon, L. (1997). *Activity theory*. Retrieved October17, 2006, from http://www-sv.cict.fr/cotcos/pjs/TheoreticalApproaches/Activity/Activitypaper Bannon.htm.

Bannon, L., & Bødker, S. (1991). Beyond the interface, encountering artifacts in use, in J. Carroll (Ed.), *Designing interaction: Psychological theory of the human-computer interface*, (pp. 227-253). Cambridge: Cambridge University Press.

Belle, D. (1999). The after school lives of children: Alone and with others while their parents work. NJ: Lawrence Erlbaum.

Bassey, M. (1999). Case study reseach in educational settings. Buckingham: Open University Press.

Bogdan, R. C., & Biklen, S. K. (1982). Qualitative research for education: An introduction to theory and methods. Boston: Allyn and Bacon.

Burrell, G., & Morgan, G. (1979). *Sociological paradigms and organisational analysis*. Brookfield, VT: Ashgate Publishing. Retrieved March 6, 2006 from http://webpages.marshall.edu/carter12/eda705a5.htm

Brown, K., & Cole, M. (1997). Cultural historical activity theory and the expansion of opportunities for learning after school, Retrieved March 10, 2008 from http://lchc.used.edu/People/MCole/browncole.html

Bruner, J. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press. Retrieved October 26, 2006 from http://chiron.valdosta.edu/whuitt/col/cogsys/construct.html

Cantrell, D. C. (1993). Alternative paradigms in environmental education research, In R. Mrazek (Ed.), *Alternative paradigms in environmental education research: The interpretive perspective* (pp. 82-104). Lethbridge: NAAEE.

Caper, S., & Leask, M. (1993). *Learning to teach in the secondary school*. London: Routledge.

Charles, C. M. (1995). *Introduction to educational research* (2nd ed.). New York: Longman.

Chisman, D. (1984). Science Education and national development. *Science Education, 68*(5), 563 - 69.

Cohen, L., & Manion, L. (1994). *Research methods in education* (4th ed.). London: Routledge.

Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th ed.). London: Routledge.

Cooper, H. M. (1998). Synthesizing Research: A guide for literature reviews (3rd ed.). Thousands Oaks, Thousand Oaks, Calif: Sage 201 p. Retrieved January 12, 2009 from http://catalog.wustl.edu/record=b2640517~S2

Dewey, J. (1933/1998) *How we think* (Rev. ed.). Boston, MA: Houghton Mifflin Company. Retrieved October 26, 2006 from http://www.chiron.valdosta.edu/whuitt/col/cogsys/construct.html

Dillon, J. (2002) Editorial-perspectives on environmental education-related research in science education. *International Journal of Science Education, 24*(11), 1111 - 17.

Driscoll, D.L. (2006). *Writing definitions*.The OWL at Purdue and Purdue University. West Lafayette, Indiana, U.S. Retrieved January 15, 2009 from http://owl.english.purdue.edu/owl/resource/622/01/

Duit, R., & Treagust, D. (1998). Learning in science – from behaviourism towards social constructivism and beyond. In Fraser, B. and Tobin, K. (Eds.), *International handbook of science education* (3-25).Dordrecht: Kluwer Academic Publishers.

Dulac, B. (2006*). The parents' role*. Retrieved February 1, 2006 from http:// sitemaker.umich.edu/356.dulac/the_parents_role77

Dzama, E. N., & Osborne, J. F. (1999). Poor performance in science among African students: An alternative to the African worldview thesis. *Journal of Research in Science Teaching, 36*(3), 387-405.

Emeagwali, G. (1987/2003). African indigenous knowledge systems: Implications for the curriculum. New Jersey: Africa World Press. Retrieved June 12, 2005, from http://www.africahistory.net/AIK.htm

Foot, K. A. (2001). Cultural historical activity theory as practical theory: Illuminating the development of a conflict monitoring network. *Communication Theory*, *11*(1), 56 - 83.

Forrester, D., & Jantzie, N. (1998). *Learning theories and the brain*. Retrieved April 10, 2002 from http://www.acs.acalgary.ca/~gnjantzie/learning_theories.htm

Fox, F. W., & Norwood-Young, M. E. (1982). *Food from the veld: Edible wild plants of Southern Africa*. Craighall: Delta Books.

Gabriel, M. (1999). Learning and growing through stories. *Journal of New Horizons for Learning*, 5(2). Retrieved December 19, 2008 from http//www.newhorizons.org

Gagne, R. M., Briggs, L., & Wager, W. W. (1974). *Principles of Instructional Design*. Fort Worth, Texas: Harcourt, Brace Jovanovich.

Galbraith, P.L., Carss, M.C., Endean, L., & Warry, M. (1997). Towards scientific literacy for the third millennium: a view from Australia. *International Journal of Science Education, 19*(4), 447 - 67.

Geelan, D.R. (1997). Epistemological anarchy and the many forms of constructivism. *Science and Education*, *6*(1-2), 15 - 28.

Good, R., Wandersee, J., & Julien, J. (1993). Cautionary notes on the appeal of the new "ism" (constructivism) in science education. In K. Tobin (Ed.), *Constructivism in science and mathematics education,* (71-90). Washington DC: AAAS press.

Gough, N. (2002). Thinking/acting locally/globally: Western science and environmental education in a global knowledge economy. *International Journal of Science Education, 24*(11), 1217 - 37.

Hardman, J. (2005). An exploratory case study of computer use in a primary school mathematics classroom: New technology, new pedagogy. *Perspectives in Education, 23*(4), 99 - 110.

Harnad, S. (1982). Neoconstructivism: A unifying theme for the cognitive sciences. In T. Simon and R. Scholes (Eds.), *Language, mind and brain* (pp.1 - 11). Hillsdale NJ: Erlbaum. Retrieved 26 October 2006, from http://cogsci.soton.ac.uk/~harnad/Papers/Harnad/harnad82.neoconst.html

Hedberg, J. G. (2003). Ensuring quality e-learning: Creating engaging tasks. *Educational Media International*, *40*(3/4), 175 - 86.

Hodson, D. & Hodson, J. (1998). Science education as enculturation: Some implications for practice. *School Science Review*, *80*(290), 17-24.

Huber, R. J., Edwards, C., & Heining-Boynton, D. (Eds.) (2000). *Cornerstones of psychology: Readings in the history of psychology.* Fort Worth: Harcourt Brace.

Husselman, M., & Sizane, N. (2006). *Imifino*: *A guide to the use of wild leafy vegetables in the Eastern Cape*. Gahamstown: ISER.

Isichei, E. (1997). *A history of African societies to 1870*. Cambridge: University Press.

Irwin, P. (2002). *An introduction to surveys and to the uses and construction of questionnaires*. Research methods course, Rhodes University, Education Department, Grahamstown.

Jegede, O.J. (1997). School science the development of scientific culture: A review of contemporary science education in Africa. *International Journal of Science Education, 19*(1), 1 – 20.

Kallaway, P. (1984). *Apartheid and education: Education of black South Africans*. Cape Town: Ravan Press.

Keiny, S., & Weiss, T. (1986). A case study of school-based curriculum development as a model for INSET. *Journal of Education for Teaching*, *12*(2), 155 - 62.

Kerrison, R. 1992. Retraining chemistry teachers in the Philippine. Research in science education, 22, 248-254.

Kimbugwe, F.K. (2001). *An investigation of factors which influence integrating indigenous knowledge of medicinal plants into the learning programme for Grade 9 General Science.* Unpublished Master's thesis, Rhodes University, Grahamstown.

Kings, C.B. (1990). Development in scientific technological education-some cross-cultural perspectives. *Australian Science Teachers Journal, 36*(3), 39 - 45.

Kruger, M., Sayed, N., Langenhoven, M., & Hoing, F. (1998). Composition of South African foods: Vegetables and fruits. Tygerberg: Medical Research Council.

Krűger, R. A. (1991). School-based curriculum development: an advanced educational concept. *South African Journal of Education*, *11*(3), 142 – 45.

Kumar, R. (1996). *Research methodology: A step-by-step guide for beginners*. London: Sage.

Microsoft visual studio (2005)/.NET Framework 2.0 Retrieved December, 29 2008 from http://msdn.microsoft.com/en-us/library/aa833237(vs.80).aspx

Mangayi, C. (1997). Curriculum 2005: Lifelong learning for the 21st century: A Users Guide. Retrieved November, 12, 2006 from http://www.policy.org.za/govdocs/curr2005.html

Mathews, M.R. (2000). *Constructivism in science and mathematics education*. Retrieved November 30, 2005, from http://wwwcsi.unian.it/educa/inglese/mathews.html

Maxwell, J.A. (1996). *Qualitative research design*: *An interactive approach*. Thousand Oaks: Sage. 1-13.

Merriam, S. B. (2001). *Qualitative research and case study applications in education.* San Francisco: Jossey-Bass Publishers.

Merriam, S. B. (2002). *Introduction to research*: *Qualitative research in practise and case study applications in education.* San Francisco: Jossey-Bass Publishers.

Meeyers, E. M. (2007). From activity to learning: Using cultural historical activity theory to model school library programmes and practices. Information research. Seattle: Washington *12*(3). Retrieved March 10, 2008 from http://informationr.net/ir/12-3/paper313.html

Michie, M., & Linkson, M. (1999). *Interfacing western science and indigenous knowledge: A Northern Territory perspective*. Retrieved June 10, 2005, from http://www.members.ozemail.com.au/~mmichie/interfacing.html

Moll, I. (2002). Clarifying constructivism in a context of curriculum change. *Journal of Education*, *23*(27), 5 – 32.

Mtshali, M. (1994). *An investigation into environmental knowledge among two rural black communities in Natal*. Unpublished Master's thesis, Rhodes University, Grahamstown.

National Science Teachers' Association (1978). *Science education: Accomplishments and needs.* Columbus, Ohio: ERIC/SMEAC.

Norman, D. A. (2002). *The design of everyday things. Interactoins*. New York: USA. *9*(4)

Nye, D. (2000). *Three psychologies: Perspectives from Freud, Skinner, and Rogers*. London: Wadsworth.

O'Brien, K. (1993). Using focus group, health surveys: An example from research in social relationships and AIDS preventive behaviour. *Health Education Quarterly*, *20*(3), 361-372.

O'Donnell, P. A. (2003). Answering the critics: Another look at educational initiatives to improve reporting of indigenous and cross-cultural issues. *Australian Journalism Review*, *25*(2), 135 – 49.

O'Donoghue, R. (2006). Locating the environmental in environmental education research: a review of research on nature's nature, its inscription in language and recent memory work on relating to the national world. *Environmental Education Research*, *12*(3-4), 345-357.

Odora-Hoppers, C.A. (2001). Indigenous knowledge system and academic institutions in South Africa. *Perspectives in Education*, *19*(1), 73 - 84**.**

Osseo-Asare, F. (2005). West African Convenience Foods and Inter-African Culinary Influences, New York: USA (pp. 191)

Ostile, N. (2005). African indigenous knowledge-an academic and socio-cultural exploration for indigenisation. *Indilinga African Journal of Indigenous Knowledge Systems,* 4(1) 89-109.

Piaget, J. (1972). *The psychology of the child*. New York: Basic Books. Retrieved October 26, 2006 from http://chiron.valdosta.edu/whuitt/col/cogsys/construct.html

Popov, J. (1998). Learning universities. *Education in Russia, the Independent States and Eastern Europe, 15*(2), 3-19.

Potvin, C. (2003). Conservation efforts must embrace local knowledge. SciDev.Net. Jean-Pierre: Canada. Retrieved March, 09, 2008, from http://www.scidev.net/Opinions/index.cfm?fuseaction=readopinions&itemid=216&language=1

Punch, K.F. (1998) *Research questions: Introduction to social research*. London: Sage.

Saljo, R. (1999). Concepts, cognition and discourse: From mental structures to discursive tools. In W. Schnotz, S. Vosniadou & M. Carretero (Eds.), New perspectives on conceptual change. Elsevier Science: Oxford.

Sanders, M. (1999). Implementing outcomes-based education in South Africa. What lessons can science educators learn from classroom practitioners in New Zealand? In J. Kuiper (Ed.), *Proceedings of the 7th Annual Meeting of SAARMSTE conference* (pp. 110-115). 13 - 16 January, Harare, Zimbabwe.

Schumacher, S., & McMillan, J.H. (1993). *Research in education: A conceptual introduction.* New York: Harper Collins.

Shava, S. (2000). *The use of indigenous plants as food by a rural community in the Eastern Cape*: *An educational exploration*. Unpublished master's thesis. Rhodes University, Grahamstown.

Singh, P., Mbokodi, S.M., & Msila, V.T. (2004). Black parental involvement in education. *South African Journal of Education*, *24*(4), 301 - 307.

Skinner, B. F. (1938). *Behaviour of organism*: *An experimental analysis*. New York: Appleton– Century.

Skinner, B. F. (1968). *The technology of teaching*. New York: Appleton-Century.

Sloan, R., & Kitchen, H. (1962). *The educated African*: A Country-by-Country Survey of Educational Development in Africa, 267-278. London: Heinemann.

Department of Education, (1995). *The White Paper on Education and Training in a democratic South Africa,* Pretoria: Government Printer.

Department of Education. (1997). *Understanding the Schools Act*. Pretoria: Government Printer. Retrieved March 6, 2006 from http://www.mindtools.com/brainstm.html

Department of Education. (2002). *Revised National Curriculum Statement Grades R-9 (Schools) for the Languages Learning Area*. Pretoria: Department of Education.

Stake, R. E. (2000). Case studies. In Denzin, N. K. & Lincoln, Y. S. (Eds.), *Handbook of qualitative research* (2nd ed.). Thousand Oaks: Sage.

Stears, M., Malcom, C., & Kowlas, L. (2003). Making use of everyday knowledge in the science classroom. *African Journal of Research Mathematics, Science and Technology Education*, *7*, 109 - 18.

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques.* Newbury Park, CA: Sage. Retrieved March 7, 2006 from http://scholar.lib.vtedu/ejournals/JTE/v91/hoepfl.html

Taber, K.S. (2001). The mismatch between assumed prior knowledge and the learner's conceptions: A typology of learning impediments. *Educational Studies, 27*(2), 159 - 71.

Todd, A. & Mark, M. (2004). Enhancing learning in South African schools: Strategies beyond outcomes-based education. *International Journal of Education Development*, 25 (3), 221-235.

Urevbu, A.O. (1984). School science and innovation: An African perspective. *European Journal of Science Education*. *6*(3), 217 - 25.

Vygotsky, L.S. (1978). *Mind in society*. Cambridge, M.A.: Harvard University Press.

Warren, D.M. (1992). *Indigenous knowledge, biodiversity conservation and development*. The International Conference on Conservation of Biodiversity in Africa. Local Initiatives and Institutional Roles. Nairobi, Kenya.

Watson, J. B. (1913). Psychology as the behaviorist views it. *Psychological Review*, *20,* 158 - 177.

Wikipedia (2008). Encyclopedia. Retrieved December 29, 2008 from http://en.wikipedia.org/Data_analysis

Wilkinson, D. (Ed.) (2000). *The researcher's toolkit: The complete guide to practitioner research.* London: Routledge.

Wood, D. (1998). *How children think and learn* (2nd ed). Oxford: Blackwell.

Worker, R. (1993). *Doing research: A handbook for teachers*. London: Routledge.

Yin, K. (2003). *Case study research: Design and methods* (3rd ed.). London: Sage.

Young, O. R. (1998). The effectiveness of international environmental regimes. *International environmental affairs,* 10(4), 267-289.

Appendix A

Appendix A1

Education Departmnet
Rhodes University
P.O. Box 94
Grahamstown
6140
08 June 2006

Dear Mrs. Van der Linde

Thank you very much for allowing me to conduct the pilot study at your school in 2005. I really appreciate it. From the pilot study I was able to conceptualise and write my proposal with clear focus and the proposal for this study is about to be submitted to the Higher Degrees Committee for approval. I would thus be most appreciative if I could begin the study in August/September on the school calendar this year.

The purpose of this study is to mobilize and include indigenous knowledge on nutritional plants in the science curriculum with the view to promote conceptual development and understanding amongst learners. I have requested permission to do the study from the Grade 7 Natural Sciences teacher, Mr Diliza Hobongwana who has since agreed to partake in the study. The study will entail teaching at least four lessons on indigenous nutritional plants at the Herbarium, Albany Museum. These lessons will be taught in the afternoons or at times suitable to your school so that we do not interfere with the normal school programme. If permitted, these lessons will be video taped and transcribed and Mr Hobongwana will be requested to do observations as well. A parent from the community will also be invited to make a presentation on how to make *imifino*.

I wish to assure Good Shepperd, Mr Hobongwana and the learners that their anonymity will be maintained. As participation in this study is voluntary Mr Hobongwana and his learners may withdraw at any point. During the study I will ask Mr Hobongwana for feedback on the conclusions drawn from the data. Furthermore, I will make the findings for the study available to the school Mr Hobongwana and other interested stakeholders in the school.

Should you have any concerns or questions, please do not hesitate to contact me at 072 260 7190, or my supervisor Mr Kenneth Mlungisi Ngcoza, at the Faculty of Education at Rhodes, on (046) 6038385 or Tony Dold, at the Albany Museum, Herbarium, on (046)6222312.

Sincerely

Phumlani Cimi
(Student number: 605c4909)

Appendix A2

Education Department
Rhodes University
P.O. Box 94
Grahamstown
6140
8 June 2006

Mzali/mmelimzali ohloniphekileyo

Igama lam ndingu Phumlani Cimi. Ndifunda izifundo zeMEd apha eRhodes University, izifundo ke ezimalunga nophuhliso lwezemfundo nokuhlolwa kwezeNzululwazi ezikolweni ngenjongo zokuphuhlisa ikamva lablantwana bethu eMzantsi Afrika. Umnqweno wam ke kukufunda ngokuphangalelelyo ngendlela zokufundisa ezeNzululwazi ngokuthi ndibonele xa abantwanan befundiswa ngezityalo zemvelo ezikukutya. Ezizifundo zakube ziqhutyelwa eHerbarium, Albany Museum, iHerbarium ke liziko lezenkcubeko nobugqi kwizityalo.

Njengoko ke kuzakufuneka ukuba ndiziteyipe ezizifundo zichaphazela umntwana wakho, khonukuze ndizibhale phantsi ngobunono, kufanelekile ukuba ndicela imvume kuwe yokwenza oko. Ngoko ke ndiyakuthembisa ukuba igama lomntwana wakho alisokuze libhengezwe xa ungafuni. Kanjalo, ndiyakuthembisa ukuba unalo ilungelo lokuyifumana lengxelo ngoluphando naninina uyifuna.

Ukuba ke unento ongayiqondiyo nceda uqhakamshelane nam kule nombolo 072 260 7190 okanye umnumzana uHobongwana kule nombolo: 046 6228998 okanye intsumpa zam umnumzana uKenneth Ngcoza kulenombolo: 046 603 8385 kwakunye nomnumzana uTony Dold kulenombolo: 046 6222312.

Ozithobileyo

Phumlani Cimi
(Inombolo yokuba ngumfundi: 605c49)

ISIQINISEKISO
Mna_____
__

Mzali/mmelimzali
ka_____

Ndiyamvumela uPhumlani Cimi ukuba abonele xa kufundiswa umntwana wam, aze acholachole nokucholachola ngeteyipu nangokubhala akubonileyo xa bekufundiswa izifundo zeNzululwazi. Ndiyaqonda ke ukuba igama lomntwana wam alisokuze libhengezwe

ngaphandle kwemvume yam. Yaye iziphumo ngoluphando ziyakuthi zifumaneke naninina xa ndizifuna.

Umsayino_____
Umhla_____

Appendix A2

Education Department
Rhodes University
P.O. Box 94
Grahamstown
6140
8 June 2006

Parent/guardian

My name is Phumlani Cimi and I am doing Med in Science Education at Rhodes University, Education Department. The purpose of my research study is to investigate the benefits of teaching/learning about indigenous wild nutritional plants used at homes as food. This study will therefore entail observing Grade 7 learners when taught about these plants at the Herbarium (which specializes in plants), Albany Museum.

As I would be videotaping these lessons in which your child will be part of, and write down my observations, it is important that I request your permission for your child to be involved in this study. I promise you that your child's name will not be revealed without your consent. I also wish to promise you that you have a right to access the information that will be gathered during this research study at any time when you want it.

If you have anything that you need to know please feel free to contact me at this number: 072 260 7190 or your child`s teacher who will also be involved in this study Mr Diliza Hobongwana at this number: 046 6228998 or my supervisor Mr Kenneth Ngcoza at this number:046 6038385 or Mr Tony Dold at this number: 046 6222312 Albany Museum, Herbarium.

Yours sincerely

Phumlani Cimi
(Student number:605c4909)

APPROVAL
I,

_____

Parent/Guadian of

_____

I give permission for Phumlani Cimi to observe, videotape and take notes during the lessons when my child is taught at the Albany Museum about indigenous wild nutritional plants. I also give him permission to interview my child after these lessons. I am pleased with the assurance

that my child`s name will not be revealed without my permission. Also, that the research report about this will be made available whenever I want it.

Signature _____
Date_____

Appendix A3

Education Department
Rhodes University
P.O. Box 94
Grahamstown
6140
8 June 2006

Dear Mr Hobongwana

Thank you very much for your willingness to be involved in my research study whose objective is to investigate the benefits of mobilizing and integrating indigenous wild nutritional plants ((imifino) with the view to promote conceptual development and understanding amongst your Grade 7 learners. The pilot study conducted at your school last year was very useful and my proposal for the study is about to be submitted to the Higher Degrees Committee for approval. I would thus be most appreciative if I could begin the study in August/September on the school calendar this year.

The study will entail the observation of at least four lessons which will be conducted at the Herbarium, Albany Museum. If permitted these lessons will be video taped and transcribed. I would appreciate if you could avail yourself to observe these lessons, as I would like to interview you thereafter. I would also appreciate it if at a later date a time could be arranged to obtain your much valued insight on the conclusions drawn from the data.

I wish to assure you that your anonymity, as well as the school's and learners` anonymity, will be maintained. As participation in this study is voluntary you may choose to withdraw from the study at any time. The findings for the study will gladly be made available to you, the school and other interested stakeholders.

Should you have any concerns or questions, please do no hesitate to contact me at 072 260 7190, or my supervisors, Mr Kenneth Ngcoza, at the Faculty of Education at Rhodes, on (046) 603 8385 or Mr Tony Dold, at the Herbarium, Albany Museum, on (046) 6222312.

Sincerely

Phumlani Cimi
(Student number 605c4909)

Appendix A4

Education Departmnet
Rhodes University
P.O. Box 94
Grahamstown
6140
08 June 2006

Dear Mr. Nonqane

Thank you very much for allowing me to use Albany Museum resourse during the pilot study of my research in 2005. I really appreciate it. From the pilot study I was able to conceptualise and write my proposal with clear focus and the proposal for this study is about to be submitted to the Higher Degrees Committee for approval. I would thus be most appreciative if I could begin the study in August/September on the school calendar this year.

The purpose of this study is to mobilize and include indigenous knowledge on nutritional plants in the science curriculum with the view to promote conceptual development and understanding amongst learners. I have already requested permission to do the study with the Grade 7 Natural Sciences' learners and their teacher, Mr Diliza Hobongwana who has since agreed to partake in the study. The study will entail teaching at least four lessons on indigenous nutritional plants at the Herbarium, Albany Museum. The name of the school is Good Shepperd Primary school. These lessons will be taught in the afternoons or at times suitable to the school so that we do not interfere with the normal school programme. If permitted, these lessons will be video taped and transcribed and Mr Hobongwana will be requested to do observations as well. A parent from the community will also be invited to make a presentation on how to make *imifino*.

I wish to assure Albany Museum and its staff that their anonymity will be maintained. As participation in this study is voluntary your Herbarium staff may withdraw at any point. During the study I will make the findings for the study available to the Albany Museum and other interested stakeholders in the Albany Musem.

Should you have any concerns or questions, please do not hesitate to contact me at 072 260 7190, or my supervisor Mr Kenneth Mlungisi Ngcoza, at the Faculty of Education at Rhodes, on (046) 6038385 or Tony Dold, at the Albany Museum, Herbarium, on (046)6222312.

Sincerely

Phumlani Cimi
(Student number: 605c4909)

Appendix A5

Education Departmnet
Rhodes University
P.O. Box 94
Grahamstown
6140
08 June 2006

Dear Mr. T. Dold (Herbarium curator)

Thank you very much for allowing me to conduct the pilot study at the herbarium in 2005. I really appreciate it. From the pilot study I was able to conceptualise and write my proposal with clear focus and the proposal for this study is about to be submitted to the Higher Degrees Committee for approval. I would thus be most appreciative if I could begin the study in August/September on the school calendar this year.

The purpose of this study is to mobilize and include indigenous knowledge on nutritional plants in the science curriculum with the view to promote conceptual development and understanding amongst learners. I have already requested permission to do the study with the Grade 7 Natural Sciences' learners and their teacher, Mr Diliza Hobongwana who has since agreed to partake in the study. The study will entail teaching at least four lessons on indigenous nutritional plants at the Herbarium, Albany Museum. The name of the school is Good Shepperd Primary school. These lessons will be taught in the afternoons or at times suitable to the school so that we do not interfere with the normal school programme. If permitted, these lessons will be video taped and transcribed. A parent from the community will also be invited to make a presentation on how to make *imifino*. I also request permission frm you to make you herbariu assistant available as a facilitator in plant identification lesson.

I wish to assure Albany Herbarium staff that their anonymity will be maintained. As participation in this study is voluntary your Herbarium staff may withdraw at any point. During the study I will make the findings for the study available to the Albany Herbarium and other interested stakeholders in the Albany Musem.

Should you have any concerns or questions, please do not hesitate to contact me at 072 260 7190, or my supervisor Mr Kenneth Mlungisi Ngcoza, at the Faculty of Education at Rhodes, on (046) 6038385.

Sincerely

Phumlani Cimi
(Student number: 605c4909)

Appendix A6

Education Department
Rhodes University
P.O. Box 94
Grahamstown
6140
8 June 2006

Mmi wokuhlala ohloniphekileyo/Mazali

Igama lam ndingu Phumlani Cimi. Ndifunda izifundo zeMEd apha eRhodes University, izifundo ke ezimalunga nophuhliso lwezemfundo nokuhlolwa kwezeNzululwazi ezikolweni ngenjongo zokuphuhlisa ikamva lablantwana bethu eMzantsi Afrika. Umnqweno wam ke kukufunda ngokuphangalelelyo ngendlela zokufundisa ezeNzululwazi ngokuthi ndibonele xa abantwanana befundiswa ngezityalo zemvelo ezikukutya. Ezizifundo zakube ziqhutyelwa eHerbarium, Albany Museum, iHerbarium ke liziko lezenkcubeko nobugqi kwizityalo.

Ndicela uzo kusiqhubela izifundo malunga nendlela ethi ilandelwe uku sukela ekukhiweni ukuya ekuphekweni de ufikelele eku yiphakeni. Ndingavuya ukuba esisicelo ungasithatha njenge thuba lokuba abantwana babone ukuba kukho abangakufundayo kubemi bokuhlala kuquka nabazali.

Sakuvuyiswa bubukho bakho.

Ukuba ke unento ongayiqondiyo nceda uqhakamshelane nam kule nombolo 072 260 7190 okanye umnumzana uHobongwana kule nombolo: 046 6228998 okanye intsumpa zam umnumzana uKenneth Ngcoza kulenombolo: 046 603 8385 kwakunye nomnumzana uTony Dold kulenombolo: 046 6222312.

Ozithobileyo

Phumlani Cimi
(Inombolo yokuba ngomfundi: 605c4909)

Appendix A7

Education Department
Rhodes University
P.O. Box 94
Grahamstown
6140
8 June 2006

Dear Coordinator (Mobile Biology Laboratory)

My name is Phumlani Cimi and I am doing Med in Science Education at Rhodes University, Education Department. The purpose of my research study is to investigate the benefits of teaching/learning about indigenous wild nutritional plants used at homes as food. This study will therefore entail observing Grade 7 learners when taught about these plants at the Herbarium (which specializes in plants), Albany Museum.

I would like to request permission to use one of your mobile biology laboratory members to facilitate a lesson on testing the resence of nutrients on wild food plants (*imifino*).

If you have anything that you need to know please feel free to contact me at this number: 072 260 7190 or your child`s teacher who will also be involved in this study Mr Diliza Hobongwana at this number: 046 6228998 or my supervisor Mr Kenneth Ngcoza at this number:046 6038385 or Mr Tony Dold at this number: 046 6222312 Albany Museum, Herbarium.

Yours sincerely

Phumlani Cimi
Student number: 605c4909

Appendix B

Appendix B1

RHODES UNIVERSITY
EDUCATION DEPARTMENT
M Ed (science)

NAME: PV CIMI
INJONGO ZOLUPHANDO: ZIZIFUNDO ZE MED

IMIBUZO

1.1 Yeyiphi imithi (utyani) eniyitya nje ngemifino?
……
……
……
1.2 Ingaba sithini isizathu?
……..……..……
……
……
2.1 Niyitya xeshaliphi lemifino? (kusasa, emini okanye ngorhatya).
……
……
……
2.2 Ingaba sithini isizathu?
……
……
……
3.1 Ingaba nikhe niyisebenzise imifino njenge sidlo ezicaweni, emicimbini yamasiko okanye xa nihlangene nje ngo sapho?
……
……
……
3.2 Ukuba kunjalo ndicela uthi gqabagqaba ngendlela othi usenze ngayo esisidlo kwakhona ukuba?
……
……
……
4.1 Ngubani onelungelo lokutya imifino nogenalo? (ngabadala, ngabafazi, ngamadoda okanye ngabantwana?)
……
……
……
4.2 Ingaba sithini isizathu?
……

……
……
5.1 Uyikhaphi lemifino? (egadini, endle, ngasebuhlanti)
……
……
……
5.2 Ingaba sithini isizathu?
……
…
……
…

Appendix B

Appendix B1

RHODES UNIVERSITY
EDUCATION DEPARTMENT
M Ed (science)

NAME: PV CIMI
PURPOSE OF THIS: ACADEMIC RESEARCH

Questionnaire

1.1 What wild plants do you eat as *imifino*?
……
……
……
1.2 Why?
……..……..……
……
……

2.1 When do you eat *imifino*? (morning (breakfast), noon (lunch) or evening (super)).
……
……
……
2.2 Why?
……
……
……
3.1 Do you have *imifino* as special meals for certain occasions? E.g. church day, ritual day or family day
……
……
……
3.2 If yes what kind of meals do you prepare for each day and why? And if no why?
……
……
……
4.1 Who may eat *imifino* and who may not? (elders, women, men, children)
……
……
……
4.2 Why?
……

……
……
5.1 Where do you get these plants? (veld, home gardens, next to kraals)
……
……
……
5.2 Why?
……
…
……
…

Appendix C

Appendix C1

Interview schedule: Herbarium Assistant

1. Q: What made you to be attracted in this field?

   A: It is redeployment through resolution 7

2. Q: How do you assist learners who want information about indigenous nutritional plants (INP)?

   A: It depends on their prior knowledge e.g. if they got a picture with them I will tell them about its importance. I will share the information we have with them.

3. Q: What are your perspectives about the importance of learning about the INP in the curriculum?

   A: I think it is a good idea/move.

4. Q: How can herbarium be used to assist the less knowledgeable learners about (INP)?

   A: By referring or providing them with relevant books and help them with identification of the real specimens they bring.

5. Q: What do you think why it is important for learners to be taught about INP?

   A: So that learners can take care of these INP and promote ways and means of conserving them.

6. Q: Is there any mechanism at the herbarium to ensure their sustainability and availability of these INP for future generations to come?

   A: by keeping them in the form of a specimen mounted on a mounting board with little bit ob history and file it.

7. Q: Is there any scientific relationship between these wild indigenous plants and those we buy from the market places?

   A: Yes there is scientific evidence that these wild indigenous plants have got carbohydrates, proteins and mineral salts some of them they have even nutrients than cabbages.

8. Q: What kind of risks involved if any in the continuous use of these INP by the community?

   A: Wrong use of certain plants e.g. some are poisonous at certain stages of growth.

9. Q: Can you share any information you think is of value about the continuous use of these plants?

   A: These plants are healthy and are available at no cost.

10. Q: How would like to use indigenous ways of knowing to support your ways of giving information to learner, researchers and community members who come and visit the herbarium?

    A: By using presentations and give lessons on indigenous ways of knowing. This is done by one of our staff members who is a community member. She can understand the culture and speaks the languages of our communities.

11. Q: Why do you think the inclusion of indigenous ways of knowing is potentially beneficial?

    A: It encourages people to use what is available with them without paying, for example you can use imifino instead of buying cabbages, spinach etc.

Appendix C2

Interview schedule for a museum educator

1. Q: Now that there is this new curriculum 2005 (C2005), how does it affect your teaching and learning approach in science?

A: Revised National Curriculum Statement (RNCS) as it is called now is worth it but time allocation hinders the normal programme (period is so short, 40min).

2. Q: What is your view point about revised national curriculum statement (RNCS) regarding the inclusion of indigenous knowledge (IK) in the curriculum?

A: RNCS should be linked with IK as prior knowledge is very relevant to it.

3. Q: How do you think the inclusion of IK in the curriculum will help improve conceptual understanding and promote an active participation in science class?

A: Kids will compare what they have experienced in real life with what they had to learn.

4. Q: If some of these indigenous nutritional plants are given to learners how would they be able to demonstrate their understanding of these plants?

A: Indigenous nutritional plants are named according to their characteristics so it is wise to intertwine this information with scientific concepts.

5. Q: How would you like to use indigenous ways of knowing to support teaching and learning processes?

A: IK moved/allow a child from known to the unknown. It is indeed worth it as a child has to learn from her experiences at home as well.

6. Q: What do you see as the anticipated contribution of indigenous ways of knowing to learning and teaching environment?

A: If IK can be inclusive it will help parents to take part in their children's education.

7. Q: Why do you think the inclusion of indigenous ways of knowing is potentially beneficial?

A: It is very constructive. It is also encouraging team work as the knowledge is sometimes gathered from old experienced people.

8. Q: What challenges need to be addressed to the use of indigenous ways of knowing successfully during learning and teaching processes?

A: IK need not to be undermined as if it is useless or associated with illiteracy. It must be encouraged to be part of our curriculum and be integrated to all learning areas.

- Lack of confidence on the side of teachers.
- Lack of commitment and teamwork.
- Classroom numbers are being huge OBE need a lot from teacher so they had to learn all the time.
- Lack of resources and training because teachers are sometimes trapped and will go to old ways of teaching.

Appendix C3

Focus group interviews

1. Now that we have gone through these lessons of nutrition can we share relationship between nutrition and imifino you have observed if any?

……
……
……

2. What are the benefits of eating *imifino*?

……
……
……

3. What nutrients our bodies can get from eating *imifino*?

……
……
……

4. How can we promote *imifino* in our communities?

……
……
……

5. How can we convince other people about importance of *imifino* in our bodies?

……
……
……

6. Why herbarium is an important institution to the community that uses *imifino*?

……
……
……

Appendix C4

Science teacher's interview questions

1. Having observed all 3 lessons, how do you think these lessons have contributed towards their conceptual development and understanding in science?

……
……
……
……

2. In your own point of view do you think these learners were able to demonstrate an understanding of their interrelationship between nutrition and wild plants used as food at their homes? May you please support your statement?

……
……
……
……

3. What was the effect/impact of engaging learners in activities on wild plants?

……
……
……
……

4. What can you say about these 3 lessons in relation to the demands and requests of revised national curriculum statement? RNCS says we must include indigenous ways of knowing in our teaching and learning activities.

……
……
……
……

5. As a teacher would you recommend this kind of approach as a way to go about in teaching and learning civilities? Please support your statement.

……
……
……
……

Appendix D

LESSON PLAN 1

Learning area: Natural Sciences

Lesson topic: Nutrition

Level: Grade 7

Lesson duration: 1 Hour

Number of learners: 16 Learners

Date:

SPECIFIC LESSON OUTCOME(S)	**ASSESSING THESE OUTCOMES**
At the end of this lesson, learners will able to:	
Identify wild food plants (WFP)	Give them fresh specimens of (WFP) to identify.
State the place used for identification	Ask learners to state the place used for identification
Describe the place used for identification	Ask learners to describe the place used for identification

Programme fit: This research work does fit to their programme because nutrition is one of the topics they need to know.

Expected problems (and solutions): I am expecting the learners to struggle with scientific terms. I will therefore try to be slow and explain every scientific term.

Prior knowledge: There will be a brainstorming session to find out their prior knowledge.

Materials needed: Fresh specimens of wild indigenous nutritional plants.

Equipment needed: Herbarium equipment such as oven, fridge, microscope, mounting boards and filing cupboard.

Additional enrichment exercises: Oral and practical work on identification of plant specimens of wild food plants.

Classroom layout: During brainstorming in the gallery learners will form 3 groups and in the herbarium layout will depends on the herbarium assistant.

Homework: Learners will be given some questionnaires to be filed by their parents or community members.

Methods that will use to assess the learners

Oral work, practical work and observation

Stages of the lesson at which the learners will be assessed on

Introduction
Development
Closure

The assessors

Myself, herbarium assistant and their science teacher who is also an observer

Place of assessment

Assessment will take place at the Albany Museum where I have been working as a volunteer when I stated this research.

LESSON PLAN 2

Learning area: Natural sciences
Level: Grade 7
Number of learners: 16 Learners
Lesson topic: Nutrition
Lesson duration: 1 Hour
Date:

SPECIFIC LESSON OUTCOME(S)	ASSESSING THESE OUTCOMES
At the end of this lesson, learners will able to:	
Define nutrition	Give worksheets
State the nutrient found in	Give worksheets
Describe the relationship between nutrition and wild food plants (*imifino*).	Give worksheets

Programme fit: This research work does fit to their programme because nutrition is one of the topics they need to know.
Expected problems (and solutions): Learners are expected to struggle with scientific terms, therefore lesson presentation will go slow and explain every scientific term.

Prior knowledge: An extract from the previous lesson will be presented. Thereafter a platform will be open for questions and comments. This will be done to bring in the knowledge they have gained from the previous lesson and from their everyday life experiences.

Materials needed: Fresh plant specimens of wild food plants (*imifino*).

Equipment needed: Mobile biology laboratory equipment for food tests.

Additional enrichment exercises: Oral and practical work on food testing of fresh specimens of wild food plants.

Classroom layout: Learners will form 3 groups.

Homework: Learners will be asked to bring any wild food plants (*imifino*) they know to the next lesson.

Methods that will be used to assess the learners

Oral, practical work and observation

Stages of the lesson at which learners will be assessed on

Introduction
Development
Closure

The assessors

Myself, herbarium assistant, science teacher and two mobile biology laboratory members.

Place of assessment

Assessment will take place at the Albany Museum where I have been working as a volunteer when I stated this research.

LESSON PLAN 3

Learning area: Natural sciences
Level: Grade 7
Number of learners: 16 Learners
Lesson topic: Nutrition
Lesson duration: 2 Hours
Date:

SPECIFIC LESSON OUTCOME(S)	ASSESSING THESE OUTCOMES
At the end of this lesson, learners will able to:	
Know how, when and where to collect, prepare and cook wild food plants (*imifino*).	Oral and practical work
Give local names of the wild food plants (WFP) used to make *imifino*.	Oral work and Worksheet
Have clear information on the some cultural and misconceptions involved in eating *imifino*.	Oral questions

Programme fit: This research work does fit to their programme because nutrition is one of the topics they need to know.
Expected problems (and solutions): I am expecting the learners to struggle with the steps involved in preparing *imifino*. I will therefore try to be slow and explain every step involved.

Prior knowledge: A summery of a topic and an extract from the previous lessons will be presented. Thereafter a platform will be open for questions and comments. This is always done to bring in the knowledge they have gained from the previous lessons.

Materials needed: Fresh plant specimens of wild food plants.

Equipment needed: Fresh leaves of WFP, stove, pot, stearing hood steak, mealie rice and salt (for more details see Appendix F).

Additional enrichment exercises: Oral work on identification of fresh specimens of wild food plants.

Classroom layout: Learners will form 3 groups.

Homework: Learners will be asked to promote and motivate their parents or community member to cook and eat imifino because of its richness in nutrition.

Methods that will be used to assess the learners

Oral, practical work and observation

Stages of the lesson at which learners will be assessed on

Introduction
Development
Closure

The assessors

Myself, community member and science teacher.

Place of assessment

Assessment will take place at the Albany Museum where I have been working as a volunteer when I stated this research.

Appendix E

Appendix E 1

Day 1 report

Nutrition

Good Shepherd 16 learners together with their male teacher were taken to Albany Museum. We gathered at the gallery which is in the ground floor for our 1st lesson on nutrition sessions.

Brainstorming

During this session questions were randomly asked to 16 learners. In this session I wanted to find out what do these learners know about wild indigenous plants which they eat at their homes as food called *imifino* and also known as *isigwamba*. In other words I was more interested to know what is learners' prior knowledge and experiences they bring to this learning programme. This helped me to identify what these learners know and some of the misconceptions they have about *imifino*.

Findings

Questions and answers

1. What is *imifino*?
imifino is the meal which is made up of wild plants.
2. Where do you get these plants?
We get them from the veld in between planted crops such as maize and also in the community gardens where people plant vegetable such as cabbaged, spinach, carrots, etc. sometimes in dumping places however we are not allowed to eat those from the dumping place because such places are not health, our parents said so.
3. Who eat *imifino*?
Some learners said everybody eat *imifino* at their homes others said only females eat *imifino* at theirs homes.
4. Why females only?
Because in theirs culture it is believed that males will gossip like females if they eat *imifino*.
5. Why do you eat *imifino*?
We eat because we are hungry, attracted to smell, look, taste, for pleasure, to grow, to become healthy, to get vitamins.
6. How do you make sure that these wild plants are not poisonous?
We take them to elderly people who are more knowledgeable than us in plants that have to eaten as *imifino*. Some said it is elderly people who collect the plants.
7. Do you know what is herbarium and its use?
The answer I got was a big no.

After this brainstorming I introduced them to the herbarium assistant who took them to the herbarium which is in 1st floor of the same building in Albany Museum.

Detailed step by step stages of the lesson at which learners were assessed on

Introduction: There was a brainstorming session during this session. Questions were randomly asked to learners. I did this to find out what do learners know about nutrition and its relationship with wild indigenous plants used to make *imifino* at their homes. I wanted to know what prior knowledge and experiences these learners bring to this learning session.

Development: I had to pause in the middle of the lesson for those who were asking questions. After brainstorming I handed over to the assistant curator who took the learners to the herbarium she continuously pause for question and at some stages she also asked question to check if they still follow the lesson. This enables her and me to assess whether we are still moving together.

Closure: 5 minutes was given to learners to ask questions. Every body was allowed to ask and answer including the observer (science teacher) and learners. Thereafter learners were given questionnaires to take them to their parents or community member. I asked their science teacher to make sure that these questionnaires do come back within a period of 2 days. We all agreed that I will get the questionnaires from their science teacher before our next session. He thereafter handed in the observation form.

Appendix E2

Day 2 report

Nutrition

Learners' knowledge about nutrition: i.e. what prior knowledge and experience they bring to this learning programme.

Extract from the previous discussion (brainstorming).

- They eat because they are hungry,
- They eat because they are attracted to smell, look, taste,
- For pleasure,
- To grow,
- To become healthy,
- To get vitamins.

However according to scientific evidence there are only 3 reasons for eating food.

- To get energy we need to perform our daily duties
- To get nutrients needed by our body to build and repair itself
- To get nutrients needed by our body to stay healthy.

Energy from carbohydrates (such as starch)
Energy and flavour from fats and oils
Nutrients for growth and repair from proteins
Minerals and vitamins are required to keep us healthy.

Different types of wild food plants (WFP) used in making *imifino* were put on learners' desks as they were divided into 3 groups. All this was done by mobile biology laboratory members. Learners were also reminded not to forget to take plants to the herbarium or to a parent or community members who are known to be knowledgeable about plants. It was mentioned that this was for correct identification and this will help you avoid eating poisonous plants.

Mobile biology laboratory member started the practical demonstration of food tests on different types of wild food plants used to make *imifino*.

It was also stated that these tests will help us know how nutritious these plants are and what can be added to make *imifino* meet the required nutrition our body needs if there is any?

Detailed step by step stages of the lesson at which learners were assessed on

Introduction: An extract from the previous lesson was presented and from some parents and community members' response given in the questionnaires. Thereafter a platform was opened for questions and every body was allowed to ask and answer including the observers. This was done to find out how much do learners can still remember about nutrition and its relationship with wild food plants used to make *imifino* at their homes. This helped them to link their prior

knowledge and experiences to what science is saying about nutrition. It also and helped them develop their conceptual understanding and clear up some of the misconceptions about *imifino.* For example men are not supposed to eat *imifino* because they will become weak and gossip a lot.

Development: Facilitator of the lesson had to pause in the middle of the lesson for those who would like to ask questions. After this introduction the mobile biology laboratory members who performed food tests on wild food plants started the practical as prescribed in their manuals (see appendix F). She continuously pauses for questions and at some stages she also asked questions to check if they still follow the lesson. This enables us to assess whether learners are still moving together. Learners were allowed to take part after the practical demonstration. This helped them to gain hands on experience.

Closure: 5 minutes was also given to learners to ask questions. Every body was allowed to ask and answer including the observers and learners. Science teacher submitted an assessment form at the end of the lesson given to him as an observer.

Appendix E 3

Day 3 report

Learners were reminded about the definition of Nutrition as the study of what keep a person, animal or plant alive and well by means of food.

They also orally mentioned that we all need nutritious food as it was discussed in the previous lesson.

This means food with
carbohydrates (starch),
proteins, lipids (oil and fats)
vitamins and
mineral salts.

Learners also reminded us that some of these nutrients are available in wild food plants which are used as food (*imifino*) e.g. starch was found to be present to all the plants used during food test lesson.

A reminder was also given as follows:

- To take a plant which you are not sure of to the herbarium or an elderly person for the correct identification. This will help you to avoid eating poisonous and less nutritious plants.
- To do food test on the plants you intend to use when making *imifino*. This will help you to know what nutrients your wild food plants have. You can now add those that are lacking for the balanced diet which your body needs.

Thereafter sis Nomthunzi a community member continue to present the processes involved in the preparation of *imifino*. For more details (see Appendix F).

After the presentation

Questions and answers

1. Q: What is the difference between *imifino* and *isigwamba*?
A: *imifino* is the term used by amaXhosas and *isigwamba* used by amaMfengu but they mean the same.

2. Q: Why *imifino* is sometimes wet/soft and sometimes dry/hard?
A: This depends on your ingredients if you have too much of mealie rice on your *imifino* is going to be dry/hard but if you too little of mealie rice your *imifino* will be wet/soft.

On the next questions science teacher had to help answer as community member was struggling to answer.

3. Q: Why do we have to cook our food and animals do not?
A: Animals have an enzyme which enables them to break down the cellulose and man lack this enzyme as a result they cook food brake down cellulose.
4. Q: What is an enzyme?
A: Enzyme is a kind of substance that assists chemical processes, but does not itself change.
Q: What is cellulose?
A: Cellulose is a tissue that forms the main part of all plants.

Detailed step by step stages of the lesson at which learners were assessed on

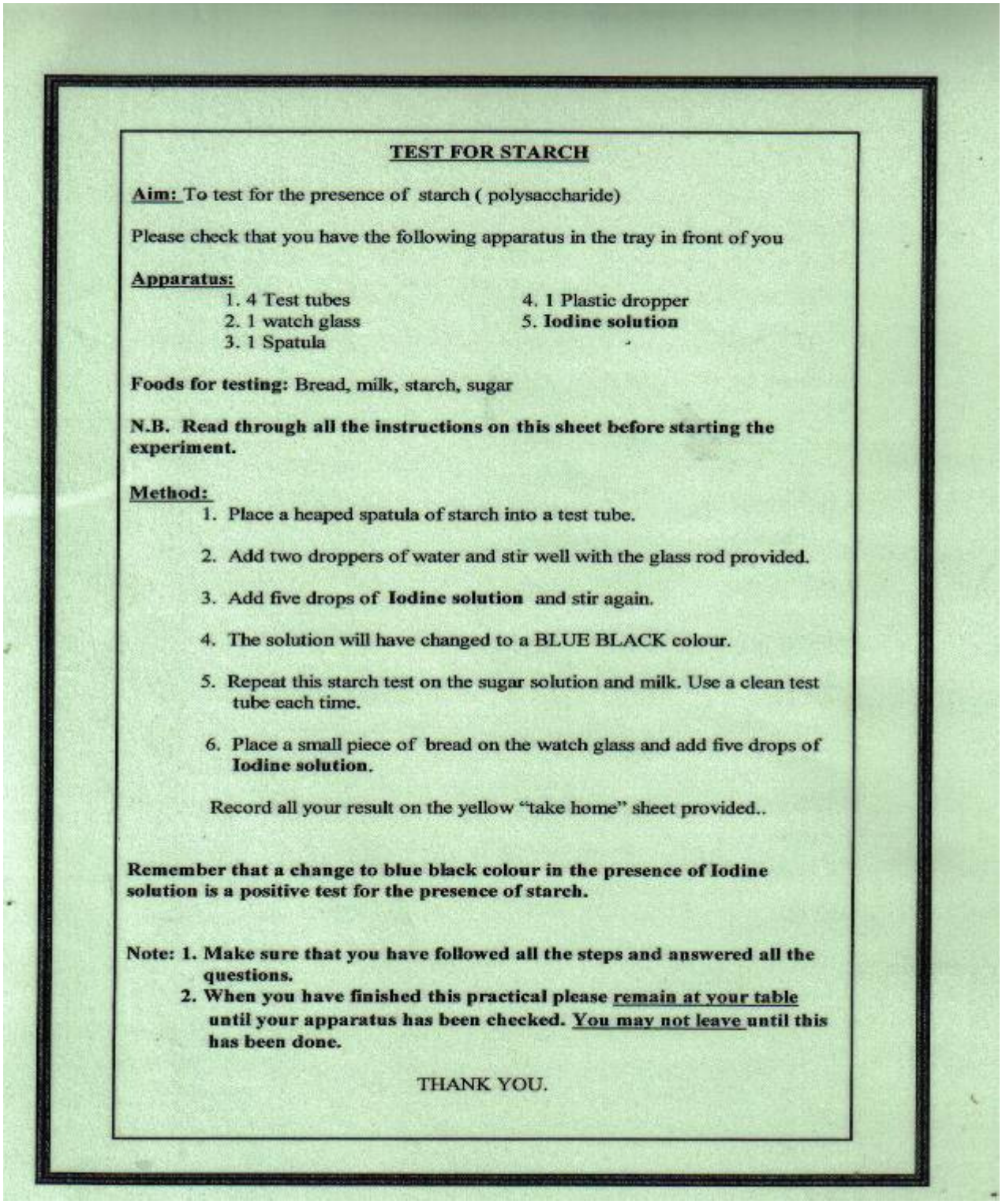
Introduction: A summery on the topic of nutrition was presented. Thereafter a platform was opened for questions and every body was allowed to ask and answer including the observer and learners. This was done to find out how much do learners can still remember about nutrition and its relationship with wild food plants used to make imifino at their homes. I wanted them to link their prior knowledge and experiences to what science is saying about nutrition and help them develop their conceptual understanding.

Development: The facilitator had to pause in the middle of the lesson for those who were asking questions. The community member who demonstrated to us how wild food plants (imifino) are collected and all the processes involved including cooking until it is ready for consumption continue with the lesson. She always pause for questions and at some stages she also asked questions to check if learners still follow the lesson.. This helps to be able to assess whether learners are still moving together. Learners were allowed to take part during the practical demonstration. This helped them to gain hands on experience. At the end imifono was dished to all of us. After eating learners were given an opportunity to comment and share their experiences about the dish.

Closure: 5 minutes was also given to learners to ask questions. Every body was allowed to ask and answer including the observer and learners. Questions were orally asked and answers were also given orally however I managed to write them down as you can see them above. This helps to assess whether learners' prior knowledge of wild food plants. Learners also cormed that the community member lesson has made them see the value of culture and beliefs though they can agree to all of them.

Appendix F

Learning and Teaching Support Materials



TEST FOR STARCH

Aim: To test for the presence of starch (polysaccharide)

Please check that you have the following apparatus in the tray in front of you

Apparatus:

1. 4 Test tubes
2. 1 watch glass
3. 1 Spatula
4. 1 Plastic dropper
5. **Iodine solution**

Foods for testing: Bread, milk, starch, sugar

N.B. Read through all the instructions on this sheet before starting the experiment.

Method:

1. Place a heaped spatula of starch into a test tube.
2. Add two droppers of water and stir well with the glass rod provided.
3. Add five drops of **Iodine solution** and stir again.
4. The solution will have changed to a BLUE BLACK colour.
5. Repeat this starch test on the sugar solution and milk. Use a clean test tube each time.
6. Place a small piece of bread on the watch glass and add five drops of **Iodine solution.**

Record all your result on the yellow "take home" sheet provided..

Remember that a change to blue black colour in the presence of Iodine solution is a positive test for the presence of starch.

Note: 1. Make sure that you have followed all the steps and answered all the questions.

2. When you have finished this practical please remain at your table until your apparatus has been checked. You may not leave until this has been done.

THANK YOU.

TEST FOR MONOSACCHARIDE

Aim: To test various foods for the presence of MONOSACCHARIDES

Please check that you have the following apparatus in the tray in front of you.

Apparatus:

1. Test tubes (x 5).
2. Box of matches
3. Paraffin burner
4. Glass stirring rod
5. A pestle and mortar
6. Plastic dropper
7. Beaker of water
8. Spatula
9. **Benedicts solution**
10. **Fehlings A and B**

Foods for testing: Flour, glucose powder and banana.

Method: (GLUCOSE TEST)

1. Place a heaped spatula of glucose into one of the test tubes.
2. Using the plastic dropper provided suck up two full droppers of water and add to the test tube. Stir, with glass rod, until all glucose is dissolved.
3. Add 10 drops of **Benedicts Solution** to the glucose solution. Stir and observe the colour.
4. Wrap a piece of folded paper around the neck of the test tube (as demonstrated) and hold at an angle with the mouth facing away from you. Make sure that it is not pointing at anyone else!
5. Light your paraffin burner and hold the test tube over the flame. Heat the contents **VERY SLOWLY.** Shake gently.
6. Take careful note of the colour changes and record all of them - in the correct sequence.
7. When the solution has boiled remove the test tube from the flame and put it in your test tube rack. Note this end colour change.

Repeat the above test on glucose powder using ten drops of **Fehlings A and B** instead of **Benedict's solution.**. Use a clean test tube. Were these results any different from those above? What does this mean?

Now test **flour** and **mashed banana** for the presence of Monosaccharide. (You may use your pestle and mortar to crush the banana). **Use a clean test tube for each of these tests.**

Note: 1. Make sure that you have filled in your "take home" sheet before leaving.
2. Please all remain at your table until your apparatus has been checked.

TEST FOR LIPID (Fats and Oils)

Aim: To test for the presence of lipid

Please check that you have the following apparatus in the tray in front of you.

Apparatus:

1. Three test tubes
2. Pestle and mortar
3. Glass stirring rod
4. Blotting paper divided into 4 compartments
5. **Ethanol**
6. **Foods for testing:** cooking oil, peanut butter and banana.

Method:

Experiment

1. Place a little cooking oil into a test tube
2. Add an equal amount of **Ethanol**
3. Shake well with finger over mouth of test tube.
4. Pour a small amount of this solution onto the correct position on your piece of blotting paper and allow to stand.

Control

Pour a small amount of pure **Ethanol** onto the correct position on the blotting paper. Allow to stand

5. Repeat the above steps using banana and peanut butter.
6. Hold your piece of blotting paper up to the light and compare the results.
7. Record all results on your "take home" sheet

N.B. A translucent stain left on a piece of blotting paper indicates the presence of lipid.

Note: 1. Make sure that you have followed all the steps and answered all the questions.

2. When you have finished this practical please remain at your table until your apparatus has been checked. You may not leave until this has been done.

THANK YOU

TEST FOR LIPID (Fats and Oils)

Aim: To test for the presence of lipid

Please check that you have the following apparatus in the tray in front of you.

Apparatus:

1. Three test tubes
2. Pestle and mortar
3. Glass stirring rod
4. Blotting paper divided into 4 compartments
5. **Ethanol**
6. **Foods for testing:** cooking oil, peanut butter and banana.

Method:

Experiment

1. Place a little cooking oil into a test tube
2. Add an equal amount of **Ethanol**
3. Shake well with finger over mouth of test tube.
4. Pour a small amount of this solution onto the correct position on your piece of blotting paper and allow to stand.

Control

Pour a small amount of pure **Ethanol** onto the correct position on the blotting paper. Allow to stand

5. Repeat the above steps using banana and peanut butter.
6. Hold your piece of blotting paper up to the light and compare the results.
7. Record all results on your "take home" sheet

N.B. A translucent stain left on a piece of blotting paper indicates the presence of lipid.

Note: 1. Make sure that you have followed all the steps and answered all the questions.

2. When you have finished this practical please remain at your table until your apparatus has been checked. You may not leave until this has been done.

THANK YOU

TEST FOR PROTEIN

Aim: To test various foods for the presence of proteins (Polypeptides)

Please check that you have the following apparatus in the tray in front of you.

Apparatus:

1. Three glass test tubes
2. Spirit burner
3. Box matches
4. Glass stirring rod
5. One plastic dropper
6. Beaker of water
7. **Millons Reagent** (Demonstrator)
8. **Biuret** solution (Demonstrator)
9. Egg white solution, milk and Fanta

N.B. Read through all the instructions on this sheet before starting the experiment.

Method:

1. Pour a little egg white solution into the test tube
2. Take your test tube to the Lab Assistant and ask for four drops of **Millon's Reagent** to be added to your solution. Shake the contents gently to mix.

Note: Millon's Reagent is POISONOUS

3. Observe what happens and note the colour
4. Wrap a piece of folded paper around the neck of the test tube
5. Heat the contents over the spirit burner. Shake gently while you do this
6. As soon as the precipitate changes colour remove the test tube from the flame and place it in your test tube holder. Allow to stand.
7. Using clean test tubes repeat the above test on Fanta and milk
8. Record your results on the yellow "take home" sheet

The teacher will now demonstrate protein tests on egg white, fanta and milk using **Biuret** instead of **Millon's Reagent**

9. Record these results on the "Take home" sheet provided.

N.B. A positive colour change for protein when tested with **Millon's** is **Rose Pink**
A positive colour change for protein when tested with **Biuret** is **purple.** When using the **Biuret** test no heating is necessary.

Note: 1. Make sure that you have followed all the steps and that you have answered all the questions.
2. When you have finished this practical please remain at your table until your apparatus has been checked. You may not leave until this has been done.

THANK YOU

Utyuthu

Amanye amagama esiXhosa: imbuya, unomdlomboyi

Imvelapi: Utyuthu apho avela khona usuka e Tropical America kodwa ngoku likhula lalapha eMzantsi Afrika, yaye ukhuliswa njengesityalo kwingxenye yamazwe ase Africa nase Asia. Ungoyena mfino uthandwayo apha empuma koloni. Lo mfino ukhula ngokukhawuleza yaye ukuphakama kwawo kungange 30 – 100cm uxhomokeka kwimo yezulu yalo ndawo.

Umsebenzi katyuthu: Amagqabi kunye nezithole zawo zinezakha mzimba. Uzindidi ke, kodwa ke lo usemtsha useluhlaza unencasa naxa lo umdala ufuna ukubabomvu uye ukrakre ngencasa. Utyebile kakhulu kwicala le iron, zinc, vitamin A kunye no C udityaniswa nomgubo wombona okanye uphekwe wodwa kutyiwe ngawo umqa okanye irice. Umpheka njani: utyuthu nethanga elizanyisiweyo thyila kwiphepha 29.
Imbewu katyuthu ityebile kwi carbohydrates ne proteins yaye ikukutya okugqalileyo e India, Sri Lanka nase Tropical Africa. Abantu baye basile le mbewu benze isidudu okanye isonka.
Iyeza elenziwa ngalamagqabi ka tyuthu lisentyenziswa ukunceda isifuba e Phillipines. Kumbindi Africa esisityalo kwenziwa ngaso i ink ebomvu.

Ubusazi? "Yi 47g kuphela yamagqabi katyuthu ene

100 % ye vitamins."

Ukulinywa nokuvunwa: Kulula ukulima utyuthu esitiyeni okanye emasimini. Njenge khula usenokulima entwasahlobo nasehlotyeni xa iqondo lobushushu lingu 16 °c noxa utyuthu esenokukhula kakuhle nakwindawo ezomileyo angafani nezinye izityalo, kodwa ubamninzi kakhulu xa kunethe imvula.

Utyuthu uthanda umhlaba othambileyo okulula kuwo ukufumana ilitha lelanga.
Ukuba izityalo ezi zikhula kakuhle usenako ukufumana imihlumela katyuthu yonke imihla ize emva kweveki ezimbini ufumane utyuthu ogqibileyo, ungaqalisa ukuvuna emva kweveki ezintandathu ukuya kwezi sibhozo (6-8) okanye emva kweveki ezine emva kokutyala xa isityalo simalunga ne 30cm ubude. Usnokuvuna amagqabi ixesha elide ukuba uthi uzisuse iintyatyambo. Imbewu emnyama encinane kulula ukuyifumana. Use nako ukulima imithi ka tyuthu. Utyuthu ukhula kakuhle kumhlaba otyebileyo, umzekelo ecaleni kobuhlanti benkomo okanye kwindawo enomgquba. Nangona zizikhulela zikhula ngaphezulu kumhlaba otyebileyo kwaye zinika izongo kakhulu, kuyingozi ukuzityа kakhulu.

Inkcazelo

Isityalo esipheleleyo	30 – 100 cm ukuphakama
Amagqabi	3 – 6 cm ubude. Aluhlaza bumfusa
Isiqu	Siluhlaza bumdaka okanye bumfusa.
Intyatyambo	Ziluhlaza aziqaqambanga, zimhlophe, pink okanye zimfusa.
Isiqhamo okanye imbewu	Zimdaka okanye zimnyama

Ihlaba

Elinye lamagama esiXhosa: irhabe

Imvelapi: Ihlaba lifumaneka e Eurasia nase North Africa kodwa ngoku lifumaneka kulo lonke ilizwe. Kudala lisaziwa eMzantsi Africa ngaphezu kweminyaka elishumi apho lithi lifumaneka ehlathini e Indonesia liyalinywa kancinane, kwakhona lilinywa ngamaxesha athile Europe.

Umsebenzi wehlaba: Amagqabi alo usenokuwabilisa uwagalele ityuwa, ipepile uwatye nomqa okanye njengomfino. Amagqabi walo asematsha ayatyiwa ekrwada njenge (salad) eUganda amagqabi ehlaba bayawomisa bawagube bawaxube nembotyi ukwenza isityu. Uyipheka njani: Imifino ka Mamu'Esther tyhila kwiphepha 28.

Xa uthi uwubilise njenge tea lomxube uyayinceda icancer. Ihlaba linezibulala zifo (linguzifozonke) liyanceda kwisisu okanye kwingxaki zesibindi.

Kumanye amazwe incidi yalo inceda ingqaqambo zendlebe issue neentsumpa. Omatiloshe bakudala la masi ehlaba babenyanga ngawo amanxeba ne ulcers. ETanzania ingcambu zalo zityiwa zikrwada okanye zibiliswe nebanana ukubulala intshulube ingakumbi iround worm. Ukuqaba elabisi lalo kumabala asempumlweni iwasusa ngokukhawuleza.IHlaba kukutya okuthandwayo kakhulu zinkukhu, imivundla kwakunye nenkomo, kodwa olwabisi lalo lunabo ubungozi kumatakane namahashe.

Ubusazi? "Ihlaba lityebile kakhulu kwi vitamin c ne iron."

Ukulinywa nokuvunwa: Ihlaba likhula kakuhle kwindawo ezinelanga okanye ezinamanzi amaninzi. Likhula kakuhle njenge khula kodwa ukuba ufuna ukulilima lizakufuna ukunakekelwa. Lizikhulela kwindawo ezifana nasezifama, emasimini okanye kwindawo apho kuthe kwatshiswa khona.

Inkcazelo

Isityalo esipheleleyo	80cm ukuphakama
Amagqabi	20cm ubude, abhijeleke apha esiqwini, aluhlaza macala onke, ngamanye amaxesha amfusa.
Isiqu	Siluhlaza bumfusa, xa unokusika kuphuma incindi ngathi lubisi.
Intyatyambo	Zilubhelu
Isiqhamo okanye imbewu	Imdaka, 4mm ubude "inoboya" obumhlophe (7-8mm) benza imbewu iphaphatheke lula ngumoya okanye amanzi.

Umsobo

Amanye amagama esiXhosa: umsobosobo

Imvelapi: Umsobo ukhona kulo lonke eli le Africa, kodwa imvelaphi ayaziwa. Uyalinywa njengesityalo esimnandi ezitiyeni nasemasimini, e Ntshona nase Mbindi we Africa. Xa kungoku ukhula kulo lonke ihlabathi, esetyenziswa njengeyeza kumanye amazwe e Africa, China, India, Israel nase Europe. Emzantsi Africa abantu bayikha ehlathini. Esi sityalo sikhula sibe nobude obuyi (meter) yaye usibona kakuhle ngesiqhamo sawo esingqukuva, sinombala omfusa.

Umsebenzi womsobo: Amagqabi ayaphekwa njengemifino owaziwayo kwaye anencasa ekrakrayo. Umsobo utyebile kwicala le iron no vitamin A. Umpheka njani: Ukupheka umsobo tyhila kwiphepha 30.
Isiqhamo sawo xa sesivuthiwe sinencasa emnandi, iyatyiwa ikrwada yenze ne(jam). Lumka esi siqhamo ungasityi siluhlaza, kuba sinobungozi xa uthe wasitya kakhulu. Umsobosobo awusetyenziswa njenge fidi kwizilwanyana kuba awuzilungeli. Amaxhosa inyhobhanyhobha athi ayenze ngesiqhamo sesityalo ayiqabe kwizitshanguba ezenziwa zintshulube. Umxube wezityalo amazulu ayisebenzisa ukunceda utyatyazo ebantwaneni. Amavenda ukunqanda (dysentry), kwakhona uyayiqaba kumanxeba nakwi ulcers iluncedo. Iti kunye nesiqhamo sawo (xa sixutywe nobusi) siyasetyenziswa ukunyanga umkhuhlane, intloko, ukubila nengqaqambo zomzimba. Iyasetyenziswa njengo (mrabho) kwingqaqambo kwakhona esisiqhamo sikwayenza nedayi emfusa.

Ubusazi? "Amagqabi omsobo abamnandi kakhulu ubukrakra galela ubisi xa upheka okanye ezinye

xa omisiwe, ukuthomalalisa iintlobo zemifino."

Ukulinywa nokuvunwa: Umsobo ukhula kakuhle kwindawo etyebileyo enamanzi amaninzi. Usenokuwulima wodwa okanye usenokuwuxuba nezinye izityalo, usenokuwulima uzintonga. Amagqabi usenokuwavuna emva kwenyanga ukuya kwezimbini kuxhomekeke kwindlela oyisebenzisileyo ukuwulima.Amagqabi awo ayafumaneka kangangeminyaka emibini.

Inkcazelo

Isityalo esipheleleyo	40 ukuya ku 100cm ukuphakama sinamagqabi.
Amagqabi	2cm ukuya ku 10cm ubude sinombala oluhlaza yaka macala omabini.
Intyatyambo	5mm ubude, sinamachokoza amhlophe.
Isiqhamo okanye imbewu	5mm ububanzi sinombala omfusa xa sele evuthiwe.

Imbikicane

Imvelapi: Imvelaphi yesisityalo ayaziwa, kodwa ke ngoku likhula elaziwayo. Amagqabi ayo ayasetyenziswa, e Africa, Europe, India nase United States of America njengeyeza. Imbewu yayo iluncedo kakhulu eluntwini jikelele. E Himalayas (India nase Nepal) imbewu yayo iyagcinwa njengesityalo sasendle, esifumaneka emathafeni, emasimini nase zitiyeni.

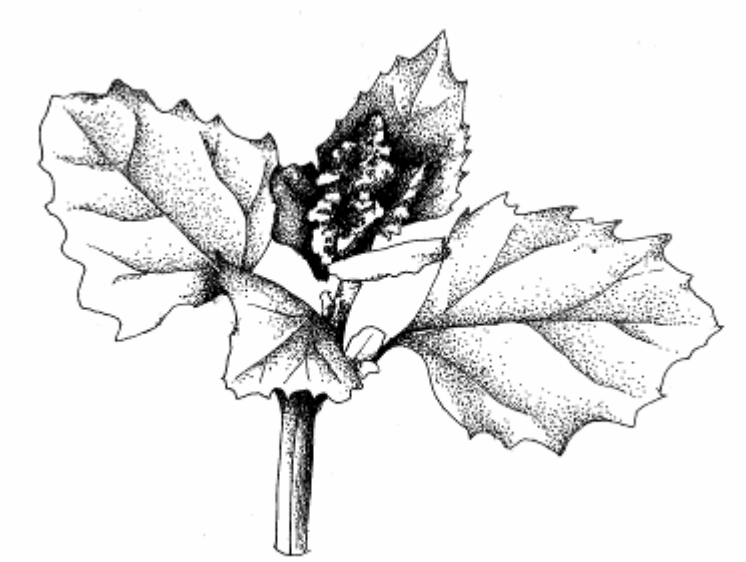
Umsebenzi wembikicane: Usenokuwupheka uluhlaza okanye womile une (iron) eninzi, calcium, selenium, vitamin C, vitamin A kunye ne protein. Imbewu yona ine protein eninzi usenokuyigalela kumgubo wengqolowa ukwenza isonka nesidudu. Intyatyambo zawo ezisencinane ziyabiliswa incasa yaso ingathi yeye broccoli. Umbala oluhlaza okhazimlayo ufumaneka kuwo ummilela. Uyipheka njani: Ilaxa lika sisi Norah tyhila kwiphepha 28.

Amaxhosa nabe Tshwana imbikicane bayitya njengokutya kwesintu okugcina igazi yaye kugcina isisu sakho sipholile kamnandi. Umxube uyenziwa ukubulala intshulube. Abesuthu bona bayisebenzisa njengechiza lokunceda isifo sencukudu. Ama Zulu umgutyana athi awenze baye bawusebenzise ukuqaba abantwana xa bejadukile. Noxa amagqabi ane (oxalic acid) athi ancede isifo samathambo, (rheumatism, arthritis kunye nezintso).

Ubusazi? "Le mbewu use nokuyigalela ikrwada kwi salad. Yigalele esityeni uyicwilisile emanzini kangange yure eziyi (12). Ngcwenga amanzi uhlambe imbewu. Gquma isitya uyiyeke ifumile imbewu, yibeke endaweni engumthunzi intsuku ezimbini ukuya kwezintathu, yonke imihla yicoce ngamanzi."

Ukulinywa nokuvunwa: Imbikicane ikhula kakuhle phantse naphina, kodwa ayiwuthandi umthunzi. Amagqabi ayo usenokuwavuna kwinyanga enye emva kokulima. Kanti nemimilela ungayifumana kwangeloxesha. Imbewu yayo incinane kodwa ifumaneka lula. Sika esisityalo usomise usibeke njengenyandana ezincinane. Singqushe ukuze ufumane imbewu.

Inkazelo



Isityalo esipheleleyo	Amasebe ukuphakama yi 1m
Amagqabi	5cm ubude kunye no 3cm ububanzi. Umbala wawo ufuna ukuba lubhelu buluhlaza (*C. murale*) okanye mhlophe buluhlaza (*C. album*)
Isiqu	Luhlaza ukuya kulubhelu
Intyatyambo	Incinane ifuna ukuba lubhelu
Isiqhamo okanye imbewu	Incinane ifuna ukubamdaka

Umhlabangulo

Elinye igamalesiXhosa: umhlabangubo

Imvelapi: Umhlabangulo apho uvela khona kuse Mzantsi America kodwa ngoku ulikhula lase Africa. Kumazwe amaninzi usetyenziswa njengesityalo esingumfino. Eyona nto ibalulekileyo usetyenziswa njengeyeza kumazwe amaninzi e Africa, Asia nase America. Esi sityalo siyaziwa kangangekhulu le minyaka eyadlulayo e Mzantsi Africa. Esi sityalo saziwa kakhulu ngembewu yaso ethi inamathele apha empahleni.

Umsebenzi womhlabangulo: Incasa yamagqabi awo iyakrakra kungoko ithandwayo ngabanye, abanye bangayifuni. Amagqabi awo amatsha athi adityaniswe neminye imifuno kuphekwe. Amagqabi awo awomileyo naluhlaza athi asetyenziswe njengesiqholo kwi sityu okanye isuphu. Uyipheka njani: Isupu yomfino tyhila kwiphepha 32.
EMexico amagqabi awo asetyenziswa njenge ti.

Ubusazi? "Umhlabangulo nguwona ulungele ukugcina sasebusika, une iron, zinc, selenium, protein vitamins kulapho ufumana khona iodine."

izakha mzimba kwisidlo A & E ngokugqithileyo yaye

Umhlabangulo lo ikakhulu usebenza njengeyeza. Abantu bakwa Zulu ingcambu, namagqabi bathi benze umxube wamanzi abilileyo, ukunceda isisu esikhathazayo. Intyantyambo zawo zona ziyalunceda utyatyazo, kwakhona xa uqala ukudubula ezangqakumba uyazihlafuna ukunceda isifo samathambo (rheumatism). Ama Venda wona asebenza amagqabi awo ukunqanda ukuya exesheni ngamandla. Empuma Africa umxube wesisityalo unceda kakhulu isisu esikreqayo, iintshulube kunye nokuqhinwa ebantwaneni. Entshona e Africa incidi yesisityalo efudumeleyo inceda indlebe namehlo (kanti ke nengcambu ungazisebenzisa), kutyatyazo, ukukhohlela nengxaki yesibindi. Emzantsi Mpuma wase Asia amagqabi esi sityalo anceda kakhulu xa unmntu elunywe yinyoka Phakathi kwabantu base Europe nabase Mzantsi Afrika umxube usetyenziswa ngamaxesha athile ukunceda ingqaqambo zomzimba. Esi sityalo xa siqala ukuhluma sityiwa zinkomo, kodwa senza ubisi lwenkomo lube nencasa ekrakrayo. Inkukhu zona zineqhayiya ngalo mhlabangulo.

Ukulinywa nokuvunwa: Umhlabangulo lo ujongwe

njengekhula kumanye amazwe kuba usasazeka ngokukhawuleza. Kufuneka ulumke xa ufuna ukuwulima kwinyangana nje ezi 4–6 esityalo sesilungele ukuvunwa, ubude ngelo xesha buyi 15-30cm. Ukususa intyantyambo kuwo lonto iyakwenza ixesha lokuvuna lib elide. Awukhuli kakuhle emthunzini.

Inkazelo

Isityalo esipheleleyo	60 cm
Amagqabi	Udla ngokuba namagqatyana amahlanu ubude bube 9cm, 3cm ububanzi, aluhlaza ngombala.
Isiqu	Siluhlaza nemigca emdaka.
Intyatyambo	1 cm ububanzi yaye sixuba mhlophe ngebala
Isiqhamo okanye imbewu	Ibala layo lifuna ukuba mnyama ukuphakama yi 1cm incinane sinamazinyo ancamathelayo empahleni.

Irhawu

Elinye igama lesiXhosa: urhalajane

Imvelapi: Irhawu lixhaphake e Europe, kodwa ngoku lifumaneka kwilizwe jikelele. Kumazwe amaninzi irhawu lisetyenziswa njengo mfino. Empumakoloni irhawu likhula njenge khula ebusika nasehlotyeni, xa kukho imvula eyoneleyo. Amagqabi alo anoboya obulumayo obenza umjaduko esikhumbeni. Xa uthe walipheka okanye walomisa iyaphela lento yokukuluma, limnandi kakhulu xa ulitya. Irhawu lelinye lezityalo ezibalulekileyo linemisebenzi emininzi njengesidlo, iyeza, idayi, njalo njalo.

Umsebenzi werhawu: Amagqabi walo asematsha ayasetyenziswa ukwenza umfino, liphekwe njenge suphu ngamanye amaxesha. Irhawu linezakha mzimba yaye lityebile kwi (proteins, calcium, iron, kunye naku vitamin A). Kodwa ke kubalulekile lisetyenziswe amagqabi alo asematsha kuba xa emadala anobungozi athi yenze umonakalo kwizintso. Ulipheka njani: Irhawu netapile tyhila kwiphepha 31
Esi sityalo sinembali ende njengeyeza lasekhaya eEurope. Iti efumaneka kumagqabi walo awomisiweyo ikwenza ufudumale ebusika. Irhawu liyalicoca igazi, likuncede kwizifo zamathambo, umjadukane kunye namaqhakuvam Umxube uthi uncede okanye unqande ukuya exesheni ngamandla. Amazulu irhawu alisebenzisa ukunceda okanye ukongeza ubuntu. E Lusuthu esi sityalo siluncedo xa ulunywa yinyoka. Umgutyana owenziwe ngamagqabi alo usetyenziswa njenge gwada ukunqanda ukopha ngempumlo. Inwebu efumaneka kwisiqu serhawu iyasetyenziswa ukwenza irhali, ilaphu kunye nephepha elisemgangathweni. E Europe esisistyalo sisetyenziswa ukwenza idayi egalelwa ekutyeni.

Ubusazi? "Iimpukane azivani mpela nobo boya balo ungalixhoma endlwini ukukhusela iimpukane."

Inkazelo

Isityalo esipheleleyo	Ukuphakama 60cm (*U. urens*) ukuya ku 150cm ukuphakama (*U. dioica*).
Amagqabi	Ukuphakama ngu 10cm igqunywe buboyana onuncinci obutshisa isikhumba.

Intyatyambo	Zincinane zinombala omfusa buluhlaza, zikhula ndawoninye okanye isicuku.
Isiqhamo okanye imbewu	Sincinane sinembewu eluhlaza ngombala.

Ukulinywa nokuvunwa: Irhawu lithanda umhlaba one (phosphates ne nitrogen) kodwa likhula msinyana gqitha kumhlaba otyebileyo ilimeka lula imbewu yalo. Ungalilima mbaxa
Umzekelo inkunzi nemazi yalo xa ufuna imbewu eyeyakho.

Umgcaleka

English: gallant soldier
Botanical name: *Galinsoga parviflora*

Imvelapi: Umgcaleka imvelaphi yawo kuse America, kodwa ke ngoku njengomfino wasendle eAfrica
mbindini we uxhaphake jikelele. Ukhula ubude bawo bube yi 20 – 60cm elifumaneka ezinomhlaba encinane xa inamathele waziwa njengekhula emasimini nase zitiyeni otyebileyo. Imbewana yawo iphetshethwa ngumoya iye apha empahleni.

Umsebenzi womgcaleka: Amagqabi omgcaleka esincinane kunye nesiqwana sawo uyaphelwa njengomfino, kodwa intyatyambo iyasuswa ayisetyenziswa njengesiqholo kwizityu, amagqabi asematsha asetyenziswa njenge saladi. Umgcaleka utyebile kwi vitamin C kunye no A) Igqabi (calcium, lawo uyaliqaba xa uthe walunywa ngumgcaleka (rhawu). Usipheka njani: Isityu somfino oxutyiweyo tyhila kwiphepha 31.

Ethiopia igqabi lawo libekwa kumanxeba. Esi sityalo sikukutya kwimfuyo njenge nkukhu, imivundla kunye nehagu.

Ukulinywa nokuvunwa: Asikukhuthazi ukulinywa komgcaleka, ingakumbi ukuba kukho ezinye izityalo esitiyeni kubakho ukhula ngokukhawuleza yaye akubilula ukuwutshabalalisa. Isityalo nje esinye seveki ezisibhozo sithwala imbewu okanye sizale izithole ezi 7000 kodwa ke esi sityalo sinezakha mzimba yaye kulula ukusivuna xa sithe sazikhulela emasimini okanye emathafeni.

Inkazelo

Isityalo esipheleleyo	Sinamagqabi, ubude baso 5cm ubude no4cm ububanzi
Amagqabi	Sinombala oluhlaza.
Isiqu	Siluhlaza sicekethekile
Intyatyambo	Zincinane zilubhelu.
Isiqhamo okanye imbewu	Imnyama ubude yi 2mm

Indlela yokuphekwa kwemifino

Imifino ka sis' Nomthunzi

a) Ingxowana yemifino exutyiweyo
(umzekelo: utyuthu, ihlaba, irhawu)
b) Ikomityi ezintathu zomgrayo (maizerice) okanye
ikomityi yerice kunye nekomityi ezimbini
zomgubo wombona
c) Ityuwa (itispuni)
d) Amafutha okanye i oyile

Bilisa umfino wakho onqunqiweyo kwisiqingatha
sekomityi yamanzi, ude uthambe umfino. Galela
umgrayo wakho okanye irice chathaza amanzi, zamisa
uwuyeke ubile kwakhona kangange 15 – 20
yemizuzu. Wuphake useshushu.

Lonke olulwazi lubhalwe ngesiXhosa silufumene ngoncedo luka sis' Nomthunzi ilungu lokuhlala ebelithe lathatha inxaxheba ekufundiseni abantwana ngemifino. Malunga nolwazi olungaphaya yiya kwiphecana lika (Husselman kunye no Sizane, 2006)

Appendix G

WORKSHEET

Lesson on plant identification

Grade 7

Instructions to learners
Do not write your name
Try and answer all the questions

1. Why it important to correctly identify plants?
……
…….....
.....

2. Where can these plants be correctly identified?
   ……
   ……
   ……

3. Give steps involved in plant identification
   ……
   ……
   ……

THANK YOU FOR ANSWERING THE QUESTIONS

WORKSHEET

Lesson on food testing

Grade 7

Instructions to learners
Do not write your name
Try and answer all the questions

1.What is nutrition?

……
…….....
.....

2.What are nutrients?

……
……
……

3.Give 3 examples of nutrients you know.

a. …….
b. ……..
c. ……..

4.What nutrients do we get from *imifino*?

……
……
……

5.If you are not sure whether your plant has got these nutrients what do you need to dois food or poisonous where can you take it for identification?

.....
.....

6.What do you do to make sure that your plant has the necessary nutrients your body needs?

……
……

7.Name any 3 plants that you know which are used to make *imifino*.

a) ……
b) ……
c) ……

THANK YOU FOR ANSWERING THE QUESTION

Appendix H

Classroom observation schedules

Classroom observation schedule 2006

Name of School....GOOD SHEPHERD E.C. PRIMARY Grade....7....

Teacher's Name....MOBOYGWAMA ELIZA.... Date.2006-08-

Presenter's Name..NOMIKI BENYA

Focus Area	Description
What activity was being conducted at the Herbarium?	THE LESSON WAS MORE INFORMING. THE PRESENTOR CHECKED LEARNER'S PRIOR-KNOWLEDGE BY ASKING THEM ANYTHING THEY KNOW ABOUT THE HERBARIUM. LEARNERS WERE KEPT ACTIVE BY GIVING THEIR EXPERIENCE THROUGHOUT THE LESSON.
What educational methods and strategies were used during the lesson? Were they appropriate?	QUESTION AND ANSWER TEACHING METHOD WAS MOSTLY USED. THE SKILL TO OBSERVE AND MANIPULATION WAS USED BECAUSE THE TOUCH THE PLANT SPACEMENTS AND OBSERVE THEM THROUGH THE MICROSCOPE. THEY WERE APPROPRIATE BECAUSE THEY INVOLVE THE LEARNERS IN THE LESSON. METHODS AND STRATEGIES WERE CONCRETE FOR GRADE 7 LEARNERS AND VERY LESS ABSTRACT.
What teaching and learning support materials were used in the activity? How were they used?	HERBARIUM IS MORE DEALING WITH PRACTICAL WORK. THE LSMS WHICH WERE THERE WERE RELAVENT AND CLEARLY EXPLAINED WHAT THEIR FUNCTIONS ARE.

Classroom observation schedule- 2006
Researcher: Phumlani Cimi

Focus Area	Description
How were learners involved in the activity? How did learners appear to be experiencing the activity?	LEARNERS WERE INVOLVED BECAUSE THEY WERE ASKED QUESTIONS AND RESPONDED TO MOST OF THE QUESTION CORRECTLY. THEY WERE ENJOYING THE LESSON.
What evidence did you note, that learners were developing understanding of indigenous knowledge AND that of science?	LEARNERS WERE NOT GIVEN A WRITTEN EXERCISE BUT, THEY RESPOND TO QUESTIONS QUITE WELL. THE WAY THEY LISTEN TO THE PRESENTER SHOW THAT THEY UNDERSTAND AND ACCOMODATE THE NEW KNOWLEDGE. THEY WERE COMFORTABLE WITH THE SCIENTIFIC CONCEPTS.
Describe the Teacher/Learner Relationships.	THE PRESENTER KEPT THE LEARNERS INVOLVED BY ASKING QUESTIONS ESPECIALLY TO ENSURE THAT THEY SHARE THEIR PRE-KNOWLEDGE. SHE REALISED THAT THEY DO NOT UNDERSTAND THEN CODE SWITCH AND THEY USE ENGLISH AGAIN. SHE ALSO MADE USE OF EXAMPLES BASED ON COMMUNITY EXPERIENCE.
Was there any evidence of gender issues that affected learning?	NOT REALLY EXEPT THAT BOYS WERE MOVING TOGETHER AND GIRLS TOGETHER.

Focus Area	Description
Was there any evidence of language issues that affected learning?	I INDICATED ON IT SAYING THAT THE PRESENTER REALIZED WHEN THEY DO NOT UNDERSTAND AND QUICKLY CHANGED TO XHOSA THEN BACK TO ENGLISH.
Was there any evidence of cultural issues that affected learning?	CULTURAL ISSUES WERE JUST MENTION IN PASSING BUT, NOT AFFECTED THE LEARNING. THEY CAME COHEN LEARNER WERE ASKING IF HERBARIUM KEEPS ONLY SCIENTIFIC HISTORY OF PLANTS. IT WAS EXPLAIN CULTURAL AND TRADITIONAL STORIES ABOUT A PLANT ARE KEPT.
Did the lesson highlight any ethical issues? If so, how did the teacher deal with them?	NO THERE WERE NO ETHICAL ISSUES I NOTICED.
In what way did the lesson depict the teacher's view of the nature of science (as knowledge, process, values, way of knowing, humanising influence, social institution, social construction ...?)	I used to isolate science from our way of life but the lesson made me to view science relating to our indigenous knowledge and our social understanding of life.

Focus Area	Description
If you were to teach this lesson what would you do differently?	The only difference was to bring the plants and allow learners to do all the processes while introducing them to the functions of the Herbarium
Other Comments and Observations	The researcher thought me that we are under utilizing the educational institutions around us. We as teacher myself in particular mostly depend on Textbooks for our planning of lessons and teaching

Appendix I

Poster presentation

HERALD (Morning Final)
12 Feb 2008
Page : 8 #

Disabled Transkei botanist wins international award for poster

Pumlani Cimi emphasises value of weeds, writes Grahamstown correspondent Mike Loewe

A DISABLED botanist from the Transkei caused waves with a poster he designed for an international conference which explains why so-called weeds growing in wastelands are rich in starch, vitamins and protein. He said the weeds were magnificent food for humans, especially starving schoolchildren.

Pumlani Cimi, 35, resident botanist at the Selmar Schonland Herbarium based in the Albany Museum in Grahamstown, recently presented his poster to the European Union-sponsored IndigenoVeg conference at Rhodes University. IndigenoVeg is an international network which aims to promote the consumption of nutritious indigenous plants, especially in poor areas.

He said pioneer plants were commonly viewed as weeds growing in disturbed and unused land, kraals and formal vegetable and flower gardens.

However, people who ate *imfino* were often derided, with meat-loving men claiming it would "make you gossip like a woman", or the plants make one "fat".

Cimi struggled while doing his master's in botany at Fort Hare University, not because he found the course challenging, but because the institution was not able to provide him with access to disabled facilities. He lost the use of his limbs from the chest down after injuring his spinal chord at his C6 and C7 vertebrae in an accident on the Alice/Fort Beaufort road in 2002.

A rural man, who grew up in a family of vegetable growers [illegible] settlement in the Gcaleka region of the Transkei, Pumlani had already obtained a BSc honours degree from Fort Hare when the accident happened. The driver, a friend, did not survive.

FEED THEM WEEDS ... Selmar Schonland Herbarium botanist Pumlani Cimi and his poster. Picture: MIKE LOEWE

Cimi then left for Rhodes to study for a higher diploma in education. Before he began his studies there, he was confronted by stairs blocking his access to the first-floor facilities he required for his studies.

Department head Professor Marc Schafer had contractors on site within a week and when Cimi arrived for his first day of study he was able to get to work with no impediments.

"It motivated me a lot. When you work in an environment conducive to working it helps you produce more than in an environment that is inaccessible and you are not accepted."

His thesis discovered that traditional knowledge about the goodness in the plants was not being promoted in the education and health systems, and was being kept alive by older people in the community. Popular plants include *utyuthu*, which is eaten with porridge and tastes like spinach.

[illegible] plants which fall into the imfino category, and they are compared to spinach or cabbage.

When calls came to produce media for the conference, Cimi used his scientific knowledge and home experience to produce a colourful and informative poster.

He said he regularly returned to his Transkei family home, where he directed planting and dispensed scientific advice.

His wife Ncediswa works as a cashier in a Grahamstown furniture store and they have a six-year-old child, Viwe.

Pumlani commutes two kilometres from their home close to the Grahamstown police station in his battery-powered, motorised wheelchair. He wants hundreds of posters to be printed and distributed to Eastern Cape communities.

His prototype cost R200 and he was able to make only two – "one for me, and one for the Rhodes education department".

"My dream is to go to communities, especially primary schools, and speak to the children, because if you start at that level, you will save the community."

Cimi wants to reach community organisations and NGOs.

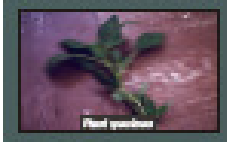
He emphasised the plants alone could not fight Aids: "People must take their prescribed medicine to get the boost they need. People are not aware that the stuff they think is for the very poor can save them from malnutrition."

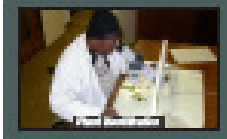
While these plants contained no poisons, he warned there were similar-looking poisonous plants.

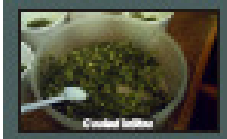
He said of his research: "It has been an inspiration. I didn't have time to think about my disability. I just committed

AN INVESTIGATION OF INDIGENOUS WAYS OF KNOWING OF FOOD PLANTS (imifino)

Phumlani Vincent Mthembu





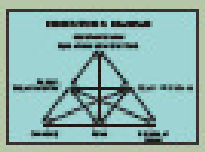


HISTORICAL BACKGROUND

INTRODUCTION

LITERATURE REVIEW

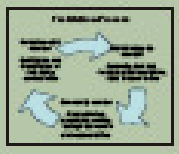
THEORETICAL ORIENTATION



RESEARCH METHODOLOGY

RESEARCH GOAL AND RESEARCH QUESTIONS

RESEARCH SITE, PARTICIPANTS AND PERMISSION



DATA GENERATION

DATA ANALYSIS

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CONCLUSION AND RECOMMENDATIONS

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