An investigation into how grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science: A case study

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By

Helena T. Shimwafeni-Mwiikeni

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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

The integration of learners' prior everyday knowledge and experiences during teaching and learning is a pre-requisite in the Namibian curriculum. The curriculum states that if learners are taught in a way which builds on what they already know and they relate new knowledge to the reality around them, their learning in school can be made more meaningful. Thus, learners' meaning making in the topic on nutrition was researched to find out whether elicitation and integration of learners' prior everyday knowledge and experience in the nutrition topic enhanced or constrained their learning. This study was conducted with my grade10 learners at the school where I am currently teaching. The school is located in a rural area in Oshana region in Northern Namibia.

This study is situated within an interpretive paradigm. Within the interpretive paradigm a qualitative case study approach was adopted. I considered this methodological orientation appropriate in this study as it allowed me to use the following methods: document analysis, brainstorming and discussion, semi-structured interviews and a focus group interview, practical activities with worksheets and observation and reflection. Multiple methods to gather data were used for triangulation and validation purposes. For data analysis purposes, the data sets were colour coded to derive themes and analytical statements. Ethical consideration was also taken seriously in this study.

The findings from this study revealed that integration of learners' prior everyday knowledge and experience enabled learners to understand science better particularly in the topic of nutrition. The study also revealed that learners possess a lot of prior everyday knowledge and experience about food they eat in their homes. However, data from the community members revealed that there are some contradictions between learners' prior everyday knowledge and the science content of the topic. Nonetheless, engaging learners in practical activities in the testing of food (local and conventional western type foods) helped them to make meaning of the content learned.

I therefore, recommend that learners' prior everyday knowledge and experiences should be incorporated during teaching and learning of the topic on nutrition. The study also recommends that the Department of Education should ensure that teachers get the necessary support and training on how to integrate learners' prior everyday knowledge and experiences.

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DEDICATION

This thesis is dedicated to my mother, Ester Kadenga who brought me up in a hard working life. Her tireless working life was a good example to me and motivated me when I was writing this thesis. It is because of you mom, that I was able to spend sleepless nights throughout this study while at the same time remained committed to my work and my family. Well done mom!

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LIST OF ABBREVIATIONS AND ACRONYMS

HIV:	Human Immunodeficiency Virus
HoDs:	Head of Departments
LCE:	Learner Centered Education
MECYS:	Ministry of Education, Culture, Youth and Sport
MoE:	Ministry of Education
NNCBE:	Namibian National Curriculum of Basic Education
NSHES:	Natural Science and Health Education Syllabus
PCK:	Pedagogical Content Knowledge
SADC:	Southern Africa Development Countries
ZPD:	Zone of Proximal Development

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CHAPTER ONE

SITUATING THE STUDY

1.1 Introduction

This chapter introduces my study. The focus of this study was to investigate how grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science.

The first section of this chapter outlines the historical background and the context of the study. Next, the theoretical framework which underpinned the study, research goal and research objectives of the study, data generation techniques which were used to generate data, problem statement and the potential value of the study are discussed. Lastly, definitions of concepts, thesis outline and some concluding remarks are provided.

1.2 Historical background and context of the research study

1.2.1 Historical background

As a learner I was educated in the system which relied on a teacher-centred approach. That is, the emphasis was placed mainly on the transmission of knowledge and repetition of facts, rather than focusing on understanding the topic (Namibia. Ministry of Education and Culture [MEC], 1993). Furthermore, the science we use in our everyday lives was not taken into consideration so that we could build on what we already knew. In general, learners were not given a chance to explore their individual thoughts to any extent so that they could come up with something very close to the elusive 'truth' (Namibia. MEC, 1993). So, learners did not relate what they already knew to what they were taught.

Growing up in a rural area in Namibia, I was raised eating different types of foods such as *mahangu* porridge, traditional spinach, different fruits such as bird plums *(eembe*), jackal berries *(eenyandi*), makalani fruits (*eendunga*), cluster figs *(eenghwiyu*) and other local fruits. I remember that my diet was restricted to eating some foods which were regarded as foods to be eaten only by the elderly. Yet these foods were not mentioned during the nutrition lessons at school. Instead, we were taught about foods and fruits such as macaroni, rice, carrots,

apples, bananas and oranges and so on. Fruits such as *eembe* (bird plumes) were regarded as wild fruits.

Also, the foods which we were taught at school as sources of nutrients were very scarce in my environment. There were very few foods which I was familiar with such as eggs and meat. But these types of foods were regarded as foods for adults in my community. Thus, as a learner I found it very difficult to make a connection between my own experiences as far as foods were concerned and the science content knowledge we were taught at school. So, I relied on just memorizing the important facts of science in order to pass the examinations. I also had very little understanding of science and its application in my everyday life. I did not even know that some of the things we were taught really existed.

A plethora of studies have indicated that the tensions which occur in most classrooms are often the consequence of the knowledge gap between school science and home experience (Stears, Malcolm & Kowlas, 2003; Ogunniyi, 2007; Oluruntegbe & Ikpe, 2011; Rennie, 2011). Perhaps, it could be argued that some gaps exist as a result of misconceptions or when school and home experiences differ (Ogunniyi, 2007). In my case there was a contradiction between home experience and science at school.

For instance, at school we were taught that eggs are a source of protein and they are needed by young children for growth. In contrast, at home I was told not to eat eggs because they were considered unsuitable for young children. Instead, eggs were only eaten by adults. We were also not allowed to question adults about this advice, as it was regarded as being disrespectful in my community. Clearly, there are tensions between the expectations of the community and schools.

From my personal teaching experience over the past ten years I have also experienced how difficult it is for learners to understand scientific concepts when their prior everyday knowledge and experience are not taken into consideration. Thus, given my experiences highlighted above, I decided to embark on a research project that would enable me to learn more about how to integrate learners' prior everyday knowledge, in particular, during the teaching and learning of the topic on nutrition. That is, meaning making of nutrition was at the heart of my study.

Oluruntegbe and Ikpe (2011, p. 207) suggest that building on the relevant experiences of learners from whatever background through a 'place-based' approach to learning within a

framework of experiential education could heighten their motivation and enhance their performance in basic science. Stears, et al. (2003) too argue that in order to acquire knowledge, learners should be actively involved in a community of practice (Lave & Wenger, 1991). They suggest that learners' everyday knowledge should be used as starting point and as a context for applying scientific ideas and skills.

In the context of this study, I thus decided to ask learners and community members about their perspectives on foods that they eat at home. The rationale for this was to explore elicitation of prior everyday knowledge in order to teach and enhance meaning making of the topic on nutrition.

1.2.2 Context of the study

Namibia is one of the SADC countries, a neighbour to South Africa along the Atlantic coast of the Southern Africa. It is divided into thirteen regions, namely, Caprivi, Erongo, Hardap, Kavango, Kunene, Karas, Khomas, Omusati, Omaheke, Ohangwena, Oshana, Oshikoto and Otjozondjupa.

Figure 1: Shows the Namibian map with its Regions (www.google.com.na/image)

This research study was conducted at my school in the Oshana region in Namibia. The school has 551 learners and 29 staff members including the school principal and four heads of department (HoDs). At present the school offers grades 8-11 with grade 12 to commence in 2013. The majority of the learners are from surrounding areas because there are a lot of feeder schools nearby. However, most of the learners are from rural areas and hence they are familiar with the local foods.

1.3 Theoretical framework

In light of the fact that this inquiry sought to obtain a better understanding of everyday experiences, knowledge, foods (local and conventional western type foods) that learners know and eat at home, the study was intended to assist learners to better engage and understand the science and concepts of food and nutrition. Thus, the socio-cultural perspective seemed appropriate for its design and analysis.

Furthermore, in terms of integrating learners' prior everyday knowledge and experiences during teaching and learning, I drew on Vygotsky's (1978) notion of the Zone of Proximal Development (ZPD). From this perspective learning leads to development. The Pedagogical Content Knowledge (PCK) is also discussed since teaching is not only about knowing the content of the subject but it is also about knowing the methods, pedagogies or strategies of presenting such content to learners. These are discussed in detail in Chapter 2.

1.4 Paradigm and methodology

This study is situated within the interpretive paradigm. Within this paradigm, it was constituted as a case study of one school in the Oshana region. The study employed qualitative methods to generate data and these are shown in Section 1.5.1 below and discussed in Chapter 3.

The study focused on one grade 10 class consisting of 17 learners and I worked with two teachers who teach the same subject (Life Science) in the same grade in my school. One teacher was my critical friend who observed me while I presented the lessons since it is generally difficult to observe one's own practice. The second teacher was interviewed on her understanding about integration and eliciting of learners' prior everyday knowledge. She was also invited to watch the videotapes of the lessons with us (my critical friend and I) so that

she could comment whether integrating and eliciting learners' prior knowledge could enhance or constrain learning. Even though the study was only carried out only in one class at the school, it provided some valuable insights on how the integration of learners' prior every day knowledge can enable or constrain meaningful learning of the topic nutrition.

1.5 Problem statement

The Namibian reformed curriculum is in favour of the use of learners' prior everyday knowledge since it is believed that learners bring to the classroom a wealth of knowledge and social experiences (Rennie, 2011). Ausubel (1968) also indicates that learners' prior everyday knowledge plays a major role in promoting meaningful learning. He continues to say that meaningful learning occurs when the learners are able to make sense of the materials presented and that what is being taught has some links with existing knowledge (Roschelle, 1995; Rennie, 2011).

However, the reformed curriculum in Namibia does not specify how learners' prior everyday knowledge should be elicited and integrated during teaching and learning. Student teachers are also not trained on how to integrate learners' prior knowledge. Thus, most teachers fail to integrate learners' prior everyday knowledge and experiences due to the lack of understanding on how to do so. In addition, during the workshops run by the facilitators, not much is said in order to prepare teachers to integrate learners' everyday knowledge. In most cases only the content and no methodology is given to the teachers.

This gap in curriculum triggered my interest to investigate whether eliciting and integrating learners' prior everyday knowledge could enhance or constrain meaningful learning when teaching Life Science, in particular, the topic of nutrition.

1.6 Data generation techniques

The following data gathering techniques were used in this study:

- Document analysis;
- Brainstorming and discussions;
- Interviews (semi-structured and focus group interviews);
- Practical activities with worksheets; and

- Observations and reflections.

Various data generation techniques were used for triangulation purposes with the view to enhance validity and trustworthiness of the research findings.

1.7 Potential value of the study

The potential value of this study is that it could provide some ways and means of developing learning and teaching support materials (LTSMs) using easily accessible resources that could foster the promotion of the integration of learners' prior everyday knowledge in school science so that science could be made relevant to the learners' everyday lives. There is also the possibility of motivating teachers to involve learners in practical activities using local materials.

Furthermore, education planners and policy makers may use this study to bring the change in the education sector in relation to integration of learners' prior everyday knowledge during teaching and learning. The study could also enable community members to find out that there is a link between local knowledge and school knowledge.

1.8 Definition of concepts

For the purposes of this study, I have defined and used the following concepts.

Conceptual development: to develop learners' concepts in the topic at hand.

Learner-centeredness: a teaching pedagogy which is fore grounded by the Namibian curriculum and which I used when carrying out my research.

Meaning making: to make sense of the subject matter being taught.

Prior everyday knowledge: the knowledge that learners possess which has been gained from their surroundings, from parents, friends and the community.

Prior knowledge: the knowledge and experiences that learners gained from previous grades or lessons.

Pedagogical content knowledge: Teachers' knowledge that includes the ways of representing and formulating the subject matter that makes it comprehensible for

learners. That is, representations, strategies, analogies, illustrations, examples, explanations, and demonstrations.

Socio-cultural theory: A perspective which posits that learning is socially constructed and mediated by tools and symbols such as language, diagrams etc.

1.9 Thesis outline

This thesis documents some findings on how grade 10 learners make meaning during teaching and learning of the topic on nutrition in Life Science. It is composed of seven chapters.

Chapter 1: Introduces the research study where I have outlined the context and the motivation that triggered this study. The chapter also details my role and interest in the study. The chapter further provides information on the purpose and goals of my study and the theoretical framework. It also provides the rationale of the study. Some concepts are explained in the context of this study and finally a brief overview of the chapters is provided.

Chapter 2: Focuses on the review of literature relevant to this study. Specifically, I have reviewed literature in the broader context of how learners' prior everyday knowledge and experiences assist learners to better understand the new knowledge in science. I have also reviewed literature on how a learner – centered curriculum emphasizes the integration of learners' prior everyday knowledge in teaching and learning and research that discusses the importance and role of indigenous knowledge in education. I have further reviewed literature on the implications of practical activities during teaching and learning. Then, I reviewed the literature on socio-cultural theory which I used as a theoretical lens in this study.

Chapter 3: Discusses the methodologies that have been employed to frame, plan and carry out this research study. It also provides a description of the paradigm used which is the interpretive paradigm within which a qualitative case study approach has been used. Research site and sampling issues are also discussed in detail. I have further outlined the data gathering techniques, how the data were analyzed and validated. Ethical issues are also discussed in this chapter.

Chapters 4 (Phase One) and 5 (Phase Two): Present and analyze the data generated from the document analysis, observation of lessons by a critical friend, semi-structured interviews with two Life Science teachers at the school including my critical friend, community

members and focus group interviews with the learners. These chapters also highlight emerging categories from the processed data.

Chapter 6: Consists of the analyzed data presented in Chapters 4 and 5 with reference to integrating learners' prior everyday knowledge, research goal and questions. In this chapter, the findings from my study are discussed in relation to some of the literature reviewed in Chapter 2 as well as the research questions outlined in Chapter 1.

Chapter 7 concludes the study by providing a summary of the research findings, recommendations arising from the study, limitations of the study and areas for future research.

1.10 Concluding remarks

In this chapter I introduced my study. I also provided a motivation for this study by discussing its theoretical framework, goals, methodology, problem statement, rationale and an outline of the thesis chapters is provided.

In the next chapter I discuss the literature relevant to my study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In this chapter, I discuss the literature that informed my study. Basically, this study attempted to investigate how learners make meaning during teaching and learning of the nutrition when learners' prior everyday knowledge and experiences is integrated.

The focus of this chapter is directed towards specific basic aspects of the curriculum issues; in particular, the Namibian curriculum and I have attempted to put the following into perspective:

- The approach to teaching and learning of the Namibian's reformed curriculum;
- The role of prior knowledge during teaching and learning;
- The role of practical activities during teaching and learning; and
- The theoretical framework that underpins my study.

2.2 Curriculum issues

2.2.1 Curriculum issues in Namibia

The Namibian curriculum pedagogical practice during the apartheid era was underpinned by an authoritarian system of instruction that supported teacher dominance and learners' passivity (Namibia. MEC, 1993). This curriculum approach was characterized by the idea of teacher-centeredness whereby teachers were regarded as the only sources of information while learners were regarded merely as empty buckets to be filled with knowledge (Namibia. Ministry of Education [MoE], 2009).

In general, learners were not given a chance to explore their individual thoughts to any extent so that they could come up with something very close to the elusive 'truth' (Namibia. MEC, 1993). As result most of the learners find it difficult to relate what they already knew to what they were taught.

It is for these reasons that the revised curriculum (Namibia. MoE, 2009) defined the previous curriculum as a curriculum that was very distant from the lives and experience of most Namibians. As a result of this narrow curriculum, most learners at that time saw the concepts

taught in school as ideas that were quite different from their daily lives. There was thus a need to address this dilemma.

The political independence achieved by Namibia in 1990 paved the way for the dismantling of pedagogical practices deep-rooted in Namibian classrooms over many years of colonial and apartheid education. The curriculum was reformed and restructured. Now, in contrast with the previous curriculum, the reformed curriculum was intended to treat learning as an active process which works best when the learners participate in their learning. The emphasis shifted from basic teaching to meaningful learning with learners at the centre of the process.

2.2.2 The approach to teaching and learning of the reformed curriculum

The approach to teaching and learning in Namibia is based on the learner- centered philosophy as described in the ministerial document: *Toward education for all: a development brief for education, culture and training* (Namibia. MEC, 1993). Learner - centered teaching is "based on democratic pedagogy, a method which promotes learning through understanding and practice directed towards empowerment to shape one's own life" (Namibia. MECYS, 1990, p. 8). In the government policy documents, a learner -centered approach is described as follows:

- The starting point is the learners' existing knowledge, skills interests and understanding, derived from previous experience in and outside school;
- The natural curiosity and eagerness of all young people to learn to investigate and to make sense of a widening world must be nourished and encouraged by challenging tasks;
- Learners should be empowered to think and take responsibility not only to for their own but also for one another's learning and total development; and
- Learners should be involved as parties in rather than receivers of educational growth (Namibia. MEC, 1993, p. 60).

The first point above indicates that the teaching and learning in Namibia should be based on the principle which states that learners bring to the classroom a wealth of knowledge and social experiences gained by growing up among family, the community and through interaction with the environment (Namibia. Natural Science and Health Education syllabus [NSHES], 2006). Ramsden (1994) and Odora-Hoppers (2001) echo similar sentiments. They

advocate that children bring to science lessons their own ideas about scientific phenomena. It is, therefore, necessary for teachers to integrate learners' everyday experiences (where possible) in the topics to be taught in schools.

The integration of learners' everyday experiences is needed for the learners to relate the new knowledge to the reality about them (Rennie, 2011). This might help learners to think critically about what they learn at school and what they do at home whenever they recognize the commonalities or differences in the two knowledges (new knowledge and prior everyday knowledge). As a result, learners might have an increased understanding of what they learn.

The second point urges teachers to use teaching methods which "allow the active involvement and participation of learners in the learning process. Teachers should structure their classes to facilitate this active learner role" (Namibia. MEC, 1993, p. 60). In addition to active participation, learners have to be taught in a way that allows them to develop skills and abilities which can be applied in new situations (Rennie, 2011). Thus, the learner-centered approach aims to develop learning with understanding, including the skills and attributes required to contribute to the development of society.

The third and the fourth points highlight that teaching and learning should be rooted in the principles of activity- based education as advocated by the progressive constructivist models of education (Nyambe, 2008). Thus, pedagogic practices should ensure that learners are provided with freedom of activity and expression, and independence of learning and problem solving (Namibia: NSHES, 2006).

The curriculum proposes that working in groups, in pairs, individually or as a whole class should be organized as appropriate to the task at hand. In other words, cooperative and collaborative learning should be encouraged whenever is possible (Namibia: NSHES, 2006). Cooperative learning is needed because learners learn from each other as they share ideas and upgrade the level of their participation in the lessons; while the teacher works as facilitator.

2.2.3 Local context and content

The Namibian curriculum emphasizes that learning the subject content should be based on the Namibian context, although the themes and topics cover a variety of scales to meet the international standard. For instance, NSHES (2006) indicates that teachers are required where it is appropriate to use local examples to illustrate scientific issues, concepts and processes (p. 3). Teachers are also encouraged to use local materials and natural resources as part of the curriculum and move away from an over reliance on commercially produced curriculum materials.

This does not mean, however, that commercially produced materials are prohibited. Rather, the idea is to contextualize subject content where possible. The use of local materials in the classroom can assist learners to find the connection between what content the learners are being exposed to and what they already know from home. In addition, Hogan (2008) and Rennie (2011) state that integrating the local environment's cultural knowledge might contribute to curriculum relevance both epistemologically and pedagogically. It also fosters stronger school-community relationships (Rennie, 2011).

2.3 The role of prior knowledge in teaching and learning

The use of learners' prior everyday knowledge in the classroom can assist learners to find the connection between what content the learners are being exposed to and what they already know from home.

2.3.1 Advantages of integrating prior everyday knowledge in the teaching and learning process

Section 2.2.1 of this chapter gives the aims of the teaching and learning approaches as espoused by learner centered education (LCE). These aims form the basis of my discussion which follows. To begin my discussion, I introduce a statement from a Namibian curriculum document which says that "the starting point of teaching and learning should be the learners' existing knowledge skills, interest and understanding, derived from previous experiences in and outside school" (Namibia. MEC, 1993). Teaching and learning needs to start with the knowledge learners bring to school because it is this knowledge and experience that empowers them to better understand the new concepts and practices (Roschelle, 1995).

In similar vein, Rennie (2011) states that everyday knowledge can enable learners to find the connection between the subject content and what is happening in their daily lives. On the other hand, Stears, Malcolm and Kowlas (2003) suggest that learners' everyday knowledge should be used as a reference point in thinking about the nature of science, and as a context for applying scientific ideas and skills. Their research also shows that the use of everyday knowledge in the science classrooms increases the level of engagement of learners in the subject.

Kasanda, Luben, Gaoseb, Marenga, Kapenda and Campbell (2005) discuss this further saying that everyday contexts allow learners to take control over their own learning, increase their participation in class and help them to determine what is to be learned. In fact, the use of everyday contexts scaffolds learners to understand the topic better and enables them to be capable of self-direction. In other words, everyday context provides learners with the confidence they need to sustain their effort and persistence during more difficult tasks, as well as stimulating a willingness to engage in the tasks.

Therefore, if learners' everyday context increases learners' participation, then teachers should provide social models of appropriate activities enabling groups of learners to do more complex activities that they can handle individually. In the environment of this study, learners were thus given an opportunity to brainstorm and do research on everyday experiences about foods they eat in their homes before the subject content was presented to them.

Likewise, in the Namibian curriculum learners' prior knowledge is perceived as playing a major role in promoting meaningful learning. Meaningful learning occurs when the learners are able to make sense of the materials presented and that what is being taught has some links with existing knowledge as suggested by Ausubel (1968).

However, for meaningful learning to take place teachers need to know how prior knowledge affects learning because the acquiring of new skills does not happen in isolation (Roschelle, 1995; McInerney & McInerney, 2006). Roschelle (1995) argues further saying that neglecting prior knowledge can result in learners learning something opposed to the educator's intentions, no matter how well those are executed. It is therefore important that teachers start with what learners know in order to prevent learners from learning something quite opposite which will not facilitate their learning.

But, it is important for teachers to evaluate such knowledge and experience with a view to clearing up any misconceptions that might come with it. To achieve this, teachers need to design tasks that encourage learners to gradually develop new scientific concepts and make connections between the new and old knowledge (Rennie, 2011). It is recognized, however, that this requires teachers to have different strategies available in order to work with learners as they present their various experiences.

Also, since there is an assumption that science is something that we deal with every day, it is very important for teachers to have ways of allowing learners to share and discuss their everyday experiences and link them with the science content knowledge. Learners also need to be encouraged to invest in their communities and school environment to engage with science concepts with the people around them.

All these points concerning the role of prior knowledge in teaching and learning are summarized by Roschelle (1995, p. 5) as follows:

- Designers should seek to refine prior knowledge and not attempt to replace learners' understanding with their own;
- Designers musts anticipate a long term learning process, of which the short term experience will form incremental parts; and
- Designers must remember that learning depends on social interaction conversations that shape the form and content of the concepts that learners construct. Only part of specialized knowledge can exist explicitly as information, the rest must come from engagement in the practice of discourse of the community.

2.3.2 Integration of prior everyday knowledge can cause misconceptions

It should be realized that prior knowledge could be at odds with meaningful understanding of the subject matter (Ramsden, 1994; Rochelle, 1995). For instance, if a learner holds a framework of understanding that is at odds with the accepted knowledge there might be barriers created to learning of explanations offered during science teaching and learning. Thus, for a teacher to be able to clear the misconceptions learners constructed through everyday experience, teachers need to cultivate sensitivity to the different points of the views that learners bring to the experience. Roschelle (1995) says that for the teacher to become sensitive, he or she must look and listen closely as learners use the materials. Roschelle

(1995, p. 16) continues, “When something strange and incomprehensible occurs, don’t give in to temptation to brush it aside; take the occurrence as the opportunity to learn”.

It is therefore advisable for teachers to allow learners to manipulate local materials and discuss the tasks with other learners while the teacher is listening and probing learners’ understanding by asking questions about the comments they make (Roschelle, 1995). Then, both teachers and learners might have time to discuss the differences and commonalities.

Since this study investigated how learners make meaning when their prior everyday knowledge on nutrition was integrated during teaching and learning, learners had to work with everyday experiences on foods that they eat at home. They were expected to discuss, reflect and make connections between the science knowledge and their everyday knowledge about foods (local and conventional western type foods).

2.4 The role of practical activities during teaching and learning

The revised curriculum documents such as the subject policy advocate that practical work helps learners to develop the skills and knowledge of the scientific world. Hodson (1990) states that:

> Almost all the major science curriculum developments of the 1960s and early 1970s promoted hands-on practical work as an enjoyable and effective form of learning. It is claimed that laboratory work allows development from concrete situation to abstract ideas and can be the vehicle for arousal of the curiosity… (and) appreciation of aesthetic aspects of the subject (p. 33).

This suggests that most learners have their interest and motivation stimulated during practical work because they use their sense of sight to observe and confirm what they have heard. Learners may become more interested if the outcomes of the practical work challenged their expectations about matters of fact (Millar, 2004). It may do so more effectively when their predictions are supported or refuted by the outcomes of the practical work. The outcomes which challenge their predictions may help learners to remember observable aspects of practical work for many months or even years (Millar, 2004).

Thus, with practical work learners could develop the understanding of scientific inquiry and later they could become intelligent consumers, just because they benefited from some experiences of practical work (Millar, 2004). The experience of carrying out practical work can also provide learners with insight into scientific practice and can increase interest in science and the motivation to continue with its study.

Hodson (1990) argues that learners can be motivated by practical work if it stimulates the appropriate 'curiosity'. However, learners can be motivated differently depending on their ages (Hodson, 1990). Young learners are sometimes motivated simply by the opportunity to manipulate apparatus or to make observations while older learners often require a cognitive stimulus, such as the exploration of ideas, the investigation of inconsistencies or confrontation of inconsistencies.

Thus, teachers need to consider which type of practical activities their learners should do so that they become interested and motivated in learning science. But Hodson (1990) warns teachers to be aware that they should not expect all learners to be motivated by the same thing and reminds them to use other techniques that can be used in science lessons that also may have high motivational value. Hodson (1990) encourages teachers to provide interesting and exciting experiments and at the same time to allow learners a measure of self-directed investigation.

The 'hands-on', 'minds-on' and 'words-on' practical activities help learners to acquire skills such as manipulating equipment, making predictions, observing, recording and analyzing data and drawing conclusion as well as experiencing science first hand (Maselwa & Ngcoza, 2003). Furthermore, Maselwa and Ngcoza believe that the use of practical activities in science teaching and learning is helpful for learners to acquire better understanding of science. They continue by saying that hands-on practical activities minimize the memorization of scientific concepts, promote conceptual development and give learners the opportunities to work collaboratively in groups to share the ideas and construct understanding of knowledge.

This means practical activities also develop the spirit of team work among learners. It also helps learners to develop an appreciation of the power and limitation of scientific knowledge. Maselwa and Ngcoza (2003) therefore, recommended that teachers should be equipped with the necessary skills to ensure active participation of their learners. However, Hodson (1990) warns that practical activities can be confusing, unproductive and ill-conceived as they are conducted in many schools.

Hodson (1990) and Ramsden (1994) say for curiosity to be aroused and stimulated, it is necessary to position activities and experiments in the context of everyday life and prior experience of learners. Ramsden (1994) goes even further and argues that every question that underpins practical work inquiries should emerge from learners' prior experience.

Ramsden (1994) also suggests that the autonomous nature of activities is important. The autonomous nature of activities encourages learners to feel that they have freedom to direct and adapt the activities according to the questions which emerge from their own prior experiences. It is for this reason that during or prior to the practical work learners should be given an opportunity to discuss scientific concepts developed through the practical activities (Ramsden, 1994). Learners' conceptual understanding could further be enhanced through discussions and concept maps (Maselwa & Ngcoza, 2003).

Millar (2004) also notes that practical activities are followed by a period of discussion of the observations and measurements made, of patterns in them such as similarities, differences, correlations and trends and how do they might be presented and explained. When learners work in groups or are guided through questions, they find it necessary to communicate their internal representations and do so spontaneously allowing curiosity to develop external representation that is mutually intelligible to other learners and the teacher.

2.5 Theoretical framework

As this study sought a better understanding of how to make use of the opportunities to use examples of everyday knowledge and experiences about foods (local and conventional western type foods) to assist learners to better engage and understand the science and concepts of food and nutrition, it would seem that the social cultural perspective might be valuable in the design and analysis of this study.

In terms of analyzing the socio–cultural milieu for integrating learners' prior knowledge and every day experiences in teaching and learning, I drew on Vygotsky's (1978) notion of the Zone of Proximal Development (ZPD). From this perspective learning leads to development and according to Goos (2004:256) the notion of the ZPD is a useful framework for explaining as increasing participation in a community of practice (Lave & Wenger, 1991).

Pedagogical Content Knowledge (PCK) (Shulman, 1986) is also discussed because teaching is not only about knowing the content of the subject but it is also about the methods, pedagogies or strategies in which the content should be passed along to the next person.

2.5.1 Social-cultural perspective

The scope of a socio-cultural perspective in science education is to give substantial theoretical weight to the role of social interaction: seeing it, as in the Vygotskian tradition, to

be central and necessary to learning (Lemke, 2001). Lemke (2001) found the scientific study of the world as itself inseparable from the organization of scientists' activities. In addition, Rogoff (1990) infers that the socio-cultural perspective suggests that learning is a process of appropriating tools for thinking that are made available by social agents who initially act as interpreters and guiders in the individual's cultural apprenticeship.

In other words, the socio-cultural perspective is about giving more value to the roles of social interaction in teaching and learning. According to Lemke (2001), socio-cultural implies concepts of thinking about science or doing science as a human activity that is carried out within the instructional and cultural framework. As this study tried to understand whether the integration of learners' prior everyday knowledge and experience could enhance teaching and learning, this seemed an appropriate perspective to use as a theoretical framework. I have found the socio-cultural perspective to be relevant to this study because it is also relevant to the learner-centered approach (see Section 2.2.1).

According to Leach and Scott (2003), the goals of teaching should introduce new ways of thinking and talking to learners, illustrating and modeling how these ideas are used appropriately in particular situations. Leach and Scott continue by saying that individual learners must make sense of the talking that surrounds them, relating that talk to their existing ideas and ways of thinking.

This goal is then supported by some of the goals of learner-centered approach (see Section 2.2.1) which says that, the starting point of teaching and learning should be the learners' existing knowledge, skills, interests and understanding, derived from previous experience in and outside school (Rennie, 2011) and learners should be involved as parties in teaching and learning rather than receivers of educational growth. Rennie (2011) also supports the socio-culturalist theory reiterating that for learners to develop the skills and abilities to become interested in the science curriculum they need to include significant interaction with the world outside school.

The role of the teacher in a socio-cultural context, then, is to introduce and support the use of new knowledge on the social plane of the classroom, such that scientific knowledge becomes the common knowledge of the classroom (Leach & Scott, 2003). In addition, Hodson and Hodson, (1998) note that the central role of the teacher is to lead learners to new levels of conceptual understanding by interacting and talking with them. Hence, teaching should consist of activities associated with enabling the learners to participate effectively in the

lesson of the more expert and learning should be seen as *enculturation* through guided and modeled participation (Hodson & Hodson, 1998).

Extensive guidance and support is needed from the teacher, for him/ her to clear any misconceptions associated with prior everyday knowledge because sometimes learners' existing knowledge may be different from accepted scientific explanations (Roschelle, 1995) (see Section 2.3.2). Anyhow, if these misconceptions are cleared up in a proper way that prior everyday knowledge can exert a significant influence on learning (Ramsden, 1994).

The task for the learners, then, is to come to understand the scientific ideas and to internalize them for their own personal use (Leach & Scott, 2003). In socio-cultural perspectives learners inevitably approach the task of making sense of ideas presented on the social plane with everyday knowledge about the world as the main intellectual resource that they can draw upon (Leach & Scott, 2003).

When learners learn science, the aim is for them to come to understand and be able to use scientific ideas that already exist through their use within particular communities. Thus, learners need to recognize how the purposes and warranting of the scientific ideas differ from everyday ways of talking about the natural world. Then, they can be able to harmonize the culture of science with their own culture.

Aikenhead and Jegede (1999) state that when the culture of science harmonizes with the life world culture, science instruction would support the learners' views of the world and the process of enculturation would happen successfully. Oloruntegbe and Ikpe (2011) argue that if learners do not see science as a real-life experience, they are likely to experience difficulty in learning science and become disappointed with studying it.

Moreover, if learners' culture is considered during teaching and learning repertoires, parents might be able to share their intergenerational knowledge with their children. In the context of this study, for example, if teachers happen to use the example of foods learners eat at home, parents would be able to explain to their children the benefits of eating those particular foods.

However, a teacher should act as a facilitator or additional resource and interpreter whose learners may request information from, when they feel blocked in their inquiries (Pea, 1993). Goos (2004, p. 260) posits that scaffolding thus enables learners to solve problems with and later without the assistance of the teacher.

2.5.2 ZPD as a mechanism for learning

Vygotsky (1978) suggests that learning is a process that occurs any time and in everyday life and that it is not just an external phenomenon. He believes too that children are at their peak of learning when they are collaborating with more skilled partners. Vygotsky (1978) continues by saying that the more knowledgeable others help the learners by intellectually scaffolding them, and this allows the learners to carry out more challenging tasks when they are alone. Vygotsky referred to this theory as the zone of proximal development (ZPD). According to Vygotsky (1978, pp. 85-86), the "ZPD is the distance between the development as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers".

In the same vein, Hodson and Hodson (1998) posit that apprenticeship is not just a process of internalizing knowledge and skills; it is a process of becoming a member of a community of practice (Lave & Wenger, 1991). In such community of practice, learners need the opportunity to work alongside knowledgeable people and to gain assistance, encouragement and support from someone who is knowledgeable about the context and content of the topic to be taught. In the context of this study, Vygotsky's ZPD theory helped me to understand my role as a teacher and enabled me to allow learners to seek help from their parents or peers when they were carrying out tasks on their own.

When learners work in collaboration with others they enter another level of discussion and argument which could lead to them making meaning of their learning processes and hence develop appropriate knowledge. In this study, I had hoped too that my learners would assist one another during group work discussions. Hodson and Hodson (1998) indicate that learners can also guide fellow learners through the ZPD during group discussions. Meira and Lerman (2001) prefer to view the ZPD as a symbolic space which emerges within social interaction. This helps extending learners' understanding of the subject at hand beyond their prior understanding as individuals.

As far as this study was concerned, it was also hoped that parents or community members would assist learners to understand the subject content better through sharing the knowledge they have about local foods. The use of both local and conventional western type foods as teaching materials can enable teachers to support and stretch the learners' understanding

through guided participation in a social activity. The integration of local materials in teaching can help learners to find connections between what is to be learned and their daily lives, gaining interest and commitment, identifying similarities and differences between the new knowledge and prior knowledge (Rennie, 2011). It is recognized that this has implications for teachers' pedagogical content knowledge (Shulman, 1987).

2.5.3 Pedagogical Content Knowledge

Shulman (1987) says it is very important for the teacher to know what is to be taught and how it should be taught. He further suggests that "teaching must properly be understood to be more than the enhancement of understanding; but if it is even that, then questions regarding performance of its other function remain moot" (pp. 7-8). The above statement indicates that teaching is not only about knowing the content of the subject, but it is also about knowing the methods, pedagogies or about strategies in which the content should be transferred. This is where the concept of Pedagogical Content Knowledge (PCK) emerges.

PCK is the knowledge that underlies the teacher's understanding, which is needed for effective teaching. It requires teachers to draw on Shulman's (1986, 1987) seven components, but there are two major components of PCK that teachers should take into consideration. Teachers should be able to recognize learners' learning difficulties/barriers and draw on knowledge to represent the topics (Loughram, Mulhall & Berry, 2004).

According to Hashweh (2005), PCK can be viewed as a form of knowledge that preserves the planning and wisdom of practices that teachers acquire when repeatedly teaching certain topics. Pedagogical knowledge is required for teachers to incorporate authentic, community issues into the classroom, or to move students outside of the classroom to work with issues in the community (Rennie, 2011).

Rennie (2011) cautions that not all teachers know how to integrate learners' prior everyday knowledge into their teaching. Furthermore, she argues that even the teachers who are good in integrating learners' everyday knowledge find it requires a lot of effort for them to ensure that they are integrating it effectively. So, if that is the case, teachers need professional development on how to integrate learners' everyday knowledge for the learners to learn science with understanding.

2.6 Concluding remarks

It emerged from the literature reviewed here that prior everyday knowledge is a very important part of learning since when learners enter school they come with rich mine of information from their homes or community. Therefore, I have come to the conclusion that teachers should integrate learners' indigenous knowledge in school science with two main aims. 1) To make science an understandable and relevant subject to the learners and 2) to assist learners to use their indigenous knowledge forever. Practical work is one of the aspects which I have reviewed and most of the researchers commented that it has the potential to contribute to meaningful learning in science.

The social-cultural perspective and pedagogical content knowledge are the theories that underpin this study. In the next chapter I discuss the research methodology employed in my research project.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The goal of this study was to investigate how grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science. This was done with the view to enhance meaning making, conceptual development and understanding of this topic.

This chapter discusses the research methodology of this study. It begins with the explanation of the research paradigm that the study adopted. It also outlines the aims or goals and questions of the study and is followed by a description of the approach - a qualitative case study - that I used.

I also describe the research site, participants and the sampling strategy I adopted. It then proceeds with a description of the data gathering techniques, namely, document analysis, a brainstorming session, semi-structured interviews and focus groups interviews, observation, reflections and the practical activity that the study employed. The chapter continues with a discussion of data analysis techniques as well as how I addressed ethical considerations. It also outlines the limitation of the study, validity and then presents the summary.

3.2 Research design

3.2.1 Research paradigm

This study is situated within the interpretive paradigm. According to Cohen, Manion and Morrison (2007), the interpretive paradigm views the social world as an emergent social process, which is created by the individuals concerned. Cohen, Manion and Morrison (2010) also point out that the interpretive paradigm is interested in understanding the subjective world of human experience. To retain the integrity of the phenomenon being investigated in this paradigm, efforts are made inhabit the person in order to understand him/her from within (Cohen, et al., 2007). This is necessary because according to Babbie and Mouton (2001, p. 27), the aim of the interpretive paradigm is "to describe and understand events within the concrete, natural context in which they occur".

Furthermore, interpretive approaches focus on action (Cohen, et al., 2010). Thus, this study endeavored to capture the sense of action as it occurred. An attempt was also made to place events in contexts that were understandable to the participants themselves as proposed by Babbie and Mouton (2001). Consequently, researchers try to observe on-going processes to better understand individual behavior and the spiritual nature of the world. I thus believed that this paradigm would allow me to understand the situation and to interpret meaning within the social and cultural context of the natural setting of this research study, in particular, nutrition in Life Science.

Researchers working in this paradigm assume that people's subjective experiences are real and should be taken seriously since we can understand others' experiences by interacting with them and listening to what they tell us. Thus, this study was designed to provide rich insights and understanding of the prior everyday knowledge learners bring to school in connection with both local and conventional western type foods. It also tried to understand learners' and community members' perspectives about the benefits of eating local and conventional western type foods. The study planned to provide some insights on how the integration of the learner's prior everyday knowledge and experiences of the foods that they eat in their homes in conjunction with hands-on practical activities enabled or constrained meaning making of the topic on nutrition.

Within this interpretive paradigm, a qualitative case study approach was adopted since I attempted to understand human actions in their social setting (Babbie & Mouton, 2001). Yin (2003, p. 15) defines a case study as "a way of investigating an empirical topic by following a set of pre-specified procedures". Lending support to this idea, Leedy and Ormrod (2010, p. 108) define a case study as "a type of qualitative research in which in-depth data are gathered relative to a single individual program, event, for the purpose of learning more about an unknown or poorly understood situation". Rule and John (2011, p. 4) define a case study as a "systematic and in-depth investigation of a particular instance in its context in order to generate knowledge".

My project was a case study of a class and teachers in a school in the Oshana region (see Section 3.4). Since I was trying to determine how learners understood nutrition when their prior everyday knowledge was incorporated into the topic, this made my case qualitative in terms of methodology. Babbie and Mouton (2001, p. 270) refer to qualitative research as a

"generic research approach in social research according to which research takes as its departure point the insider perspective on social action". Similarly, Payne and Payne (2004) refer to qualitative research as an umbrella term, covering different types of research (p. 175). They further explain that the qualitative method focuses on how the individuals interact, emphasizing the interpretation of the meanings which each individual brings to the interaction and the way mutual understandings are negotiated.

This suggests that qualitative research is a combination of several research strategies that seek to make sense of human actions such as behaviours and attitudes and how people experience the reality of the phenomena in their social surroundings.

The study took place in a classroom setting where the learners' prior everyday knowledge and experiences about foods that they eat was considered, observed and video-taped. As I described in Chapter 2, the socio-cultural theory seemed to be the appropriate theoretical framework to employ.

3.3 Research goal, objectives and questions

The main goal of this research study was to investigate how grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science at a school in Oshana region in Namibia.

The objectives of this study were to:

1. Find out what the curriculum documents say about the integration of learners 'prior everyday knowledge and experiences on nutrition;
2. Identify foods (local and conventional western type foods) that learners and community members know and eat in their homes;
3. Investigate the learners' and community members' perspectives on the foods (local and conventional western type foods) that they eat at home; and
4. Investigate whether the elicitation and integration of learners' prior everyday knowledge and experiences on the foods (local and conventional western type foods) that they eat at home in conjunction with hands-on practical activities enables or constrains meaning making of the topic on nutrition.

To realise this main goal and objectives, I endeavoured to answer the following main question:

How do grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science?

To answer this main question, the following sub-questions were answered:

- What are the curriculum documents' expectations on the integration of learners' prior everyday knowledge and experiences in teaching and learning?
- Which types of foods (local and conventional western type foods) do learners and community members know and eat at home?
- What are learners' and community members' perspectives about the foods (local and conventional western type foods) that they eat at home?
- Does eliciting and integrating learners' prior everyday knowledge and experiences on foods (local and conventional western type foods) that they eat at home enable or constrain learner participation and meaning making of nutrition?
- Does eliciting and integrating learners' everyday knowledge and experiences on foods (local and conventional western type foods) that they eat at home enable or constrain meaning making and conceptual development of the topic nutrition?
- What are the challenges of eliciting and integrating learners' prior everyday knowledge and experiences on the foods (local and conventional western type foods) that they eat in their homes during the teaching and learning of the topic on nutrition?
- Does engaging learners in hands-on practical activities associated with the different foods tests enable or constrain learners' conceptual development and meaning making of the topic on nutrition?

3.4 Research site and participants

This study was conducted at Twahangana Combined School (pseudonym) where I teach. It is a public rural school in the Oshana region of Namibia and it is about 7km from a small town called Oshakati. The school is located in a community where the majority of the parents is unemployed or has low income levels. As a result, most learners are used to eating local foods such as *omahangu* (millet) and so on.

In this study, I worked with my colleague as a critical friend who observed my lessons while teaching Life Science to a class of 17 grade 10 learners. I decided to involve a critical friend in the hope that a critical friend observing my lessons would help me to gain insight into how to make the teaching of nutrition more meaningful to the learners. Furthermore, in doing so, I

was hoping that my findings would "promote understanding or inform practice for similar situation" (Leedy & Ormrod, 2010, p. 137).

I also involved the other Life Science teacher teaching grade 10 at the school to understand her views about integration of learners' prior everyday knowledge and experiences in teaching and learning after watching the video together. Apart from teachers and learners, five community members also participated in the study with the purpose of getting their perspectives on and insights into their everyday knowledge about the foods that they eat.

3.5 Data generation techniques

The main data generation techniques that I used in this study were document analysis; brainstorming and discussion, interviews (*semi-structured* and *focus group interviews*); practical activities with worksheets, observations and reflections. I used a number of data gathering techniques so that they could complement one another.

I undertook the research process in four stages and multiple methods of data gathering techniques were used. The first stage of the research process was document analysis where I reviewed documents relevant to my study, namely, the Namibia National Curriculum of Basic Education (NNCBE), the Life Science grade 8-10 syllabus, the two prescribed Life Science textbooks for grade 10 and the subject policy for grade 5-12.

The second stage of the research process was the brainstorming session on foods (local and conventional western type foods) that learners eat at home and an observation of lessons by my colleague who also teaches Life Science. The third stage of the research process involved semi-structured interviews with my colleague who observed my lessons, my other colleague who teaches Life Science at the same school and five members of the community. The last stage was a focus group interview which I conducted with six learners from the class where hands-on practical activities on food testing were carried out. The four data gathering methods used in this study are summarized in Table 3.5 below.

Table 3.5: Data gathering techniques, data gathered and purpose

	Method to be used to gather data	**Data to be gathered**	**Purpose**
Stage 1	Document analysis	The data on the inclusion of learners' prior everyday knowledge and experiences in the National curriculum and Life Science syllabus.	To understand the importance of including learners' prior-every day knowledge and experiences in teaching.
Stage 2	Part 1: Teacher's and Learners' interviews in the community; brainstorming and discussions Part 2: Introductory science lesson presentation	Types of foods that learners and community members know and eat at home, learners' and community members' perspectives about the benefits of the foods that they eat at home. Basic scientific concepts on nutrition.	To find out the types of foods that learners and community members eat at home; to establish learners' and community members' perspectives about the benefits of the foods that they eat at home. Introduce learners to the different types of nutrients available in foods.
Stage 3	Observation of my lesson presentations by a critical friend. Note: All lesson presentations were video -taped by a friend who was a non-participant observer. All the lessons observed were video typed	Learners' engagement and learning processes during my lesson presentations.	To understand how the contextualizing of content on nutrition affects learners' participation and meaning making during the lessons.
Stage 4	Individual semi-structured interviews with critical friend.	To seek clarity on the explanations; and her perspectives on the learners' prior everyday knowledge and experiences used in the science classrooms.	To gain insight into what my critical friend (Life Science teacher) thinks about incorporating prior everyday knowledge into science classrooms.

Stage 5	Practical activities-worksheets	Learners' engagement during hands-on practical activities. The development of learners' understanding on the nutrients available in foods through practical activities	To allow learners to have control over their own learning by carrying out the practical activities themselves. To understand which food groups contain which types of nutrients?
Stage 6	Focus group interviews to be carried out after the hands-on practical activities.	Follow up on learners' reflections on food testing and on the outcomes of the worksheet and the test results with a view to seek clarity on issues already raised during lesson presentations.	To clarify issues raised by means of the other methods of data collection; to prioritize experiences and identify opportunities for change
Stage 7	Reflections and discussion with my critical friend who is a Life Science teacher.	The strengths of the lesson presentation to be maintained and the areas for improvement.	To allow all the observers to comment To discuss new things they learnt from the presentations.

These are now discussed in greater detail below.

3.5.1 Document analysis

Nieuwenhuis (2011, p. 82) refers to document analysis as the "analysis on all types of written communications that may shed light on the phenomenon that you are investigating". In addition, De Vos, Strydom, Fouche and Delport (2005, p. 314) refer to document analysis as the "analysis of any written material that contains information about the phenomenon that is being researched." This implies that any document that contains relevant information about the study can be used. Merriam (2001, p. 113) identifies four categories of document analysis and these include "public records, personal records, physical materials and research-generated documents".

In this study I reviewed the following curriculum documents: the Namibia National Curriculum of Basic Education (NNCBE, 2009), Life science syllabus for Grade 8-10, two Life Science textbooks, National Policy for Natural science and (Natural science and Health Education (NSHE), Life Science and Biology). These documents were analyzed with a purpose of understanding issues surrounding curriculum and teaching methods on the

importance of integration of learners' prior everyday knowledge and experiences during teaching and learning repertories (Hopkins, 2008).

The key documents analyzed were assigned codes to make it easy for data analysis and the coding system used for the documents is as follows:

- Namibia National Curriculum of Basic Education (NNCBE)- D1;
- The syllabus- D2;
- The textbooks- textbook1 D3a , textbook2 – D3b; and
- The subject policy –D4.

3.5.2 Brainstorming and discussion

Rawlinson (1981, p. 36) defines brainstorming as "a means of getting a large numbers of ideas from a group of people in a short time". Rawlinson further argues that during brainstorming everybody has an opportunity to contribute ideas and "all sorts of ideas, good and bad, sensible and silly are allowed and recorded" (Rawlinson, 1981, p. 39). Correll (2004) defines brainstorming as "coming up with fresh new ideas where we interact with other's to build upon them- has the potential to become an exhilarating experience for everyone involved".

Based on these statements learners were given an opportunity to brainstorm on the foods they eat at home to gain an understanding of their perceptions of those foods. Precise instructions were given to them so that they could have a clear picture of what they had to do as suggested by Rawlinson (1981).

After the brainstorming session, learners presented and discussed their prior experiences of the foods that they eat at home. According to Rawlinson (1981), during brainstorming sessions the ideas are allowed to be exchanged, developed and changed by the group, under the control of the leader. Thus, learners were given an opportunity to comment on each other's ideas. Some ideas were changed, accepted or discarded.

At the end of the first lesson learners were given a research task so that they could ask their parents or community members about the benefits of eating the foods that they ate. In the second lesson learners discussed the research task feedback.

3.5.3 Observation

According to Cohen, et al. (2007, p. 396), an observation is a "research process that offers an investigator the opportunity to gather 'live' data from naturally occurring social situations". Moreover, Simpson and Tuson (2003) argue that an observation is a useful technique to use in investigations to bring forth first-hand information. Through observations researchers obtain first-hand information through looking directly at what is taking place in a situation at that particular point in time.

In this case study, during observation I was a participant observer since I was teaching the lessons which were observed by my critical friend. According to Nieuwenhuis (2011, p. 85), "the researcher becomes as participant in the situation being observed and may intervene in dynamics of the situation and even try to alter it". In a similar vein, Payne and Payne (1994, p. 157) state that "in participant observation the researcher takes on an active role within the social setting that is being studied". I taught three lessons in which I was a facilitator while my critical friend observed. This indicates that I essentially became part of the lives and daily routine of the learners that I was teaching (De Vos, Strydom, Fouche & Delport, 2005).

3.5.4 Semi-structured interviews

According to Payne and Payne (2004, p. 131), semi-structured interviews "are based on a small number of open-ended questions, the answers to which are actively and freely probed by the interviewer for elaboration". In the similar vein, Leedy and Ormrod (2010, p. 188) argue that "in semi-structured interview, the researcher may follow the standard questions with one or more individually tailored questions to get clarification or probe a person's reasoning".

Therefore, semi-structured interviews were conducted in this study to obtain a full account of what the teachers (critical friend and Life Science teacher) thought about the elicitation and integration of learners' prior everyday knowledge and experiences in teaching and learning. I also interviewed the community members to find out what foods they eat at home and also to establish their perspectives about the benefits of those foods (local and conventional western type foods).

I asked the participants (teachers) about their understanding and experiences on the prior everyday knowledge, challenges encountered and strategies for improvement. Semi-structured interviews were conducted in such a way that created an opportunity for interviewees to provide sincere and honest responses and to allow me to probe unclear issues by asking follow-up questions.

All interviews were planned for the afternoons so that there would be no conflict with teaching activities or core functions of the school. Interviews conducted with teachers were done in English. In contrast, the interviews conducted with community members were in their vernacular language (Oshiwambo) for better communication purpose. I conducted my interviews alone and I interviewed each individual participant once.

Interview conversations were recorded using a voice-recorder with the permission of the participants. All interview conversations were transcribed soon after the interview while my mind was still fresh to recall what happened during the interview process. Interviews were used to achieve what Nieuwenhuis (2011) describes as rich descriptive data and to see the world through the eyes of the participants. The data from interview was triangulated during data analysis with data from document analysis and observation.

3.5.5 Focus group interview

Krueger (1994) defines a focus group interview as a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes toward a product, services, concept, advertisement and ideas. De Vos, et al. (2005, p. 299) define focus group interviews as a "means of better understanding how others feel or think about an issue, product or service".

According to Nieuwenhuis (2011) and De Vos, et al. (2005), in focus group interviews participants are able to build on each other's ideas and comments and to provide an in-depth point of view not attainable from individual interviews. Unexpected comments and new perspectives can be explored easily within the focus group and can add value to a study.

For me in order to hear learners' ideas and to ease them into a process where they would actively debate about lessons on food and the testing of food, I decided to do focus group interviews. Each group had to choose one learner to represent their group, so that they could

form a focus group. The number of focus group members was restricted to six learners to allow everybody to participate within the short time (Leedy & Ormrod, 2010). I made sure that every learner had a chance to answer each question asked. In addition to that, a special classroom was organized to create a tolerant environment (De Vos, et al., 2005). Learners were aware of the use of a voice recorder because I requested their permission for it to be used and were well informed about the purpose of the interview (Payne & Payne, 2004). The interview conversation was transcribed as it was recorded with semi-structured questions.

3.6 Data analysis

According to Nieuwenhuis (2011), qualitative data analysis is usually based on an interpretative philosophy that is aimed at examining meaningful and symbolic content of qualitative data. Nieuwenhuis (2011) continues to explain that data analysis tries to establish how participants make meaning of a specific phenomenon by analyzing their perceptions, attitudes, understanding knowledge values, feelings and experiences in an attempt to approximate their construction of the phenomenon. In addition, Cohen, et al. (2011) state that "qualitative data analysis involves organizing, accounting for and explaining the data; in short, making sense of data in terms of the participants' definitions of the situation, noting patterns, themes categories and regularities" (p. 537).

In this research study, data generated was inductively analyzed with a focus on how grade 10 learners made meaning during the teaching and learning of the topic on nutrition. Through the use of inductive analysis (Cohen, et al., 2011; De Vos, et al., 2005), primary categories and patterns emerged from the data. The data was also colour-coded. For example, I used green for the data on curriculum expectations; the colour blue data showed active participation of learners, pink on the data indicated practical activities. Nieuwenhuis (2011, p. 105) defines coding as marking the segments of data with symbols, descriptive word and unique identifying names. Thus, the coding was done with the purpose of assisting me to make sense of the data and identify themes and patterns which were later combined into analytical statements.

All data gathered by electronic digital tools such as voice recorder and video recordings were also transcribed. Data generated through interviews was analyzed under broad themes and summarized in relation to the questions asked during the interview process. These were then organized into categories and subcategories using a constant comparative approach, by

reading across all the transcripts. This allowed for greater discrimination and differentiation in the analysis of the data (Nieuwenhuis, 2011). During analysis the data was revisited to ensure that themes and categories genuinely emerged and were not imposed and the essence of the dialogue was preserved (Nieuwenhuis, 2011).

Data generated through reviewing of documents and observations was also analyzed by writing up summaries, inductively doing it and then interpreting it, using the pedagogical reasoning model to seek for evidence of knowledge, comprehension, transformation, instruction evaluation, reflection and new comprehension (Wilson, Shulman & Richert, 1987).

3.7 Validity and trustworthiness

According to Bassey (1999, p. 75), "validity is the extent to which a research fact or finding is what it claimed to be". To ensure validity and trustworthiness in this study, I used four data gathering techniques, namely, documents analysis, brainstorming and discussion, observation, and interviews (semi-structured and focus group interviews). The use of the multiple methods helped to triangulate and to build on each type of data gathering method while at the same time compensating for potential weaknesses in any single approach (Babbie & Mouton, 2001).

Cohen, et al. (2007, p. 141) define triangulation "as the use of two or more methods of data collection in the study of some aspect of human behaviour". Babbie and Mouton (2001, p. 277) state that "triangulation is the best way to elicit the various and divergent constructions of reality that exist within the context of a study to collect information about different events and relationships from different points of view". Thus, I let the learners brainstorm about foods they know and eat in their homes and then also interviewed the community members to view their perspectives on foods they know and eat. Triangulation was used to complement and look for consistency, patterns and discontinuities in the data gathered from learners, community members as well as teachers.

3.8 Ethical implications

I have followed the customary procedure in this kind of research with regard to ethical considerations. Pseudonyms were used in this study to respect and protect the rights of the

research participants (Payne & Payne, 2004). Pseudonyms were also used to address ethical issues as far as anonymity and confidentiality were concerned (Cohen, et al., 2007).

Likewise, the ethical issues of confidentiality, anonymity, voluntary participation and the right to withdraw were addressed in this study since I was working with people whose rights needed to be protected and respected (Payne & Payne, 2004; Cohen, et al., 2007). Merriam (2002, p. 313) too argues that "ethics begin with the research project and end with how we present and share with others what we have learned".

Before the research was conducted, I obtained permission from the relevant authorities such as the school inspector in Oshakati, my school principal, my critical friend who is a Life Science teacher, the learners' parents and the learners (See Appendices A1, A2, A3 and A4). I decided to employ my cultural strategies here. That is, permission was negotiated personally first and thereafter followed in the form of official letters.

Furthermore, all the participants were informed about the purpose and objectives of the study to allow them to make informed decisions about their role in the study. They were informed about their right to participate freely or to withdraw from the study at any time should they feel uncomfortable with the process. I ensured trust in participants by assuring them of their anonymity and of the confidentiality concerning any information they might share with me.

The research study only commenced after permission had been granted from all the people mentioned above as well as after the research proposal had been approved by the Education Higher Degrees Committee (EHDC) from Rhodes University. I also found the EHDC's comments and suggestions on my proposal very informative and useful.

3.9 Limitations

Different factors such as time, accessibility expense and others have been identified as barriers that hinder researchers from obtaining information from the entire population as Cohen, et al. (2010) argue:

> Factors such as expenses, time and accessibility frequently prevent researchers from gaining information from the whole population. Therefore they often need to be able to obtain data from smaller group or subset of the total population in such a way that the knowledge gained is representative of the population…..under study (p. 100).

Thus, because of limited time and because this research was designed as a case study which focused on only one school in the region and targeted only one teacher and her class of many classes at the school, findings cannot be generalized.

Another limitation I encountered was that observation, as one of my data gathering techniques, might not give a true picture of the situation as it is possible that participants might have behaved differently from normal because they were aware that they were being observed. Most of the learners were not free to speak in the videos because of the barrier using English created. Consequently, I decided to ask some questions in their mother tongue. Furthermore, the data gathered from community members was gathered using their vernacular language and thereafter translated into English. During the translation of the data some meanings might have been distorted. Another problem that I experienced was that it was difficult to find accurate translations of some foods' names in English.

Another limitation observed was poor concentration of learners in one of my presentations especially learners who were sitting on the sides of the classroom. Possibly, this could be due to the fact that they were going to write a test in the next lesson. Some learners were trying to read for the test.

Some school programs such as meetings and workshops delayed my gathering of data. There was a day whereby my observer was not able to observe me because she was given a task to complete. However, we agreed to watch and discuss the video together later.

3.10 Concluding remarks

This chapter outlined my research approach, touching on the topic and the goal of my research. It described the features of the research that made it qualitative and interpretive in nature. It outlined and explained why the study employed a case study approach.

The chapter also discussed the criteria used to select a school as a research case as well as the sampling strategies that were employed to select the research participants. It outlined that the school was selected in terms of its accessibility to me as the researcher and that purposive sampling was used to select the participants. It also described the four data gathering techniques that were used during the study and outlined how each technique was used and why it was used. The chapter further discussed the rationale for using a multi-method

approach in qualitative research with regard to triangulation since it was able to enhance the validity of the data.

The chapter presented a brief description on how the data from the four data-gathering techniques were analyzed in order to arrive at the findings. The chapter also touched on the ethical issues that were well thought-out and addressed throughout the research process. It revealed that the research process was not carried out as perfectly as planned due to various limitations which are also discussed in this chapter. The chapter explained how validity was enhanced in this study.

The next chapter presents and analyses the data that emerged from the data gathering techniques such as learners' brainstorming session and semi-structured interviews with five community members.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS: PHASE ONE

4.1 Introduction

In this chapter I compile the data that emerged from the learners' brainstorming session and semi-structured interviews with five community members. The data is based on the foods that the learners and community members know and eat at home. The data also describes the learners' and community members' perspectives on the foods that they eat. The presentation of data uses two analytical categories. The foods eaten in the community and community members' perspectives on the foods prohibited to be eaten by some people.

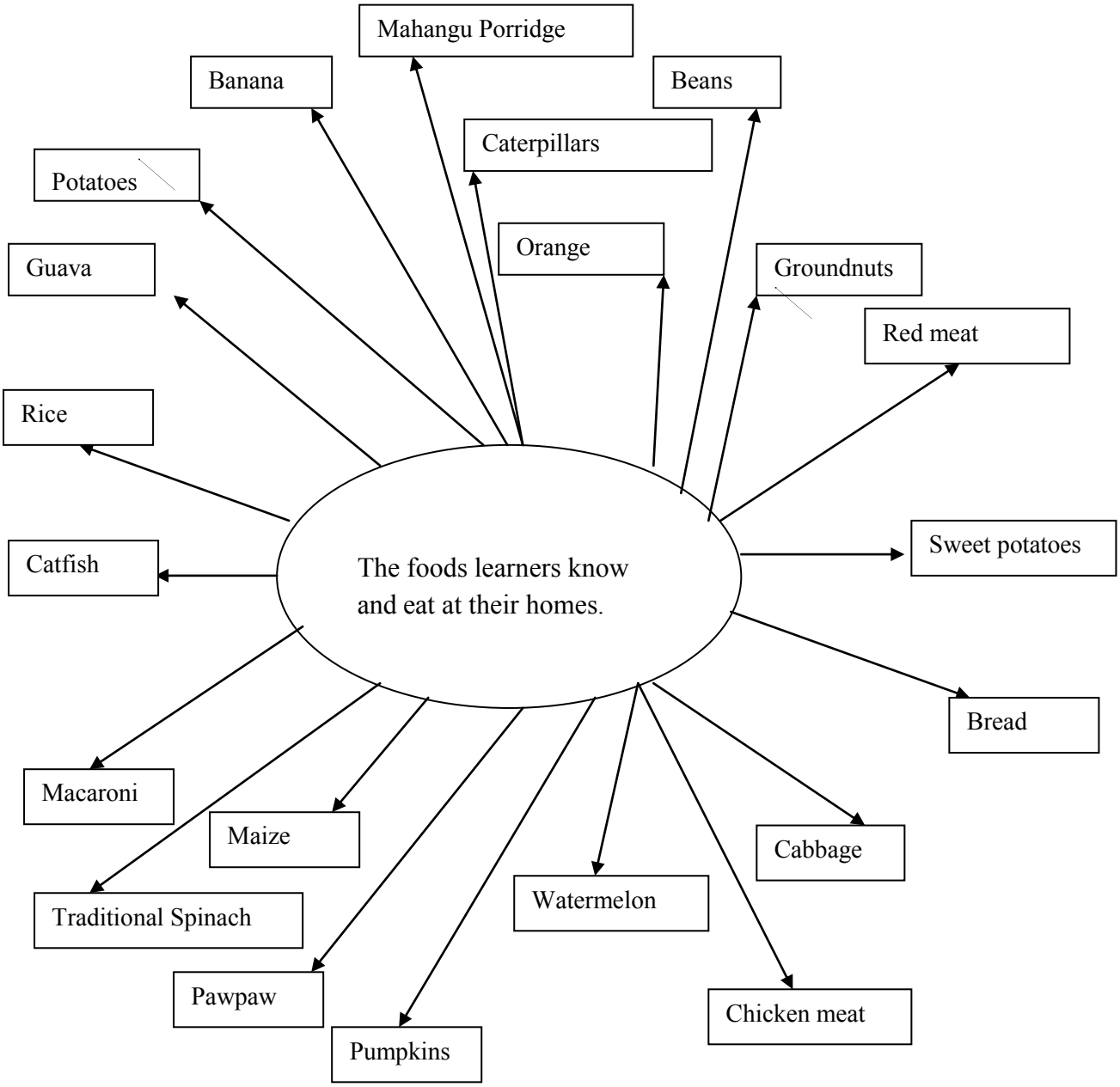
4.2 Data collected during brainstorming session

In Chapter 3, Section 3.3, I stated that the main goal of my research project was to investigate how grade 10 learners make meaning during teaching and learning of the topic on nutrition in Life Science. As I was researching my own practice, to realize this goal, I needed to elicit learners' prior everyday knowledge to facilitate meaning making and conceptual development in nutrition.

4.2.1 Foods (local and conventional western type foods) mentioned during brainstorming

In lesson one, I asked learners in their groups to list names of foods (local and conventional western type foods) that they eat at home. The diagram below documents the different foods mentioned by the learners from all the groups in the classroom during brainstorming session (see Appendix B1).

Figure 2: This figure shows the foods which were mentioned during brainstorming session with learners in grade 10 B



4.2.2 Learners' perspectives on the foods they know and eat at home

During the brainstorming session, learners had to brainstorm about foods (local and conventional western type foods) they know and eat. According to the findings from the notes of my observer and transcripts of the video, most learners were actively involved in listing the foods and they were all able to provide the benefits of eating the foods that they listed as it is indicated by the observer (see Appendix B3). The main intention was to find out whether learners could use their prior everyday knowledge in the lesson. In many cases they

indicated that you get vitamins from certain foods because in their vernacular language they refer to vitamins as all the nutrients available in the food.

The following is the brainstorming on the perspectives of learners on the foods they know and eat at home.

Teacher: *Among all the foods you mentioned I would like you to tell me the benefits of eating each of those foods, the benefit of eating each of that food and the nutrients that are available in those foods can you quickly discuss that?*

Learner: *We eat food to get vitamins, to grow and to be healthy.*

Teacher: *Which foods among the foods you have listed help you to grow or give you energy?*

Learner*:* *We get carbohydrates*

Teacher*:* *Those are nutrients that you are getting, for what purpose you are eating the food ….like porridge.*

Learner: *To get energy*

Teacher: *Eewah"* (Yes)

Learner: *The nutrients ___the carbohydrates*

Teacher: *Is that all you get from the food?*

Learner*:* *Fish obtain calcium, eggs obtain vitamins*

Teacher: *Vitamins from eggs" The class has disagreed that we don't get vitamins from eggs.*

Learners: *___ unless from eggs you get proteins.*

Teacher*:* *Okay the other group? Jeremiah……*

Jeremiah*:* *Benefits of eating local foods ___porridge make you strong, cabbage and spinach for our body to grow.*

Teacher*:* *Cabbage and spinach for our body to grow?*

Jeremiah*:* *Fish and chicken for our body to grow.*

Teacher*:* *I would like you to listen to others please.*

Learners: *Cabbage and spinach for our body to repair the tissues, the nutrients we get from porridge rice, bread we get carbohydrates, from chicken, fish, eggs we get protein, from cabbage, spinach and beans we get vitamin.*

Teacher*:* *Ok*

Learner: *Porridge, we eat porridge to get fat and the nutrients we get from porridge is carbohydrates, beans provide us with vitamins and it build and repair body tissues, we get fat from the meat, it supplies for our body.*

Teacher*:* *Next group*

Learners: *The foods that are categorized by carbohydrates are porridge macaroni and bread they give us energy while under protein meat, ground nut and beans, help to build new cells and build up damaged cells, while bananas are only for vitamins which are provided by pumpkins to accurate our body temperature.*

After brainstorming, the learners were asked to categorize the foods into two groups of nutrients. The two groups of nutrients are macro and micro nutrients.

The data that I obtained from the transcriptions and from watching the videos indicated that learners found it easy to associate new knowledge such as micro and macro nutrients and old knowledge (nutrients available in foods they eat) (see Appendix C2). Learners were able to tell the sources of macro nutrients. However, they found it difficult to establish the source of micro nutrients because in some foods one can get macro nutrients and at the same time you can get micro nutrients. During the lesson, learners were eager to know more and they asked some questions such as:

1. *In which group of nutrients we can categorize sugar and salt?*
2. *Why do we need a small quantity of micro nutrients?*

Here are the extracts of how learners tried to find out which food is in which group of macro and micro nutrients.

Teacher: *The nutrients are divided into two groups. We are having the micro nutrients these are the nutrients that are needed in small quantity by the human body so, we do not need a lot of food from that group, the example of the micro nutrients include mineral salt and vitamins and minerals when we are eating them we don't need a lot of them. Then we have macro nutrients, those are nutrients which are needed in a large quantity, because once there is decrease of these nutrients, then the body will develop malnutrition. The example of macro nutrients are carbohydrates, protein, fibre and fat. By now I would like you to tell me which foods are a source of macro nutrients. Can you discuss and tell me which ones are the sources of macro nutrients and which one are the sources of micro nutrients.*

Learner: *The sources of macro nutrients are porridge, macaroni, meat, beans, ground nuts and maize.*

Teacher: *Ok, she said that those foods are source of macro nutrients. Are those foods needed in large quantity?*

Learner: *Yes.*

Teacher: *Those foods are the source of energy which is macro nutrient. Which ones are the sources of micro nutrients? The one that are needed in small quantity, which one*

Learner*:* *In small quantity?*

Teacher: *Mhuu… the one that you have listed in your groups*

Learners: *Ok Mrs*

Learners: *Cabbage*

Teacher: *Yes cabbage is a source of vitamins which are micro nutrient, the other foods you have listed in your groups needed in small quantity by the body.*

Teacher*:* *Laina*

Learner: *Traditional spinach*

Teacher: *Traditional spinach*

Learner*:* *Yes*

Learner*:* *Oranges*

Teacher*:* *From your group*

Learner: *Water melon and pawpaw*

Teacher*:* *Water melon and paw paw, are there other foods that are providing nutrients that you did not mention in your group.*

Learner: *Caterpillars*

Teacher*:* *Are caterpillars not a source of protein*?

Learner: *Yes*

Teacher*:* *Caterpillars is a source of protein, caterpillar is a source of macro.*

Learner*:* *Nutrients*

Teacher: *You can ask any question about macro or micro nutrients*

Learner: *In which group we categorize sugar and salt?*

Teacher: *He is asking in which group we categorize sugar and salt.*

Teacher: *Sugar is a source of which nutrient?*

Learner: *Fat*

Teacher*:* *Fat and?*

Learners: *But also in vitamins*

Teacher*:* *First you need to know that sugar is a source of what, before you categorize it.*

Teacher*:* *Yes Ottilie*

Learner: *Sugar is a source lipid*

Learners: *Aaye (no)*

Teacher: *Sugar is a main source of what? .....Ye?*

Learner*:* *Is a main source of carbohydrates.*

Learner*:* *Is a main source of energy.*

Teacher: *Energy?*

Learner*:* *Yes*

Teacher: *So, in which group of nutrients you can include sugar?*

Learner: *Is macro nutrient.*

Teacher*:* *Is macro*

Learner & Teacher: *Nutrients*

Teacher: *Now the question is; do we need a lot of sugar?*

Learners: *Yes…No…Yes!*

Teacher: *You do not just need think about the sugar you know and see. We have different types of sugars that we can get from different foods that we eat. If sugar is a source of energy then it is needed in large quantities.*

Learner*:* *In which category are we going to categorize salt? Salt is a source of what?*

Learner: *Mineral*

Teacher: *Salt is a source of minerals. In which group of nutrients we can categorize salt?*

Learner: *Micro*

Teacher*:* *Micro?*

Learners and teacher: *Nutrients*

Teacher: *Another question again if you have.*

Learner: *No query*

Teacher: *Ok then if you don't have a question it is clear.*

Teacher*:* *Ok*

Learner*:* *Why do we need a small quantity of micro nutrients?*

Teacher: *The body itself needs it in small quantity.*

Learners: *Yes Mrs.*

Teacher: *Now everybody knows what the macro nutrients are and what the sources. Ok, now we have the homework. I would like everybody to list different foods and ask your parents or anyone from your community about the benefits they get from eating those foods. There are a lot of benefits that we get from the foods that we eat*.

4.3 Data gathered from the community members using semi-structured interviews

4.3.1 The types of foods eaten in the surrounding community

All five interviewees indicated that they eat different types of foods such as vegetables, fruits and meat. The foods listed by community members were: mahangu porridge, traditional spinach, *Oshikundu* (a drink made from mahangu flour), jackal berries *(eenyandi)*, birds plumes *(Eembe*), fish (different types of fish), mushrooms - even though there are poisonous mushroom in the area - these mushrooms were not mentioned and I neglected to ask a follow up question about it, red meat, chickens, beans (dried beans and fresh beans green ones), makalani fruits (*eendunga)*, caterpillars, oil extracted from marula nuts and pumpkins seeds, cluster figs (*eenghwiyu,)* eembu *(local fruits))*, rice, macaroni guava and mangoes (See appendix G). They stated that there were a lot of foods in their community. They eat different foods but this was determined by seasons and the environment. The two community members referred to as Nghishidimbwa and Silas (pseudonyms) said they ate a wide variety of foods.

Table 4.3.1: Shows different types of the foods eaten in the community

Name of interviewee	Responses of the interviewee in Oshiwambo	English translation of the responses
Nghishidimbwa	*Oikulya ei hatu li ongaashi oshifima shomahangu, ombidi, oshikundu, oova no kahauxwilili, eeshi, omatumbula nomafuma. Oyiimati ngaashi eenyandi, eembe. Oikulya imwe ohai monika ashike pefimbo lodula. Imwe oye likolelela ponhele apa u li. Ombelela ohatu li ngaa ndee hayo naanaa ya fimana. Oya ningilwa ashike okupitifa oikulya ikwao ngaashi oshifima.*	Freely translated: The foods that we eat are: Mahangu porridge, traditional spinach, fish, traditional brewed drink called (*oshikundu*). We also eat fruits like, birds plums, jackal berries, mushrooms. We also eat some food that only come around rainy season time like: Frogs and cat fish, it also depends on where you live, Meat we also eat, but it is not that important.
Silas	*Otu na omaludi oikulya mahapu e likolelela pomafimbo omudo. Oikulya yafimana unene oyo oshifima shomahangu noshikundu. Ope na yoo omakunde, eefukwa, eenhanga. Omakunde , eefukwa neenhanga oyo ohai liwa ongoshikulya sha wedwa po. Oshifima ohashi liwa ngaho nombelela ile nombidi. Ohatu li yo oiimati ongaashi eenyandi, eembe, eenghwiyu, eembu neendunga.*	Freely translated: We have different foods depending on the seasons of the year. The most important food is porridge, *oshikundu*, beans, fish. Beans, fish are not eaten alone as a complete meal, but you eat them as extra for after or before porridge. You also eat porridge with meat, spinach. We also eat fruits like birds plums, jackal berries, cluster figs, and also makalani fruits.

4.4 The benefits community members believed to be gained from eating different foods

All five community members interviewed believed that they eat different types of foods to gain different nutrients. They also stated that those nutrients have different functions in the body. However, they stated that they did not know exactly what nutrients they gained from specific foods. What they knew was only that when you eat *Oshifima* (mahangu porridge) you would feel satisfied and you could be able to do a lot of work. They also noted that some foods helped to prevent or heal some diseases.

The community members also believed that if you eat oil extracted from marula nuts and pumpkin seeds, it would help your eyesight. Furthermore, they believed that there were some foods which needed to be eaten by young children because it helped them to grow faster and stay healthy.

Table 4.4: Shows the community members' perspectives on the benefits of foods eaten in the community

Name of interviewee	**Responses of the interviewee in Oshiwambo.**	**English translation of the responses**
Nghishidimbwa:	*Oikulya yomaludi a yooloka ohai liwa opo omalutu etu a kule, oku yandja eenghono momalutu opo tu dule okulonga, osho yo okukaleka omalutu etu noukolele nokukeelela omalutu komikifi. Omikifi dimwe ohadi kwata amalutu etu omolwomhumbwe yoikulya imwe. Omunhu ngeenge oho li oiimati oto li keelele uha kwatwe koshinamayoo. Oikulya ngaashi omaadi eengongo (odjove) nomaadi eenhanga nosho yo omaadi eengobe ohaa yandje eenghono komidi domesho. Omunhu ngeenge e na oshiwiwili ohaku tiwa na lye omaadi eengongo ile eenhanga. Oshiwiwili ongeenge omunhu iha mono ko nawa oufiku ndele omutenya okuwete ko ngaa.*	We eat different types of food so that we build our bodies with a balanced diet. We also eat different food to get energy to do our day to day work, and also to be healthy and prevent our bodies from different diseases. For example when you eat fruits you will prevent yourself from getting scurvy. Oily food like marula oil, olive oil, and dairy oil is believed to be good for eye nerves. And when you have poor sight at night you are told to eat marula oil (*Ondjove*) or olive oil. The state when you see clearly during the day and cannot see during the night, it is called night blindness. There is also salt that prevents a person from suffering from swollen throat. In the olden days when salt was scarce, people use to die because of swollen throats due to lack of salt in their

	Ope na yoo omongwa oo hau kelele omunhu opo a ha dinde momunino. Efimbo lonale eshi omongwa kwa li wapumba ovanhu okwa li hava dulu okufya kodindo yomomunino eshi hava li oikulya ihe na omongwa. Omunhu ta dindi ashike momunino ndee ta fi ngaashi ashike eengobe odo inadi mona oikwamongwa hadi dindi.	food.
Kafute:	*Ohatu li oikulya yomaludi a yooloka shaashi keshe oshikulya oshi na oshilonga shasho molutu. Oikulya ohai tungu omalutu, okukulika omalutu etu, oku tu pa oitungifi, okuningifa omauluvi etu a kale taa longo nawa nokweendifa nawa ohonde momalutu. Omashini ohaa kwafele okukoleka omakipa unene omashini omawa okuliwa kounona vashona shaashi ohaa kwafele omakipa ounona opo a kule nawa a kale a kola nawa.Okwa twikila nokuhokola, Omaungu ohaa yandje oitungifilutu ihapu. Omaungu ohaa dulu okutuwa ndee taa ningi oufila. Oufila oo ohau dulu okuningwa oshimbobo shounona. Unene tuu ovo va filwa ooina. Ounona ovo ohava dulu yoo okupewa omashini oikombo a tulwa moshimbobo shomahangu.*	Food like mealies helps the body to be strong. Paw paws give the body vitamins, marula juice gives us vitamin c. Marula oil and olive oil helps the body and the eyes to be healthy, it also helps the brain to function properly. Olive oil is also used as lotion to apply on our body and be looking nice. Milk helps to make our bones strong, more especially milk is very good to be eaten by the babies because it helps the body of the baby to develop strongly. Yes, but it does not mean adults must not eat milk. Adults also need milk for their bones to be strong, but children need milk more. When a person is making olive oil, they also get an oshiwambo dish called (*Etapwati*) that makes our body healthy and strong. There is also mopane worms that give vitamins to the body. The mopane worms can be dried and pounded to make fine so that it can be cooked and make porridge for the kids (orphans) and you will find them much bigger and healthier than the ones that are breast fed. Baby infants can also be given mahangu porridge. If there are goats, they can be given goat milk and they eat with mahangu porridge, that baby will just be as normal and will grow even bigger
Silas:	*Oikulya imwe ohai liwa opo tu kute.*	Some foods are eaten to satisfy people. There is no specific scientist that told us

	Kape na naanaa ovanongononi ve tu lombwele kutya moshikulya omu omu na ouwa wonhumba, ndee otwa didilika ngaho kutya ngeenge owa li oshifima oto dulu ashike okulonga oilonga yoye efimbo lile nawa. Eenhanga doo vene ihadi liwa naanaa momuvalu muhapu ashike okwa didilikwa ngaho kutya ohadi yandje omaadi. Omaadi oo oku na oitungifi ihapu. Okwa didilikwa vali kutya momaadi eenhanga omu na Ovitamine D. Omaadi eengongo (odjove) omwamonika kutya namo omu na oitungifilutu ihapu. Oitungilutu oyo ohai eta okumona ko nawa, nokukaleka oshipa sha pupala nawa. Omaungu nao oku na oitungifi ihapu. Oyiimati imwe oyi na (ta yolo) oipeta hai kelele ombato. Oyiimati oyo ngaashi eeshegele neembe ohadi kwafele oikulya i kale ta i piti nawa medimo. Oyiimati imwe ngaashi eemheke ohai kwafele omunhu a kale e na ohonde tai ende nawa molutu.	that we get what in a specific food, but we noticed that if you eat porridge you will be able to do your work for a long time. Olive is not eaten too much but people make oil from it, and this oil helps the people to have healthy eyes. Now that we have scientists, they have figured out that olive oil gives us vitamin D. Marula oil (*ondjove* is believed to have a lot of vitamins that helps in keeping our skin healthy and prevents us from contracting different diseases. We also have mopane worms, mopane worms give us a lot of protein and it does not have any side effects like some other foods.
Vatilifa:	*Oikulya oi na oitungifi yolutu.Ngeenge owa lambalala ashike oshikulya shimwe kashi na eshi tashi ku etele. Oshifima ohashi kutifa, nokuyandja oukolele. Oshikundu ohashi etifa eenghono. Omaadi eengongo (ondjove) neenhanga ohaa eta oukolele womesho.*	It is what the heart wants, and again it is those foods that build the body. If you only stick to one food consistently, it will bring no good to your body. The porridge satisfies you quickly and again it keeps you healthy. *Oshikundu* gives people more energy, palm and olive oil keeps the eyes healthy.
Tuyenikelao:	*Ohatu li oikulya yomaludi a yooloka opo tu kale tu na oukolele. Ngaashi omahangu oku na oitungifilutu ihapu. Eenyadi nado ohadi dulu okutelekwa*	We eat different types of foods for our bodies to be healthy. Foods made out of mahangu provide us with a lot of nutrients. Fruit like eenyadi and wild

	ndee to li, ashike odi na oitungifilutu ihapu. Okwa didilikwa omukulukadi umwe e na ombuto yoHIV neeCD4 daye okwa li da wa pedu nai. Naashi a lombwelwa a lye oiiyamati okwa kala ashike ha li eenyadi. Omaadi eenhanga ohaa kwafele okuninga nawa omesho. Oha dulu okulongifa edimo nawa. Wo ohaa dulu okuvavwa kolutu ndee oshipa ta shi kala nawa. Eembe ohadi kwafele okushunifa ofyuuka pedu, do ohadi kelele ile di xwepopaleke okangela yokoshidalelo (ta hokolola moule) ope na meme umwe a monika okangela yokoshidalelo ndee eshi ha li eembe, unene tuu edi ditalala okangela oyo otai ende kashona. Omaungu nao oku na oitungifi ihapu. Ohaa li ashike omafo omufyaati,sha yela kutya momafo omufyaati omu na oitungifilutu ihapu.ombidi ohai kwafele okulongifa nawa medimo. Omaongo ohaa kelele oshidu. Pefimbo lomaongo ounona ohava pewa ngaa oungo vashona opo vaha kwatwe koshidu.	berries provide many vitamin. There is one lady who is HIV postive and her CD4 counts were very down. When she was told to eat a lot of fruit she eats eenyadi because she does not have money to buy fruit from the shops. It is also believed that wild berries help to slow down the womb cancer. There is (she explained in detail) one woman who was diagnosed with womb cancer but as she keeps eating fresh wild berries the cancer is not getting worse. Olive oil is good for eyes. It is also nice for a smooth digestion process. People can also apply this oil on their bodies. Caterpillars are good for health, they eat only mopane's leaves which means that in mopane's leaves there are lot of vitamine.Traditional spinach has vatimins and it helps the stomach to function well. A fermented drink made out of marula fruit juice helps to prevent fever which in most case affects people after the rainy season.

4.5 Community members' perspectives on the foods prohibited to be eaten by some people in the community

All the interviewees told me that some people are prohibited from eating some foods in their community. These people are mostly pregnant women, breast feeding mothers, children, girls and sometimes all females. They shared that pregnant women are discouraged from eating some foods because it is believed if you eat the prohibited food your unborn baby will have the same characteristics of the animal or plant from where that food originates. For instance, a pregnant woman is not allowed to eat mopane worms because it is believed that the child

would have an abnormal salivation disorder. They are also prohibited from eating the meat of wild animals which they do not know, for example, meat of the elephant because they believe that child will be violent and have a hard skin like an elephant.

Breast feeding mothers are also prohibited from eating meat of wild animals, for example, Kudu. It is believed that if a mother who has a child who is not yet speaking and eats Kudu's meat, the child might not speak at the right time.

Young children and girls are prohibited from eating some birds because they migrate with their offspring and so the children might migrate with their families when they grow up. Children (both boys and girls) are also prohibited from eating eggs. The interviewees said to me that children were not allowed to eat eggs because if they ate eggs, they would like them and hence they might steal them resulting in hens hatching fewer chickens. That is, this restriction was enforced to prevent children from stealing eggs. Thus, elderly people decided to tell them that eggs are only for older people. Even the name given to eggs in Oshiwambo is Omai which means that an egg is something that is bad and not edible.

Females are also not allowed to eat some parts of animals such as the pancreas and the meat from the inside the mouth of a cow. One community member stated that an animal's pancreas is not allowed to be eaten by women because they will just be all over men looking for attention. The meat from inside the mouth of a cow is not good for females because it may lead to some infections on their private parts. A tongue of a cow is not allowed to be eaten by two people because if it is shared by people, they would argue all the time, it should only be eaten by one person and that person should be an elder.

When I asked why some people were prohibited from eating some of these foods, all interviewees said that the prohibitions were just beliefs. Some of them were just trick laws put there to keep order in the houses, as in the case of children eating eggs.

Married men are discouraged from eating dried beans and cooked mahangu (*omahola*). These foods are culturally regarded as food of less value. Thus, it cannot be eaten by men (mostly married men). When their wives cook dried beans they make sure that they cook something special for their husbands.

Expectant and breast feeding mothers are prohibited from eating some foods for cultural beliefs and the myths which are attached to some of the foods.

Community members indicated that according to their experience, some foods have negative side effects on people who suffer with certain diseases. They noticed that if a person suffering from certain diseases eats a certain type food the disease worsens. Thus, some rules were put in place to avoid health problems. When I asked whether the people who are prohibited from eating some of the foods mentioned need the nutrients from those foods, the interviewees indicated that they do need them. One of the interviewees explained that:

> "*However, because it is culturally prohibited they cannot eat them. Apart from getting the nutrients from the prohibited foods, they can get the nutrients from other foods they eat*".

Table 4.5: This table indicates community members' perspectives on the foods prohibited from being eaten by some people in the community

Name of interviewee	**Responses of the interviewee in Oshiwambo.**	**English translation of the responses**
Silas	*Osha li omhango nokueta po elandulafano. Luhapu ovalumenhu ovo hava ningi eemhango. Okwa li hava kendabala okwaameka ouwa kombinga yavo (ta yolo). Pefimbo limwe ohandi lipula ngaa kutya ohashi dulika oikulya imwe ya fa i na omulyo muwa yo kaihapu. Nongeenge nee okwa tiwa keshe umwe na lye otashi dulika omusamane aha mone po sha, shaashi ovakainhu ovo hava teleke. Opo nee shiha liwe po opa tulwa nee omhango oyo.*	It was just a law to bring order in the nation. On many occasions, these laws were set up by the men, and so they did the laws to their advantage, the delicious parts of animals to be eaten by them. At some point I also think that perhaps those foods that have restrictions taste nicer and yet again they are not a lot. And so if it is said everyone in the house must eat, the man of the house might end up not getting anything because it is the women that do the cooking. So it is for that reason that those laws have been put in place.
Kafute:	*Oikulya imwe oya indikwa ngaho okuliwa omolwa oundjolowele. Ovanhu ava ve na ounghudi ova indikwa okulya oikulya imwe. Ngaashi omakunde I haa liwa kovanhu tava ehama oshinona, shaashi vati omakunde ngee taa fuluka ohaa di etutu lihapu. Efuluko olo*	Some foods are prohibited because of health issues; people that suffer from some diseases are prohibited from eating some food. Like I stated that beans are not allowed to be eaten by people who suffer from the

	ola itavelwa tali hapupalifa oshinona	disorder of fainting.
Kafute:	*.....Omaxuli, Omai nelaka oi na lela oitungifi oyo nokuli ya pumbiwa kounona, ndee omolwa omufyuululwakalo okwa indikwa okuliwa kounona…..*	Liver, eggs and animal tongue are really good for the body and are the most needed by children, but because of culture and tradition children are not allowed to eat them.

4.6 Concluding remarks

In this chapter I presented and analyzed the data gathered from the learners' and community members' perspectives about the foods that they eat in their homes. The data gathered showed that people in the community eat different types of foods. They indicated that they eat different types of foods to be healthy and to have energy to do their jobs. However, there are some people in the community who are prohibited from eating some foods for different reasons something which is in contradiction with school science.

In the next chapter, I present data gathered from document analysis, learners, teachers and lesson presentations.

CHAPTER FIVE

DATA PRESENTATION AND ANALYSIS: PHASE TWO

5.1 Introduction

In this chapter, I present and analyze data that emerged from the selected curriculum documents, lessons observed (lesson 1- 4) and the semi- structured and focus group interviews. The data presented describes the understanding of teachers regarding the integration of learners' prior everyday knowledge and experiences and outcomes of lessons presentation. The data also highlights the learners' opinions about the integration of their daily knowledge and experiences.

The presentation of data uses the following analytical categories: Curriculum expectations (5.2); data that emerged from lesson presentations (5.3) and data that emerged from interviews both semi –structured and focus group (5.4). Ethical issues of anonymity and confidentiality of the participants were considered in this study. Therefore, the participants were given codes in the text in order to respect and protect their identity (see Section 3.8). The codes of the participants are as follows:

The two teachers interviewed are referred to as T2 and T3. The teacher who presented the lessons is T1) while six learners interviewed are referred to as L1, L2, L3, L4, L5 and L6.

5.2 Curriculum expectations

5.2.1 The national curriculum for national education

The National Curriculum for Basic Education (NCBE) in Namibia is the official document for teaching, learning, and assessment. It gives direction to planning, organizing and implementing teaching and learning. It also provides a coherent framework to ensure that there is consistency in the delivery of the curriculum in schools throughout the country.

5.2.1.1 The approach to teaching

Preparation for a knowledge-based society requires a learner-centered approach to teaching and learning (see Section 2.2.1). This suggests that the point of departure during teaching and learning should be what the learners already know and can do. Thereafter, this could be followed with acquiring new knowledge through ways of working which are significant and meaningful for them, and learning how to apply their knowledge creatively and ingeniously.

This teaching approach emphasizes the diverse process and learning experiences needed for the creation of knowledge, rather than relying mainly on the transmission of knowledge by the teacher.

5.2.1.2 Learning: Experience, reflection and knowledge creation

The Namibian National Curriculum for Basic Education states that, "children are always exploring their social and material environment, and learn through communication with others-playing, experimenting, experiencing reflecting things and by reflecting on them" (NNCBE , 2009, p. 29). It is through reflecting on what has been experienced that understanding grows. That understanding could then be supplementary to and modify previous experience and understanding. Hence, the new understanding could lead to further activities and exploration of reality-knowledge creation.

The national curriculum also states that the understanding and ability to create knowledge and acquire new skills does not happen in isolation. It should thus be recognized that learners are situated in natural and cultural contexts with which they interrelate, which affects them and which they draw upon to construct understanding. Furthermore, learning is both an individual and shared experience. Thus, in schools, whatever is done or whatever is presented should be based on the experience of each learner.

That is, there should be accessible learning strategies for learners. If learners are taught by rote memorization, some might fail to remember what they repeated. In contrast, if learners are taught in a way which builds on what they already know and have experienced, that could result in meaningful learning.

5.2.2 The syllabus

The syllabus is the policy document that should enlighten and shape all teachers' teaching. It provides the guiding principles on what teachers should teach in order to develop learners' understanding on specific topics, the general objective and specific objective that learners should achieve.

The learning experience and ensuing outcomes in natural science subjects are tailored to promote the learners' knowledge and understanding of the physical and biological world in which they belong. The Life Science syllabus for the junior secondary phase thus integrates natural science, social, economics, physical, mathematical and technological learning areas of the broad curriculum.

The Life Science syllabus was developed to be in line with learner-centered education (LCE). LCE presupposes that teachers should have a holistic view of the learner, valuing the learner's life experience of learning and teaching. Teachers should therefore select learning content, contexts and methods on the basis of the learners' needs as well as within their immediate environment and community.

5.2.2.1 Approach to teaching and learning

The approach to teaching and learning in Life Science is based on learner-centered education (LCE) as described in the national curriculum (see Section 5.2.1.1). The aim is to develop learning with understanding, including skills and attitudes required to contribute to the development of society.

Some of the necessary skills that learners should possess are embedded the scientific environments are the following:

- *Communication skills*: the ability to communicate fluently by being able to tell, act out, draw, write, show, discus, display, report and dramatize;
- *Self-management and competitive skills*: learners develop self-confidence, self-reliance and understanding of the world in which they live through meaningful activities;
- *Problem solving skills:* the ability to think critically in solving problems and apply those skills to tasks;

- *Participation:* taking part in learning activities by relating to others and taking responsibility for ones actions; and
- *Physical skills:* The ability to use appropriate techniques and to handle apparatus/material competently with due regard for safety; these skills are essential for most subject areas as are they are concerned with the development of the psychomotor skill which are fundamental for the learner's daily life.

The focal point for the teaching and learning in Life Science is based on the principle which states that learners bring to school a wealth of knowledge and social experience gained continually from the family, the community and through interactions with the environment. Thus, the Life Science syllabus builds on, extends and challenges the learners' prior knowledge and experiences. For example, in the context of this study, the perspectives learners have about the foods they eat in their homes.

The syllabus also indicates that learners learn best when they are actively involved in the learning process. Therefore, working in groups, in pairs, individually or as a whole class should be organized in such a way that is appropriate to the task at hand. Furthermore, cooperative and collaborative learning should be encouraged whenever possible. In such a case, tasks need to be designed in such a way that allow pairs or group work to see the need or relevance of carrying out the tasks together.

In this syllabus, teachers are given the opportunity to decide, in relation to the learning objectives and competencies to be achieved, when it is best to teach content directly and when it is best to let learners discover or explore information themselves. The teacher should therefore decide when learners need direct learning, and when they need reinforcement or enrichment learning.

5.2.2.2 Local context and content

The learning content in the Life Science syllabus is based on a Namibian context, although the themes and topics are on a scale to meet international standard. The syllabus also encourages teachers to use local examples to illustrate scientific issues, concepts and processes.

5.2.3 The Life Science textbook

Life Science for Grade 10 has two prescribed textbooks which I analyzed in this study. These textbooks have been written to align with the revised Namibian syllabus. The content knowledge in these textbooks is based on the Namibian context. That is, it is localized since there are examples of different foods which are used in different regions of the country, such as mahangu, sweet potatoes, maize, bread and rice (see Appendix H). This suggests that learners' prior everyday knowledge is accommodated in these Life Science textbooks.

As far as the subject matter is concerned, it is organized in a logical manner and is in accordance with the syllabus objectives. The sub-topics on the topic of nutrition in these textbooks are also similar to the basic competencies in the syllabus.

The activities in the textbooks also cater for hands-on practical activities as well as demonstrations. In addition, the activities are designed in such a way that critical thinking is encouraged. Similarly, facilitation of meaningful learning and assessment of skills and knowledge are taken into consideration.

Here are some examples of instructions from the food testing activities which could stimulate critical thinking.

> *Using the test indicated in step 5 above, state the types of nutrients found in mahangu meal. Make a conclusion from your observation (Life Science in-context Grade 10 page 74).*

The activities in the textbooks are clearly linked to the syllabus learning objectives. Instructions for the activities are also clearly stated and instructions for practical investigations are outlined step-by-step.

Most of the activities are prepared for using group work. This shows evidence of cooperative learning that is fostered in these Life Science textbooks. This also indicates that through group work activities, learners are required to develop the skills of communication and interpersonal relations, while learners also gain the skills such as measurement, observation and handling of the apparatus through practical activities. All these skills are emphasized in the Life Science syllabus.

5.2.4 The subject policy

The subject policy is a ministerial policy document that should be consulted regularly by all subject teachers to ensure that they teach within the guidelines laid down by the ministry. This policy document encourages individual teachers to take the initiative, especially in presenting the subject content and facilitating learning. The subject policy emphasizes the learner-centered approach for teaching, learning and assessment in Life Science. The subject policy also emphasizes the utilization of learners' prior knowledge during teaching and learning processes as well as linking science to learners' real life situations. The subject policy also indicates that learners should get well planned work every day.

The subject policy advocates that a variety of materials should be used to enrich and assist in achieving lesson objectives and that teachers must improvise teaching and learning by using easily available resources in their immediate environment. Thus, local environment and community should be used as a resource to obtain information and to stimulate investigation for inquiry.

5.2.4.1 Practical activities

The policy further states that the Life Science syllabus's practical activities, approaches or demonstrations are required for each topic. Thus, all learners should be exposed to these as a minimum requirement.

The policy stipulates that every learner must acquire practical skills in order to develop the skills and knowledge of the scientific world in learners. Thus, teachers should see it as a serious opportunity lost if this experience is not provided in the school environment.

The subject policy emphasizes that where teachers intend to conduct some practical work or demonstration, learners themselves must be carefully prepared, and tasks should be tried out beforehand. The time factor should always be considered so that the activities can be mastered within the available time, or mechanisms developed for carrying on over more than one day.

5.3 Data gathered during the lesson presentations

5.3.1 Data collected during lesson two

After the brainstorming session, learners were given some homework to do in which they had to list foods different from the foods they discussed during the lesson (see Section 4.2.2). They were also required to ask their parents or community members about the benefits of eating those foods. From the findings from watching the video, reflections on the two lessons and observer's notes, it was evident that learners asked their parents about the benefits of eating different foods. They really got all the necessary information.

The findings also show that learners did not only ask about local foods but some learners also asked about the conventional western type foods such as carrots, apples and tinned fish. During the lessons observed (mostly in lesson two), learners were able to link the knowledge they acquired from their homework to the content taught. But there were some cases where some of the learners' answers did not really relate to the homework feedback. Some of the answers were given as a result of the prior knowledge of the subject content from the previous grades.

Below are the discussions of the homework feedback during lesson two of my study.

Researcher: *The other day I told you to choose from each group of nutrient one source of that nutrient and ask the benefits of eating that food from your parents or anybody from your community. If you prefer you can discuss or give feedback in Oshiwambo (vernacular language) because I know that some of the explanations you got you cannot put it as it is in English. I would like someone to tell us the name of the food and state the benefits you hear, that are coming from eating that food those*

Learners: *The traditional oil .Omaadi eengongo ohaa kwafele oshiwiwili.* Freely translated:

"marula oil believed to be good for eye nerves. And when you have poor sight at night you are told to eat marula oil (Ondjove) or olive oil. The state when you see clearly during the day and cannot see during the night is called night blindness".

Teacher: *Ngeenge u na oshiwiwili otashi di po nge wa li omaadi eengongo ile ongahelipi?* Freely translated:
Does the night blindness disappear when you eat mural oil or how?

Learner: *Ngee ho li omaadi eengongo ito kwatwa koshiwiwili.*

If you eat marula oil you will not have night blindness.

Teacher: *Oo! Hamba tash iti ngeenge oho li omaadi eengongo osha yela kutya ito kwatwa koshiwiwili.*
Oo! If someone eats marula oil they will not suffer from night blindness.

Teacher: *Olye vali a uda sha kombinga yomaadi eengoongo?*
Who else heard anything about marula oil?

Learners: *Otwe shi uda. Ohaa vavwa opo a kaleke oshipa shipu.*
We heard that you can also apply marula oil on the skin.

Teacher: *Oikulya vali imwe mwa uda?*
What else have you heard about other foods?

Learner: *Omashini.* Milk

Teacher: *Omashini elipipo?* Which type of milk are you talking about?

Learner: *Omashini kutyaokwashikwa ile inaa shikwa ohaa kwafele oshipute shi ninge Omakoko.* Sour skimmed milk, but all types of milk help wounds to heal fast.

Teacher: *Nashike vali?* What else?

Learner: *Ngeenge omunhu ohali omaxuku ohaa koleke omesho ndee to ka la ho mono ko nawa*. Marula oil helps people to have healthy eyes.

Teacher: *Oshikulya vali shilipipo mwa uda hashi kwafele oku kale ka po oukolele wo mesho ?* What other foods are helpful in preventing eye problems?

Learners: *Carrots and olive oil?*

Teacher: *Ee….. oikulya imwe vali*? Ee ….What other foods?

Learner: *Eenyadi, odina ovitamine C, ohadi kwafele okukoleka eendjamama.*
Eenyadi (local fruits)) has vitamin c and it helps people to have strong gums

Teacher: *Vamwe ova uda shike?* What else?

Learner: *Eeshi domodooxa ohadi kwafele omunhu a kale e na omakipa a kola*. Tinned fish helps a person to have strong bones.

Learner: *Oshifima oshi na ocarbhydrate*. Mahangu porridge has carbohydrates.

Learner: *Omashiishin eengobe nge owa li oudiyo ndele to a nu oto kungu ko osho wa lya*. If a person has eaten some poison and drinks fresh milk immediately, he/she can vomit out the poison.

Teacher: *Oo…. What else?*

Learner: *Oshikundu ohashi pange oshimela ndee ndee iha shinuwa komunhu e na omukolo shaashi ohashi nyaa pofingo. Shikundu* (Tradional brewed drink, brewed with mahangu flour) helps to stop diarrhea but it is not recommended for somebody who is coughing.

Learner: *Apples give vitamins to the body.*

Learner: *Omeva, nomeva ohaa kwafele okuendifa nawa ohonde molutu.* Water helps for the proper transportation of blood.

Learners reported openly on the data they gathered from their parents or other community members. They reported that marula oil is believed to be good for eye nerves and for smoothing the skin when it is applied on the skin. Learners also mentioned that eating carrots help people to have healthy eyes.

Learners stated that Mahangu porridge is a source of energy. On the other hand, they reported that a drink made out Mahangu helps stop diarrhea.

They reported that fruits such as apples and *eenyadi* (jackal berries) supply vitamins to the body. They reported that drinking sour milk helps wounds to heal fast. Fresh milk made people who had eaten poison vomit. While water helps in the transportation of the blood in bodies.

5.3.2 Data gathered during practical activities

Lesson three and four were practical activities on testing of different foods. All the groups were provided with the instructions on how to do the testing of each nutrient. They were also given worksheets which each group had to complete after each testing of a nutrient (See appendix E2). Unfortunately, because of the lack of apparatus at the school, all groups could not do the testing of nutrients at the same time. Instead, they took turns in testing one type of the nutrient while other groups were watching.

As the learners were doing the practical activities, I asked the different groups to explain what would be done next. This was done with the purpose of making sure that everybody knew what was going on. All learners in each group were required to read the instructions and follow them closely.

The basic component of the practical activity required learners to:

- Name all the apparatus and the chemicals used in the testing of each nutrient;
- Observe the change of the colours; and
- Draw conclusions from their observations.

Learners were not given a chance to predict the outcomes of the testing. The predictions done were only on the testing of oil, but it was not initiated by the teacher. I am suggesting this as an area of improvement for future research.

The findings on the food testing indicated that learners were very interested and eager to observe what was going to happen. They were very curious and started to ask questions such as:

1. *Is there no indication of measurement we are going to use in testing of glucose?*
2. *Is the beaker not going to burst when we heat it?*
3. *Does it mean when you are testing for protein always the colour will be just like that irrespective of the colour of the food?*

Learners were surprised to find out that Mahangu and macaroni contained starch, even though they categorized them in the same group as sources of carbohydrates. The findings also indicated that learners were amazed that dry beans and eggs contain proteins.

Most learners predicted the outcomes of testing fats and oils before the testing was done. Learners predicted that after mixing water with marula oil it would turn milky. They used their prior knowledge and experience to predict this to find out what they expected from the outcomes of testing. Their predictions were not scientifically correct but the outcomes were similar with their predictions.

5.4 Data gathered through interviews

5.4.1 Data gathered through semi-structured interviews

5.4.1.1 Teachers' understanding of learners' prior everyday knowledge and experiences

Both the teachers interviewed indicated that prior everyday knowledge and experiences were knowledge or experiences learners acquired from home, in the community and when they interacted with different resources in their surroundings (T2 and T3) (see Appendix D).

T2: Defined prior everyday knowledge as *"knowledge that learners have already either from previous grade or when they are consulting different sources such as parents, friends and their surroundings. Learners' experiences: Are experiences learners get from home either from parents or friends and also checking on computers watching television or listening to the radio, which means they got it from different things happening round the world".*

T3: Defined prior everyday knowledge as "*knowledge that learners or experience which learners bring from home, meaning that they know them because they normally do them from home. Things learners used to do at home".*

T3 indicated that she incorporates learners' prior everyday knowledge and experiences in her teaching. She said that she normally starts a lesson by asking questions based on learners' experiences from home before she teaches a new topic.

5.4.1.2 Teachers' views on the benefits of integrating learner's prior everyday knowledge and experiences

Both teachers interviewed indicated that it was very good to integrate learners' prior everyday knowledge because it helped them to understand or improve their understanding, as they are working with things they normally do in their daily lives.

T3: explained that *"most of the topics taught in Life Science have a connection with the surroundings".* She continued saying that it is therefore important to integrate learners' prior everyday knowledge and experiences as a way to encourage learners to seek more information from their parents. She further said that integration of prior everyday knowledge would also help learners to link the knowledge they got from home with what they learn at school.

T3 indicated that it is very important for teachers to integrate learners' prior everyday knowledge in order to motivate and encourage learners to think effectively. She added that *"this integration may avoid the problem of learners from struggling with subject content"*.

5.4.1.3 Challenges observed during elicitation of learners' prior everyday knowledge

Both T2 and T3 commented that incorporation of learners' prior everyday knowledge and experiences was time consuming and could retard the coverage of the syllabus content. They revealed that the Life Science syllabus for grade 10 is very long with limited time to cover it. They continued by saying that they were expected to cover the syllabus in only two terms as the third term is regarded as a term for revision. Their other concern was the starting time for examinations. They said the examinations start very early and this hindered their teaching methodology. The other problem noticed in integration of learners' prior knowledge was poor expression of English as the medium of instruction.

T3 said: *"The problem I have experienced whenever I am trying to integrate that our learners are not free to express themselves. Sometimes even if they know the information they would just be scared of expressing themselves and they are afraid of making mistakes that their friends are going to laugh at them. So, I find it difficult to integrate their experiences because they are not free, so if they were to be free that they express themselves the, the integration was going to be easy"*.

T3 also indicated that the language barrier hindered the integration of learners' prior everyday knowledge because learners are unable to say what they know in English. In this regard, she added that "*you find learners are already in grade 10 but they still have a problem in expressing themselves, so I find it difficult"*.

T2 also commented on language as a barrier to effective sharing of experiences of learners but in her case the learners she observed were allowed to speak in their vernacular. This was only allowed in order to get all the necessary information for the research project. Code-switching is not allowed in Namibian schools even though it is necessary in some cases.

5.4.2 Data gathered using focus group interviews

5.4.2.1 Learners' views on why Life Science is their favourite subject

All six learners interviewed during the focus group interview indicated that Life Science was their favorite subject because it was easy. When I asked them why Life Science was easy, they indicated that Life Science is all about life, and whatever they do at home.

L5: said that "*Life Science is easy because what we learn in Life Science is basically what we do every day with our surroundings".*

Only one learner said Life Science could act as a gateway to some career such as scientist and geologist. L4: said that "*Life science is my favorite subject because in this subject you can be someone in future, you can be a scientist, a geologist and you can able to work in forests.*

L3 said: "*Life Science is just my favorite subject as well because it is teaching us to know yourself and whatever we do in our daily lives".*

5.4.2.2 Learners' views on how prior everyday knowledge and experiences help them to understand the content taught

All learners interviewed indicated that the integration of prior knowledge helped them to make links with what they do at home and what is taught at school. It also helped them think about the environment.

L1 said "*you mostly link it because you need to compare it with what you have learned"*.

They continued saying that prior knowledge made it possible for their parents to assist them in doing their homework. Learners said that when they were given homework to discuss about the benefits of food they eat at home, especially local foods, their parents explained it very well to them.

In contrast, two learners felt that their grandparents could not assist them with their homework because they are not educated. So, they felt that their grandparents would not know anything about the subject content knowledge they learn at school. However, when he was asked if his grandparents could help him about knowledge on local foods, he agreed that

she/he could only help with local knowledge. L3: said that *"Oomekulu otave ku kwafa nee shike ngee ova kulupa"?* Can our grandparents assist us with homework if they are old?

5.4.2.3 Learners' views on practical work

All six learners indicated that they enjoyed the practical work on food testing. They also commented that the food testing they did was their first experience of such work (see Appendix F). Therefore, they were excited to find out how nutrients are tested in food.

L4 said: *"Ayee ame onde lihonga mo lela shihapu, kakwa li nokuli ndi shi ngee ope na neestarch noglucose ilipo ya ningwa nale. Onde ya ashike ku shi mona eshi hatu ningi o experiment. Naashi to ti ohatu longifa ostarch okwa li ngaa ndi shi ohatu longifa o starch ei i li moikulya".*

Freely translated: I have learned quite a lot. I have never even known that there is ready made starch and glucose. It is a real new experience. When you said you are going to test starch, I had heard of starch which I heard was available in food. He continued *"I have also learned that you cannot test with your tongue when you are in the laboratory."*

One learner said that practical activities are good because they can provide you with correct or incorrect answers. For instance, L5 said: "*I real like the food testing because it can prove you wrong or correct. Before food testing we were predicting that there is starch in eenyandi (local fruits) but the testing results show that there is no starch but there is glucose."*

L5 also stated that he never knew that proteins existed in beans because in his culture dry beans are one of the foods which are regarded as food of less value. So, the testing of foods showed him that there are also proteins in dry beans.

Finally, all the learners I interviewed encouraged other teachers to do experiments or practical work where possible (see Appendix F2). Learners maintained that experiments aided their learning more than when the teacher only explained verbally.

5.5. Concluding remarks

In this chapter I presented and analyzed the data gathered through documents analysis, semi-structured interviews with a critical friend and a life science teacher and focus group interview with learners as well as the data gathered during lesson presentations.

All learners and teachers involved in the study indicated that the elicitation and integration of prior everyday knowledge was very important. Most of the ideas suggested by the curriculum documents are supported by the participants irrespective of the contradictions which exist as they have indicated.

In the next chapter I discuss the data presented in Chapters 4 and 5 (Phases One and Two).

CHAPTER SIX

INTERPRETATION AND DISCUSSION OF FINDINGS

6.1 Introduction

The goal of this study was to investigate how grade 10 learners make meaning during the teaching and learning of the topic on nutrition in Life Science. In this chapter, I interpret and discuss the findings of the data presented in Chapters 4 and 5. The discussions are substantiated by making reference to the key ideas and concepts highlighted in the literature reviewed in Chapter 2. The discussions are also based on the themes and analytical statements that evolved from the analyzed data.

Furthermore, the themes and analytical statements are related to the key research questions informing this study as described in Chapter 3. In line with the main goals and objectives of the study, seven analytical statements were developed from which some concluding remarks are drawn. The table below provides a summary showing how the analytical statements were developed.

Themes	**Data sources**	**Analytical statements**	**Research questions**
Curriculum expectations	Document analysis - Namibia National Curriculum of Basic Education (NNCBE), the syllabus, the textbooks and the subject policy)	Learners' prior everyday knowledge and experiences is a prerequisite for teaching and learning. Consideration of use of local materials and sharing of ideas and experiences is highly required.	1. What are the curriculum documents' expectations on the integration of learners' prior everyday knowledge and experiences in teaching and learning?
Prior everyday knowledge and experiences	Interview by the learners to the community members. Interview by the teacher to the community members.	Types of foods learners and community members know and eat at their homes. Learners' and community members' perspectives about foods they eat	2. Which types of foods (local and conventional western type foods) do learners and community members know and eat at home? 3. What are learners' and community members' perspectives about the foods (local and conventional western type foods) that they eat

			at home?
Learner engagement and participation Meaning making and conceptual development	Brainstorming session Observation from critical partner, audio-visual techniques, semi-structured interview to a critical partner and another life science teacher	Use of prior everyday knowledge and experiences promotes meaning making and conceptual development	4. Does the elicitation of learners' prior everyday knowledge and experiences on the foods that they eat at home enable or constrain learner engagement and participation? 5. Does eliciting and integrating learners' everyday knowledge and experiences on foods (local and conventional western type foods) that they eat at their homes enable or constrain meaning making and conceptual development of nutrition?
Teachers' views on prior everyday knowledge and experiences	Observation from critical partner and semi-structured interview from teachers	Use of prior everyday knowledge and experiences requires time, knowledge and effort from both teachers to integrate it.	6. What are the challenges of eliciting and integrating learners' prior everyday knowledge in teaching and learning of the topic nutrition?
Practical activities	Observation from critical partner and focus group interviews to learners	Practical activities involving prior everyday knowledge and experiences of local and conventional food enhances skills required in science teaching	7. Does engaging learners in hands-on practical activities associated with the different food tests enable or constrain learners' conceptual development and meaning making of the topic on nutrition?

Table 6.1: Shows a summary of the analytical statements

The analytical statements are discussed in detail below and these were used to make some key recommendations in Chapter 7.

6.2 Analytical Statement 1:

Learners' prior everyday knowledge and experiences is a prerequisite for teaching and learning

The curriculum documents reviewed in this study outlined that the point of departure during teaching and learning should be what the learners already know and can do. That is, the curriculum documents are in favour of the use of prior everyday knowledge since it is believed that learners bring to school a wealth of knowledge and social experience (see Sections 5.2.1 and 5.2.4). The points outlined in the curriculum documents are in line with what Ramsden (1994) and Odora-Hoppers (2001) advocate that children bring to science lessons their own ideas about scientific phenomena.

Lending support, Rennie (2011) too indicates that integration of learners' everyday knowledge allows learners to relate the new knowledge to the reality about them. The curriculum documents also indicated that the use of prior everyday knowledge gives learners an opportunity to take control over their own learning and hence increasing their participation (see Section 5.2.2.1). This resonates with the aims of the socio-cultural perspective (see Section 2.5.1) which according to Goos (2004) acknowledges that learning involves increasing participation in a community of practice (Lave & Wenger, 1991).

The views expressed in the Namibian curriculum documents certainly concur with Ausubel's (1968) line of thought that meaningful learning occurs when the learners are able to make sense of the materials presented and what is being taught has some links with existing knowledge (Roschelle, 1995). I concur with this and it was at the heart of this study.

However, the curriculum documents analyzed here failed to indicate how learners' prior everyday knowledge and experiences should be integrated during teaching and learning. In other words, teachers are not informed in any one of the curriculum documents reviewed on how to integrate learners' prior everyday knowledge and experiences. Consequently, teachers as the implementers of the curriculum might experience problems doing this.

Rennie (2011) too cautions that for teaching to be effective not only subject knowledge is needed, but pedagogical knowledge is required for the teachers to incorporate authentic, community issues into classrooms or to move students outside of the classroom to work with issues in the community. In other words, teachers themselves need to be scientifically literate so that they can be comfortable with dealing with everyday situations that arise in the community (Rennie, 2011).

Rennie further advocates that for teachers to be able to help learners to learn about and use science in everyday contexts requires a high level of pedagogical context. She believes that this is important since using knowledge in different contexts often requires considerable reworking of that knowledge so that it can be used in a new situation. Ogunniyi (2007) too warns that teachers can make or break the curriculum; regardless of how reputable its context and design might be if they do not understand how to teach the content and context of their subjects.

6.3 Analytical Statement 2:

Consideration of use of local materials and sharing of ideas and experiences is required

As is expected by the Namibian curriculum, the documents reviewed support the idea of utilizing available materials during teaching and learning (see Section 22.2). In the context of this study, learners had to discuss what foods they eat which led to the topic on nutrition. Rennie (2011) argues that the use of local materials in teaching and learning can help learners to find a connection between what is to be learned in daily life, gaining the interest and commitment, identifying similarities and differences between the new knowledge and prior everyday knowledge. Rennie refers to this as blurring of the boundaries between home and school science. This is easier said than done. But why is this important?

Alkenhead and Jegede (1999) state that when the culture of science harmonizes with the world and supports the learners' views of the world and process of enculturation (Hodson & Hodson, 1998) meaningful learning is likely to take place. In my view, it is for that reason that the reviewed curriculum documents emphasize that teachers should use local materials where possible during teaching and learning.

The curriculum documents reviewed also outlined that learners learn when they are actively involved and central to the learning process. In view of this, it is recommended that teachers should be equipped with skills to ensure active participation of all learners during teaching and learning. For instance, Euvrard and Wilmot (1998) note that having learners work collaboratively in small groups gives them an opportunity to share ideas and construct understanding of knowledge (see Sections 5.2.2.1 and 5.2.3). Similarly, the findings from this study revealed that the documents analyzed are in favor of sharing of ideas amongst learners. As a result, even some textbook activities are arranged in such way that they afford learners an opportunity to work in groups.

According to the documents reviewed, the role of the teacher is to facilitate the learning process which is taking place in the class. It is believed that when the teacher is facilitating learning, learners are afforded an opportunity to interact and talk (Lemke, 2001) so that they can reach the new level of conceptual understanding by interacting and talking with their teachers (Hodson & Hodson, 1998). Goos (2004) refers to this as 'ZPD as scaffolding' whereby the teacher structures tasks to allow learners to participate in joint activities as I did in this study.

6.4 Analytical Statement 3:

Types of foods that learners and community members know and eat at their homes

The findings of the study revealed that most of the foods known and eaten by learners and community members who took part in this study were local foods. Foods mentioned or listed were foods such as mahangu porridge, traditional spinach, oshikundu (home brewed drink)*, and eenyandi* (jackal berries)*, eembe* (bird plums), beans, *eendunga* (makalani fruits) and many others (see Sections 4.2.1 and 4.3.1). Few examples of conventional western type foods mentioned were foods such as tinned fish, apples, carrots, macaroni and rice. All these types of foods were mentioned during the brainstorming session process with learners and during the semi-structured interviews with community members.

Learners and community members found it enjoyable and easy to list the names of foods that they eat at their homes. For instance, during the brainstorming session each and every learner wanted to get an opportunity to mention the foods that they eat at home. At the beginning of the lesson, however, some learners did not realize that the brainstorming session was an introduction to learning about nutrition. Learners were also able to tell which types of nutrients were provided by the foods that they eat even if they could not tell their scientific names.

Community members were also able to tell which types of foods provided them with energy, fats and vitamins even though they did not differentiate between vitamins and proteins in their vernacular language. Quite interestingly, the local language of the learners and community members (vernacular language) who took part in the study refers to all the nutrients obtained in the foods that they eat such as proteins, fats and oils and carbohydrates as *eevitmine or oitungilutu* (vitamins). Herein lies Thompson's (2012) plea that for LCE to be relevant in developing countries there is a need for 'cultural translation'.

6.5 Analytical Statement 4:

Learners' and community members' perspectives about foods that they eat at their homes

Both learners and community members indicated that they eat different types of foods to get different nutrients. Learners were able to name the different types of nutrients they obtained from some foods and that could be attributed to their prior knowledge from the previous grades. In contrast, the community members could not tell the nutrients by their names but they seemed to know a lot of benefits from eating different foods.

Also, the learners and community members believed that people eat food to be satisfied, to grow, to get energy, to be healthy, protect their bodies from different diseases and to get vitamins. There are also foods which are regarded as being good for babies.

6.5.1 Foods regarded as energy providers

Community members and learners believe that some of the foods provide the body with sustained energy throughout the day. The findings revealed that foods which learners and community members regarded as energy providers in the society are the foods which are regarded as sources of carbohydrate nutrients in science at school.

According to the science knowledge, carbohydrates are the sources of energy. The findings showed that prior everyday knowledge and experiences of learners is similar to the science knowledge in the Life Science textbook. It is for that reason that Roschelle (1995) recommends that educators should use learners' prior everyday knowledge during teaching and learning as a starting point as well as a building block. This resonates with Rennie's (2011) sentiments of the need to close the gap between community and school science.

6.5.2 Foods for keeping the body healthy and prevent diseases

Both the community members and learners indicated that some foods, especially the fruit, which they eat keeps their bodies healthy and prevents them from being affected by diseases. They stated that eating some fruits prevent people from being affected by scurvy, for example. There are also some specific fruits which are regarded as preventing or slowing down some specific diseases such as: *eenyandi* (jackal berries) which is believed to boost the CD4 count for HIV infected people and help people to develop strong bones. Fresh *eembe* (bird plums) are believed to slow down the increase of cancer cells in the body, in particular cancer of the womb.

Marula oil, oil extracted from seeds of melons, daily oil and carrots are believed to be good for nerves in the eyes. These oils are also believed to heal people suffering from night blindness (the state when you see clearly during the day but you cannot see during the night). It is believed that they are also useful for smoothing the digestion process and help the brain to function properly. They also believe that traditional spinach also helps the stomach to function well.

Fresh milk and tinned fish help to make bones strong while sour milk helps wounds to heal fast. Salt is believed to prevent people from suffering from swollen throats. *Omaongo* (a fermented drink from marula fruit juice) is believed to bring down fever.

Learners stated confidently that *oshikundu* (the traditionally brewed alcoholic beverage brewed using *mahangu* flour) helps to stop diarrhea but it is not recommended for somebody who has a cough. They added that water helps in the transportation of blood.

The information generated by community members and learners is not necessarily scientifically proven but it is knowledge derived from the interaction between people and their environment and a product from a community practical engagement in everyday life (Kibirige & van Rooyen, 2006). This knowledge has commonalities with science knowledge which will help learners to easily cross over from prior knowledge to classroom science (Kibirige & van Rooyen, 2006). Roschelle (1995) supports this by saying that educators need to design tasks that will enable learners to gradually develop new scientific concepts and make connections between the ‘old’ and ‘new’ knowledge. This resonates with Rennie’s (2011) research findings alluded to earlier.

6.5.3 Foods that provide vitamins to the body

Both community members and learners identified foods which provide vitamins to the body. However, the findings indicated that in their vernacular language they do not make a distinction between vitamins, proteins, carbohydrates or fats and oils. Instead, most nutrients available in their foods are regarded as vitamins (*Oitungifilutu*). Foods which are regarded as vitamins providers are such as jackal berries (*eenyandi*), marula juice, paw paw, apples and Mopani worms.

6.5.4 Foods regarded as good for babies

One of the community members revealed that milk is good for babies. They believed breast-feeding to be most important in keeping babies healthy. However, in the absence of breastfeeding, animals' milk was used. They first boil the milk but could provide no explanation for this. Here lies the role of a teacher as a more experienced knower in the discipline.

Mopane worms were also considered to be good for babies. Mopane worms can be dried and then pounded to make flour. The flour can then be cooked to produce a soft porridge to which milk can be added and then given to the babies. In the case of orphans, this porridge helped the babies to grow healthily.

Scientifically, milk is also good for children because it has a lot of calcium which is important for growing bones and teeth. Milk also provides good proteins and gives fat for energy and growth. It also provides some vitamins, especially vitamin A and B. It could be argued that these two knowledges (scientific and prior everyday knowledge) have many commonalities.

These findings are supported by Kibirige and Van Rooyen (2006) who state that these knowledges can and should supplement each other and that indigenous knowledge can enrich the science learning experiences of learners. Aikehead and Jegede (1999) too state that "when the culture of science generally harmonizes with a student's life world-culture, science instructions will tend to support the students' view of the world and the process of enculturation will happen successfully" (p. 274).

6.5.5 Perspectives on the foods that are prohibited from being eaten by some people in the community

Roschelle (1995) and Ramsden (1994) indicate that learners' prior everyday knowledge can be at odds with the subject content. This study has also shown that learners from this community might have prior everyday knowledge which is different from what they learn in school science. For instance, the data in Chapter 4 indicated that there are some foods in their community which are prohibited from being eaten by some people and these are the foods that are rich in certain nutrients in Life Science. Foods such as mopane worms, beans, liver and many more are prohibited from being eaten by some people, yet in the case of pregnant women they would need these proteins and vitamins, and the same applies to the restriction on children eating eggs (see Section 4.5 in Chapter 4).

The findings also showed that males (mostly married men) are also discouraged from eating dried beans yet beans are very rich in proteins. Science textbooks rate beans as having more proteins than red meat. The results from the food tests that we did showed that proteins were plentiful in beans.

The study also indicated that learners were not provided with reasons why some foods were prohibited from being eaten by some people in the community. Instead, people were just told not eat certain foods. However, further research could be carried out on how to challenge this knowledge in the community.

The transition of learners from a home to a school environment might be a challenge because the culture of their families is different from the school knowledge. However, Aikehead and Jegede (1999) state that if learners receive proper assistance from their teachers the transition might be easier.

6.6 Analytical Statement 5:

Use of prior everyday knowledge and experiences promote learner engagement, meaning making and conceptual development

6.6.1 Learners' engagement

The data in Chapter 4 showed that during the brainstorming session learners participated actively and this resonates with the aims of the socio-cultural perspective (see Section 2.5.1). All learners were able to list the names of the foods (local and conventional western type

foods) that they eat at home as well as their benefits. Learners discussed freely in their groups irrespective of the language which was sometimes a barrier. They sometimes resorted to using their vernacular so that they could clarify their ideas.

During group presentations, learners from different groups commented on each other's presentations and asked some questions something which was unusual. My critical friend was pleasantly surprised with this. These findings resonate with what Ramsden (1994) and Odora–Hoppers (2001) that learners bring their own ideas about scientific phenomena to science lessons.

The whole class did the homework and came up with a lot of information from the community (see Section 5.3). They discussed their homework confidently showing that they knew what they were saying. Most of the answers given during the brainstorming session and discussions from the learners' homework were similar to the science content knowledge. As a result, after the discussion of the homework, learners found it easier to understand the lesson. However, learners struggled to find which foods were the sources of micro-nutrients. Consequently, some learners asked questions such as: *In which group of nutrients can we categorize sugar and salts? Why do we need a small quantity of micro – nutrients?*

My critical friend's notes and reflections also indicated that the participation of learners was very high compared to how they used to participate when the lesson did not integrate their prior everyday knowledge. Throughout this research process, learners debated and argued about some of the information presented by certain groups. They tried to correct others and shared what they had heard which was at times in contrast to what other groups were presenting to the entire class.

6.6.2 Meaning making and conceptual development

The observer (critical friend) indicated that the use of learners' prior everyday knowledge helped learners to understand the lesson better. She identified that after discussions of the benefits of eating foods, most of the learners were able to find out which nutrients were available from the foods that they eat. Data from the interviews showed that T1 and T2 found it important to integrate learners' prior everyday knowledge and experiences because it encouraged learners to seek more information from their parents. They also realized that the integration of learners' prior everyday knowledge helped learners to link the knowledge they got from home and school knowledge (Stears, et al., 2003; Rennie, 2011) and encouraged

them to think effectively. T2 said that '*this integration of knowledge may avoid learners from struggling with subject content"*

The findings also indicated that learners found the integration of their prior everyday knowledge helpful in making links with what they do at home (Oloruntegbe & Ikpe, 2011) and what is taught at school. It also helped them to think more about their environment, made it possible for their parents to assist and discuss the homework with them. To be specific, learners said that parents played a big role in providing the required information to do the homework on foods that they eat at home (see Section 5.4.2.2).

6.7 Analytical Statement 6:

Use of prior everyday knowledge and experiences require time, knowledge and effort to integrate it

Both T1 and T2 stated that the integration of prior everyday knowledge and experiences increased learners' participation. In addition to this, it also made learners think critically, and involved parents in their children's education. However, it could hinder the coverage or delivery of the syllabus content. They expressed that the Life Science syllabus is very long and it needs to be covered within a short period of time.

Thus, although both teachers interviewed liked the idea of integrating learners' prior everyday knowledge, they had some reservations that it could affect the completion of the syllabus. Both T1 and T2 cautioned that if you did not cover the syllabus your learners would fail the examinations even if they mastered some topics well.

Similarly, Schulman (2004, p. 100) assumes that "most teaching is initiated by some form of 'text' in a textbook, a syllabus an actual piece of material…". This assumption is confirmed by Chi-Chung Ko and Chi-Kin Lee's (2003) research findings that indicated that in Hong Kong many teachers continue to use exposition methods and rely on textbook and syllabus when they are teaching. They argue that the teachers' main concern is fear of "not covering the syllabus" (p. 200). They also revealed that some teachers found the syllabus made it difficult to use innovative methods.

Also, T1 and T2 said that they encountered some problems when they try to incorporate their learners' prior everyday knowledge and experiences because their learners are unable to say

what they know in English (see Section 5.4.1.3). Learners' proficiency in language plays a vital role on how learners contribute in their own learning.

Since code-switching (Probyn, 2009) is not allowed in Namibian schools, T1 and T2 find the use of local language problematic. Since code-switching is used illegally in most classrooms in South Africa, Probyn (2009) refers to this as 'smuggling the vernacular'.

T1 and T2 showed their concerns on integrating learners' prior everyday knowledge and experiences as they were not trained on how to do this and there are no experts available to advise them. In addition, they felt that as a teacher you are also required to be familiar with learners' prior everyday knowledge to be assured that what learners are telling you is correct or not and this requires more effort. In a similar vein, Halim and Meerah (2002) argue that the key component of PCK is learners' understanding and clearing of their misconceptions of a particular topic. This will help the teacher to interpret learners' actions and ideas.

Notwithstanding, it is very important for teachers to know learners' prior knowledge before the introduction of a topic or concept (Roschelle, 1995). Learners come from different backgrounds and they already have some kind of knowledge from their environment. Even the scientific knowledge they bring to class is different. However, Halim and Meerah (2002) caution that experienced teachers might be the source of the problem in teaching and learning if they do not consider the learners' prior-knowledge.

6.8 Analytical Statement 7:

Practical activities which involving prior everyday knowledge and experiences on local and conventional foods enhance skills required in science teaching

The subject policy states that practical activities or demonstrations are required for each topic so that learners could be exposed to what they learned theoretically and to acquire practical skills. The skills stated in the Life Science syllabus are skills such as communication skills, self-management and competitive skills, problem solving skills, participation and physical skills (see Sections 5.2.41 and 5.2.2.1).

The data presented in Chapter 5 shows that learners enjoyed the practical activities in this study. They were excited to find out how nutrients were tested in foods. Learners also commented that they learnt a lot during the practical activities.

Millar (2004) posits that most learners become more interested if the outcome of the practical activities challenged their expectations about matters of fact, that is, that jackal berries

contained glucose not starch and beans contained proteins. Learners liked the practical activity and they appealed to teachers to do more experiments.

6.9 Concluding remarks

This chapter provided an interpretation and discussion of the data sets presented in Chapters 4 and 5 using some of the literature reviewed in Chapter 2. Insights were captured and reported according to a set of analytical statements, and each was discussed in some detail. The analytical statements in this chapter were used to make some key recommendations in Chapter 7.

CHAPTER SEVEN

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

7.1 Introduction

The main goal of this study was to investigate how grade 10 learners make meaning of the topic on nutrition in Life Science. This chapter presents a summary of the findings of my research study. It then suggests some recommendations in relation to the integration of learners' prior everyday knowledge and experiences during teaching and learning. Finally, the chapter discusses the limitations experienced in the process of carrying out this research project and makes some recommendations for further areas to be researched.

7.2 Summary of findings

The study revealed that the curriculum documents reviewed are in favour of the integration of learners' prior everyday knowledge and experiences acknowledging that learners bring to the science classroom a wealth of knowledge. It is also believed that recognition of learners' prior everyday knowledge and experiences has a potential to increase learners' participation during teaching and learning.

The curriculum documents also indicated that learners make sense of what is being taught if it has links with existing knowledge and hence recommend the use of local materials as a strategy to enhance the connection between school science and home knowledge (Stears, et al., 2003; Oloruntegbe & Ikpe, 2011; Rennie, 2011). However, the study found out that the curriculum documents analyzed did not state how the learners' prior everyday knowledge should be integrated during teaching and learning.

The study further found out that learners and community members are knowledgeable about the foods that they eat at home. Both learners and community members indicated that they gain a lot of vitamins and energy from eating different types of foods. However, evidence from learners and community members shows that there are some contradictions between everyday knowledge about foods that they eat and what is taught about topic on nutrition in schools.

The study also revealed that teachers are interested in the use of learners' prior knowledge and experiences as it promotes meaning making and conceptual development. However, in

contrast, teachers indicated that this process could limit the time required to cover the syllabus.

Furthermore, the study found that hands-on practical activities enhanced the skills required in science teaching. The evidence from practical activity worksheets and focus group discussions showed that learners were interested in carrying out the practical activities and they learnt a lot from them (Maselwa & Ngcoza, 2003). Therefore, the study concludes that the integration of learners' prior everyday knowledge and experiences enable learners to make meaning during teaching and learning. Notwithstanding, if misconceptions are not cleared prior everyday knowledge can constrain learning.

The findings of the study satisfactorily answered all the research questions well.

7.3 Recommendations

Some of the pertinent recommendations associated with the findings of this study include the following:

- Integration strategies for prior everyday knowledge and experiences should be made clear to all education stake holders and teachers should be trained on how to implement it.

It could be argued that lack of pre-service and in-service training is the main contributing factor to teachers' lack of knowledge on how to integrate learners' prior everyday knowledge and experiences during teaching and learning. For example, the teachers involved in this study indicated that they did not receive any training on this aspect of science teaching. In view of this, I thus recommend that there is a need for more comprehensive workshops and training of teachers in this field. There is a need for teachers to be scientifically literate and knowledgeable in their subject content and pedagogical knowledge (Shulman, 1986) so that they can be comfortable with dealing with everyday situations that arise in the community (Rennie, 2011). Rennie (2011) states that without an understanding of how to integrate learners' prior everyday knowledge and experiences, learning would remain less meaningful. It is vital that learners discover that science is around them in what they do every day.

- Teachers should also be motivated to improve textbook activities so that such activities could be relevant to their learners' everyday experiences (Stears, et al.,

2003). That is, where there is a scarcity of resources, teachers should be equipped with improvisation skills so that they are able to develop their learning and teaching materials (LTSMs) using easily accessible resources (Czerniewicz, Murray & Probyn, 2000; Stears & Malcolm, 2005).

- The study recommends that teachers should strike the balance between teacher-centered and learner centered approaches and involvement of their learners in hands-on practical activities and arguments. Teachers need to be aware that making meaning in learning allows learners to draw their own conclusions about important environmental and society issues.
- The study recommends that teachers' awareness of community everyday knowledge should enable them to help learners to build their meaningful learning (Roschelle, 1995). Thus, apart from teachers' workshops and training, teachers should familiarize themselves with the community's everyday knowledge.
- The study recommends the use of local materials that encourage learners to link science knowledge to their everyday lives (Oloruntegbe & Ikpe, 2011). The study found that materials that encourage learners to link science knowledge to their everyday lives contain opportunities for fostering discussions around values, beliefs and encourage linking of theory and practice that promote learners' participation and decision making. In addition, the study also found that the use of local materials in teaching and learning can help learners to find connections between what is to be learned and daily life, gaining the interest and commitment, identifying similarities and differences between the new knowledge and prior everyday knowledge.
- The study recommends making a link with community members because such a link might create more opportunities for community members to share their knowledge with teachers and learners alike. The study recommends the use of practical activities to develop needed scientific skills. The study found that practical activities develop necessary scientific skills such as problem solving, communication and self-management skills. The study also found that learners enjoyed practical activities more than theoretical presentations. The study recommends that teachers should use more practical activities where possible to develop the interest of the science subject. Ramsden (1994) posits that learners remember easily what they saw but forget quickly that they heard.

7.4 Recommendations for further research

- Further studies should be conducted on how teachers integrate learners' prior everyday knowledge;
- Further studies should be conducted to find out how English as the sole medium of instruction is a barrier to learning;
- How can teachers be helped to strike the balance between teacher- centered and learner-centered approaches so that they could integrate learners' prior everyday knowledge smoothly; and
- Investigate whether hands–on practical activities enhance.

7.5 My research experience

During this research process there were times where I felt I should just give up. As a mother, a wife, and a teacher of four different grades that is Maths for grade 8, 10, 11 and Life Science grade 10, time management was a challenging factor for me during this journey. However, I managed to gather my data in time and the support and encouragement I received from my family, my supervisors and my fellow students was what kept me going.

My learners, participant observers and other participants in this study were cooperative and did not give me any problems. As a first-time researcher I learned a lot, for instance, the need to transcribe the data as soon as it is gathered, the need to analyze data immediately after gathering it is important so as to be able to validate your findings. To analyze data straight away as a researcher makes things easier since the whole process is still fresh in the minds of both researcher and participants (easy to verify mistakes or problems).

I think at the heart of doing a research project is the data and its analysis for the reason that it could help a researcher refine and one's discussions. The fact that I met many people because of this study has been a great joy for me. Through this study I shared views, ideas and asked questions related to my study in order to verify and validate my research project.

7.6 Limitations and challenges of this research study

Knowing what learners knew me made me plan the lessons the way I did and I think this might have affected the data gathered in one way or other. The topic on nutrition in the regional scheme was supposed to be taught during the first term of the year. However, I had to postpone teaching because I was not ready for the gathering of data by that time. I was fortunate to be based at my school and teaching my own learners.

The other limitation was lack of chemicals used for testing of the foods. Most of the chemicals we had had already expired. I had to approach the Teachers' Resource Centre in the region to borrow some chemicals. Unfortunately, they were also running out of stock. Luckily, I got these chemicals from a school in the same region. The other limitation was the insufficient supply of laboratory apparatus such as a Bunsen burner and test tubes. As not all the groups did the food testing on their own, some had to observe while others carried out the food tests.

Finally, my study was a qualitative case study conducted at my school with only one grade 10 class, and so it cannot be generalized to reflect a broader picture on how to integrate learners' prior everyday knowledge during teaching and learning of the topic of nutrition.

7.7 Conclusion

The study revealed that the integration of learners' every day knowledge enhanced learner engagement and hence enabled learners to understand the science better, particularly in the topic of nutrition where the research was carried out. Thus, the study recommends that the Department of Education needs to ensure that teachers get the necessary support and training on how to integrate the learners' prior every day knowledge and experiences in teaching and learning.

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Appendices

Appendix A1

Helena T.Shimwafeni

Okatana CS

Oshakati circuit

29 May2012

The Circuit Inspector

Oshakati circuit

Oshana Regional Education

Dear Sir

Ref: A request of a permission to carry out my research study at Okatana CS with 10 B learners in Life Science.

I am Helena T Shimwafeni a teacher at Okatana C.S and I am doing my Master Degree in Education with Rhodes University. As part of my studies, I am tasked to work on a research study at my school. As a result, I planned to do it with grade 10 B learners in Life Science subject.

I am therefore requesting your good office to allow me to work on my research study at the above mentioned school as from 12-15 January 2012.

Thank you for paying attention to my request.

Yours faithfully,

.....

Helena T. Shimwafeni

Life Science Teacher

Appendix A2

Helena T. Shimwafeni

Okatana Combined S

Oshakati circuit

04 June 2012

The Principal

Okatana Combined S

Oshakati circuit

Dear Sir

Ref: A request of a permission to carry out my research study with grade 10 B in Life Science Lessons.

I Helena Shimwafeni currently doing my second year of Master Degree in Education with Rhodes University , I am seeking for the permission to carry out the research study at this school. As part of my studies, I am tasked to work on a research study at any school. I chose to carry out this research study at my school with my learners in grade 10 B.

I planned to carry out the study for one week as from 12 -15 June 2012. I also requested Ms Musilizo Mercy as science teachers to help me during my lessons as a critical friend.

I am therefore requesting your good office to allow me to work on my research study with the aforementioned individuals. I believe such research will benefit the researcher, observers and learners.

Thank you for paying attention to my request.

Yours faithfully,

.....

Helena T. Shimwafeni

Appendix A3

Helena T. Shimwafeni

Okatana combined school

Private bag 5544

Oshakati

09 June2012

Dear Mercy

RE: Taking part in my research study as an observer and critical friend.

As I have already communicated it to you that you are going to be my observer, I would like to inform you that the research study will commence on the 12-15 June 2012.

Therefore, I am requesting you to include this observation session in your plans for next week.

Thank you in advance

Your Faithfully

Helena Shimwafeni

Appendix A4

Okatana combined school
Private bag 5544
Oshakati
29 May 2012

Omapulo: Helena Mwiikeni
0812085495

Omudali omufimanekwa

Exuku: Ekufo mbinga lovanafikola vondodo onhimulongo B momapekapeko moshilongwa sho Life Science

Komudali wa ..... oto i ndilwa nefimaneko upitike okaana koye ka kufe ombinga mo mapekapeko ta a kaningwa mo mafiku 12 – 15 June 2012.

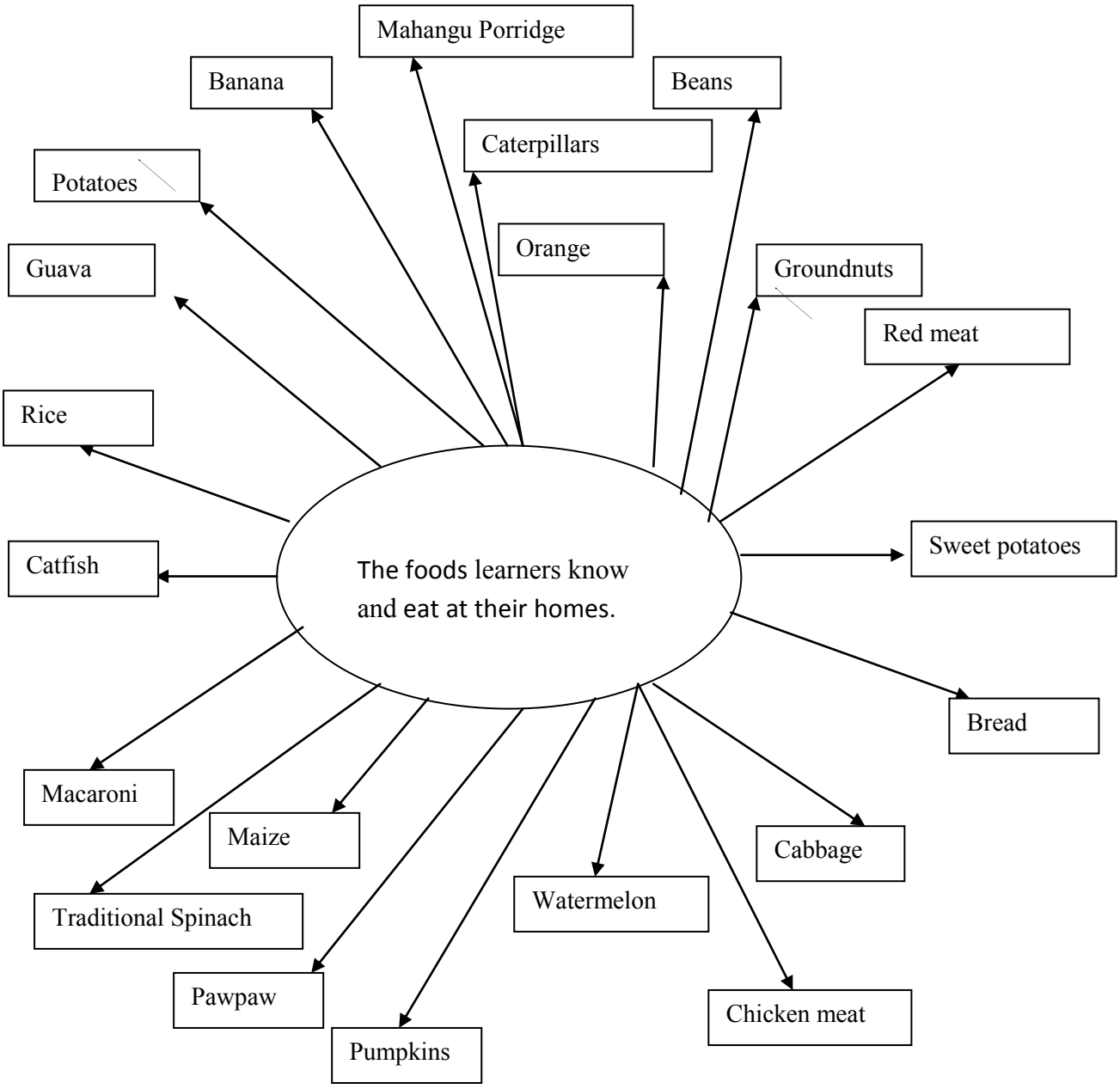
Omapekaapeko otaa kaningwa moshilongwa shounongononi (Life Science). Oku li kombinga ye kwatafano lounongononi neshivo lo keumbo.

Oto pandulwa eshi to pitike okaana koye opo ka kufe ombinga.

Tangi unene

.....
Helena Mwiikeni
Omulongi wo shilongwa - Life Science

Appendix B1



A mind map of the foods list by learners groups during brainstorming session (lesson one)

Appendix B2

Transcribe of the brainstorming session (lesson one)

Teacher: Among all the foods you mentioned I would like you to tell me the benefits of eating each of those foods, the benefit of eating each of the foods and the nutrients that are available in those foods. Can you quickly discuss that?

Learner: We eat food to get vitamins, to grow and to be healthy.

Teacher: Which foods among the foods you have listed help you to grow or give you energy?

Learner: We get carbohydrates

Teacher: Those are nutrients that you are getting. For what purpose you eat the foods ….like porridge.

Learner: To get energy

Teacher: Eewah" (Yes)

Learner: The nutrients ___the carbohydrates

Teacher: Is that all you get from the food?

Learner: Fish obtain calcium, eggs obtain vitamins

Teacher: Vitamins from eggs" The class has disagreed that we don't get vitamins from eggs.

Learners: ___ unless from eggs you get proteins.

Teacher: Okay the other group? Jeremiah……

Jeremiah: Benefits of eating local foods ___porridge make you strong, cabbage and spinach for our body to grow.

Teacher: Cabbage and spinach for our body to grow?

Jeremiah: Fish and chicken for our body to grow.

Teacher: I would like you to listen to each other please.

Learners: Cabbage and spinach for our body to repair the tissues, the nutrients we get from porridge rice, bread we get carbohydrates, from chicken, fish, eggs we get protein, from cabbage, spinach and beans we get vitamin.

Teacher: Ok

Learner: Porridge, we eat porridge to get fat and the nutrients we get from porridge is carbohydrates, beans provide us with vitamins and it build and repair body tissues, we get fat from the meat.

Teacher: Next group

Learners: The foods that are categorized as carbohydrates are such as porridge, macaroni and bread. They give us energy. The sources of the protein are such as meat, ground nut and beans. They help the body to build new cells and build up damaged cells, while bananas are only for vitamins.

Appendix B3

Observation sheet No 1 at Twahangana Combined School

1. List different types of foods local foods learners mentioned.

Names of foods	Benefits from foods	The nutrients learners believed available in the foods
1. Beans	For replacements of warn-out tissues	Minerals
2. Fish	-Provide proteins for growth and reproduction.	- Proteins
3. Pumpkins	-Provide Carbohydrate which gives our body with energy.	- Carbohydrates
4. Eggs	- Proteins to repair damaged body tissues	- Proteins
5. Sour milk	- Provide carbohydrates which supply energy to the body.	-Proteins
6. Spinach	- To keep us healthy - Protects us from getting different diseases.	- Vitamins
7. Meat	For growth and making new cells	- Proteins
8. Graund nuts	- Maintains body structure	- Minerals - Fat and oil

2. How was the level of the learners' participation in brainstorming?

Very active ☐
Active ☒
Moderate ☐
Poor ☐

Comments

Most learners were actve involved only few learners did not participate in group work

3. (i) Were learners showing interest and enthusiastic?

Yes ☒ No ☐

Comments

yes. Because most of them they were able to list most local food eaten.

(ii) Were learners able to relate the lesson to the everyday experiences?

Yes ☒ No ☐

Comments

All the food the learners listed are part of the balanced diet needed.

4. How relevant was the lesson to the learners' everyday?

→ Learners they acquired knowledge on the Importance of different types of food and nutrients they obtain from them.

→ Learners learnt also which types of nutrients are needed in large quatity and which are needed in small quatity.

Appendix C1

Transcribe of the presentation of lesson two

Teacher	:	Good afternoon learners?
Learners	:	Good afternoon teacher?
Teacher	:	Hmm…the day before yesterday we learned about macro and micro nutrient. Now, I would like you to tell me the difference between macro and micro. What is the difference?
Teacher	:	Yess… Blasius (a name of a learner)
Learner	:	Micro is food that we need in small quantity
Teacher	:	Is micro a type of food or nutrients?
Learner	:	Is food that we need in small quantity
Teacher	:	What about macro?
Learner	:	Are nutrients hmmm… that we need in a large quantity.
Teacher	:The other day I told you to choose from each group of nutrient, one source of that nutrient and ask the benefits of eating that from your parents or anybody from your community. If prefer you to discuss or give feedback in Oshiwambo (vernacular language) because I know that some of the explanations you will get you cannot say it as it was said in English.	
Teacher	:	I would like someone to tell us the name of the food and state benefits you heard, that are coming from eating that food. Oikulya e i mwa pula.
Learners	:	The traditional oil omaadi geengongo ohaga kwafele oshiwili.
Teacher	:	Ngeenge una oshiwiwili ota shi dipo nge wa li omaadi eengongo ile Ongahelipi
Learner	:	Ngee holi omaadi eengongo ito kwatwa koshiwiwili
Teacher	:	Oo! Hamba ta shiti ngeenge oho li omaadi engongo shayela kutya ito kwatwa koshiwiwili
Teacher	:	Olye vali audasha kombinga yomaadi eengoongo?
Learners	:	Otweshi uda

Teacher	:	Oikulya vali imwe mwa u da?
Learner	:	Omashini
Teacher	:	Omashini elipipo?
Learner	:	Omashini aa ashikwa, aeshe ngoo oha kwafele oshipute shininge Omakoko
Teacher	:	Nashike vali
Learner	:	Ngeenge omunhu ali omxuku ohaa koleke omesho- opo ukale homonoko nawa.
Teacher	:	Shayela kutya omaxuku, okwiifa nondjove shaashi momaxuku omo hanundi ondjove ndishi? Oshikulya vali shi li pipi mwauda hashi kwafele oku mona ko nawa komesho?
Learners	:	Carrots
Teacher	:	Olye eshi omaadi eenhanga? Ina mudasha kombinga ya woo?
Learners	:	Okwa uda
Teacher	:	Eshi mwa tala omaadi eenhanga nondjove kaeli mongudu imwe?
Learners	:	Okuli mongudu imwe. All are in the group of oil and fat.
Teacher	:	Ee….. oikulya imwe vali?
Learners	:	Omaadi eemheke.
Teacher	:	Omaadi eemheke oha liwa? Ihaa liwa ndishi? Apa oha tu popi oikullya.
Learner	:	Eenyadi, ondina ovitamin c oha di kwa fele oku koleka eendjamana.
Teacher	:	Vamwe ova uda shike?
Learner	:	Eeshi ndo modooxa oha ndi kwafele omunhu a kale ena oma kipa a kola.
Learner	:	Oshifima oshina ocarbhydrate
Teacher	:	Owamona ngahelipi kutya oshifima oshina ocarbohydarate keumbo
Learner	:	Meme oye a lombwelange but it was not in Oshiwambo. She said it helps bones to be strong and grow well.
Teacher	:	Oo! Ota mu tu kumwe naashi ottilie tati? Omakipa otaa ningwa a kola koshifima

Learners	:	Aye
Teacher	:	Ok, that is what she heard, no problem.
Learner	:	Omashini, aa ngaa eengobe, omashiishini ngee owali oudiyo ndee to anu oto kunguko osho walya.
Teacher	:	Hambaa, shayela kutya omashini ohaa dulu oku ku famo oudiyo
Learner	:	oshikundu oha shi pange oshimela ndee vati ina nuwa lomunhu ena omukolo shaashi oha shi nyaa pofingo
Learner	:	Apples give vitamins to the body
Learner	:	omeva, nomeva oha kwafele oku endifa nawa ohonde molutu
Teacher	:	Thank you for feedback on the homework. For those of you who you did your homework I thank you very much.
Teacher:		By now we are going to discuss the functions of the nutrients in the body. Discuss the benefits of eating different foods. I believe you can able to tell the functions of the nutrients in the body. What is the function of carbohydrates? According to what we discuss we had. What do you think are functions of carbohydrates in the body?
Learners	:	Carbohydrates are a source of energy.
Teacher	:	Yes, that is why you said if you eat omahangu porridge you have enough energy.
Teacher	:	What is the function of fat and oil? According to what you have discussed here.
Learner	:	Fat and oil supply heat and energy to the body.
Teacher	:	What about vitamins? After a moment of silent , teacher said we talk of healing wound strength gum when you were giving feedback for the work. What are the functions for the vitamins and minerals?
Learners	:	Protein is for growth and repairing the
Teacher	:	Which means in milk there is protein that's why it help healing of the wounds. It also helps in replacement of the worn out cells.
Teacher	:	What is the function of fibre? After a moment of silence, the teacher continued saying in grade 9 you learnt about the functions of fibre. Even at home if you do not want to have constipation what types of foods do you eat?

Learners	:	(Almost the whole class) we use whole grain products.
Teacher	:	Why do you use whole grain products?
Learners	:	To prevent us from constipation.
Teacher	:	Why whole grain products prevent constipation
Learner	:	because they contain lot of fibres. It helps digestion process to be done smoothly.
Teacher	:	What is the function of the vitamins?
Learners	:	Vitamins are responsible to maintain the normal function of the body.
Teacher	:	By this moment everybody knows the purpose of eating different types of food, even the local food you know now. In the book we have only the example of food we get from the shop. But from our community, our fields we get food that are providing us with protein, vitamins, carbohydrates and minerals and fats

The following is your homework, you will bring it along on Monday. For the homework you are going to use local food to come up with a weekly menu. The menu must provide all the nutrients needed by the body such as protein, carbohydrates, vitamins fat and fibre.

Appendix C2

Observation sheet No 2 at Twahangana C.S

1. What do the community members believe are the benefits of eating different local foods according to the learners' homework feedback?

-To prevent people's bodies to infected by different diseases.
-To get energy and for the body growth.

2. How did the homework enable learners to understand the benefits from the local foods?

	Yes	No	Commends
Did learners use concrete examples to explain their answers?	X		Learners explained very well that if you eat like marula oil you will have health eyes.
Did learners' answers have link between the subject content and everyday knowledge?	X		Learners find out that foods that gives them energy are foods ~~the~~ which are in the group Carbohydrates.

3. How did Learners' prior everyday knowledge of foods enable them to discuss some of the functions of nutrients available in local foods?

☑ Learners were able to recognise benefits people get eating those foods.

☑ Learners were able to link their everyday experiences with the knowledge of the subject content.

☑ Prior knowledge helped learners' in facilitating their group discussions.

4. How do you describe the level of individual learner in the lesson?

Every learner was interested and participating actively

5. Does involvement of learners' everyday experience and knowledge motivate learners to ask questions?

Yes [X] Not [ ]

Comment Learners asked some questions during lesson presentation.

Appendix D

Semi- structured interview gathering tool for Teacher two

1. What is your understanding of the prior knowledge and experiences learners bring from home?

2. What are the benefits of integrating learners' prior knowledge and experiences you have observed during the presentation of lessons?

3. What the challenges you observed in learners' prior knowledge integration?

4. How was the participation of learners in the lessons when their prior everyday knowledge and experiences were integrated?

5. How can integration of the learners' prior knowledge and experiences be strengthened in teaching to support effective learning of life science?

Transcribe of a semi- structured interview with teacher two.

Teacher one : Good morning meme?

Teacher two : Good morning meme

Teacher one : Thank you for accepting me to interview you. As I have already communicated to you that we are going to do the interview on learners every day prior knowledge and experience they bring to school from home.

Teacher two : Yes

Teacher one : Here are the following questions you are expected to answer. I would like you to answer any question, if you do not understand the question please you are well come to ask me to repeat the question or to elaborate more.

Teacher two : Ok

Teacher one : The first question goes on like this: What is your understanding of prior knowledge and experience learners bring from home?

Teacher two : Thank you, the prior knowledge is knowledge that learners have already either in previous grade or when they are conducting or consulting different sources. So how this knowledge help them to understand their daily lessons, and experience, these learners get it from home either from parents or friends and also checking on computers, watching television or listening to radio, which means they get experiences from different……..different what? Different happenings around the world.

Teacher one : What about the local experience? Does the local experience has any connection with what we learn at school?

Teacher two : Yes, it has because most of the things that we learn they are from our surrounding. So once learners have knowledge sometimes we can send them to ask more information from their parents. This will help them to understand more about what we learn at school.

Teacher one : Can you tell me the link essential in nutrition topic that learners have between home and school?

Teacher two : In nutrition topic learners learn more about food they eat at home. At home we are also told to eat different food so that we get vitamins. Which help learners to grow and also stay healthy. So I think there is a link because at school they learn the same. They will bring the experience they learn at home and integrate it with one they get at school then this will enrich their knowledge and skills.

Teacher one : The second question is this one: what are the benefits of integrating learners' prior knowledge you observed during the lesson presentations.

Teacher two : If learners has little basic what they are learning it is very easy for learners to understand the topic. This might help them to compare what they know already. The known to unknown, this helps them to understand the lesson better. This happen because they have basic from home.

Teacher one : The third one, what are the challenges you have observed in learners' prior everyday knowledge when I was teaching?

Teacher two : Learners tend to ignore the prior knowledge they have learnt before. I think learners need to consider what they have learnt from previous grade and keep it in their mind.

Teacher one : Ok meme, but I am saying what are the challenges you have observed in lesson or you have seen that might be caused by integration of learners' prior everyday knowledge and experiences?

Teacher two : Learners were able to give different type of food they eat at home and participate more freely, they able to control other learners mistakes, they also able to add on what other learners have said.

Teacher one : How was the level of participation when their everyday knowledge was integrated?

Teacher two : There was highly participation of learners. Learners enjoy the lesson very much because they knew the functions of food they eat at home. They were also able to explain the functions of food which were not asked for. The lesson was really interesting.

Teacher one : The fourth question, which is last question, how can the integration of learners prior should strengthen in teaching.

Teacher two : Learners can be given chances to do research where-by learners can find out for themselves and be able to discover. They can also be given assignments where they will spend time looking for the information. They can also be given a chance to watch video so that they are able to see different real things for themselves.

Teacher one : Thank you very much for sharing your ideas with me and for your time. Or do you have anything to add on apart from what I have asked you.

Teacher two : It is very important for the teachers to integrate learners prior knowledge in order to motivate and also encourage learners to think effectively because if we do not find out what learners will struggling in the lessons I think if all teachers were integrating a learners prior

knowledge in teaching this will help our learners understanding. It was really good.

Teacher two : Thank you very much meme.

Semi-structured interview (gathering tool) for teacher three

1. What is your understanding of prior knowledge and experience learners bring at school?

2. Do you integrate learners' prior knowledge and experience in your teaching? If yes , How do you integrate it?

3. What do you think are the strength of integrating learners in prior knowledge and teaching since you integrated it into your own teaching?

4. What are the challenges you experience with the integration learners prior knowledge and experience of their every day's knowledge?

5. How is the level participation of the learners in the lesson when something they do at home or know before it is taught in the lesson?

6. How can you strength integration of learners' prior knowledge and experience to support effective teaching and learning of Life science?

Transcribe of the semi-structure for teacher three

Teacher one: Teacher Three, let me welcome and thank you for accepting me to interview you in this interview.

Teacher Three: Yes Madam

Teacher one: These are the following questions that I am going to ask you then I would like you to feel fee. Then if you are having a question or one of the questions is not clear to you, I would like you to ask.

Teacher Three: I would do that.

Teacher one: Okay, question one goes is like this _____What is your understanding of prior knowledge and experience learners bring at school?

Teacher Three: Okay, so I understand it as a knowledge that learners or the

experience which learners are bringing from home, meaning that they

know them because they normally do them from home. So, that is how I understand it. Something that learners are used to do at home so meaning that it can be linked to the topic or new topic that they are going to do.

Teacher one: Okay

Teacher Three: They are own experiences from home.

Teacher one: "Okay" and the second one _____ Do you integrate learners' prior knowledge and experience in your teaching? If yes , How do you integrate it?

Teacher Three: So, I think I do, because normally before the lesson is introduced or

even when the lesson is taught itself, so you try to work on the experience which learners have from home or you build from their experience that learners have from home then you bring in the new content, so they have to start from their own knowledge they are having from home before adding the new information".

Teacher one: Okay then Teacher Three can you tell me briefly how do you incorporate it into your teaching?

Teacher Three: So, I incorporate it in my teaching normally by starting asking them

questions based on their experience from home before I teach the new

topic to them so, normally I would ask them questions based on their own experience so before I bring in the new topic.

Teacher one: It means you first ask them questions about things they already from

home.

Teacher Three: Yes I ask them questions about things they already know from home

because I know from there ____I can link their own experience to the new topic that they are going to do.

Teacher one: Okay, what do you think are the strength of integrating learners in prior knowledge and teaching since you integrated it into your own teaching?

Teacher Three: So, I think the importance is that it would help learners to understand or to improve learners' understanding because they are working on the things they normally do at home ____so then from what they do then they would have additional information of what they are supposed to do.

Teacher one: Do you want to say that if you integrate learners' knowledge in the topic, they would understand the, the, the content better?

Teacher Three: So, I am trying to build from what they know, to what they don't know

_____it will not be difficult. If I just start from what they don't know where I did not involve them by asking them what they know already then they cannot build from what they know.

Teacher one: Okay then, apart from the improvement or understanding of the content, what are the challenges you experience with the integration learners prior knowledge and experience of their every day's knowledge.

Teacher Three: Okay so, they, they ____let me start with the problem that I've

experienced whenever I am trying to integrate that our learners are not free to experience themselves sometimes even if they know the information, they would just be scared of expressing themselves and they are afraid of making mistakes that their friends are going to laugh at them. So, I find it difficult to integrate because they are not free, so if they were to be free that they, they, express themselves then the integration was going to be easy.

Teacher one: May be what do you think cause the problem of learners not to be able to express themselves?

Teacher Three: Just say, it is the foundation where the learners started from. Normally I know the learners who are starting, let me say learners who are starting with kinder garden or pre-primary, so they are more open than the learners who are coming directly and start grade one, so, I find it, those one started with pre-primary even their language or English is fluent, so they don't experience any problem when expressing themselves but those who are just starting in grade one, our policy is learners in grade 1 – 4 are taught in their own language only in grade 5 – 12 they start with in English – now you find it difficult – you find

learners are already in grade 10 but they still have a problem in expressing themselves, so – I find it difficult.

Teacher one: Do you want to say learners are failing to express themselves because of the language? Which means English is the barriers?

Teacher Three: Yes, English is the barriers.

Teacher one: Okay, the other question is _____How is the participation of the learners in the lesson when something they do at home or know before it is taught in the lesson?

Teacher Three: So, I find their participation good, because at least they would be able to tell what they normally do at home even though I said there must be a language barrier here and there. At least when you are teaching a topic or they have experience I find the participation good.

Teacher one: Which means if you are teaching them something they are familiar with, the participation is good than when you are teaching them the content on something which they are not familiar.

Teacher Three: Yes, when you are teaching something they are familiar with, so the participation is good than teaching them a topic on something they are not familiar with.

Teacher one: Okay, and the last question _____How can you strengthen the integration of learners' prior knowledge every day? And every ____I am sorry _____Let me repeat myself, how can you strengthen integration of learners' prior knowledge and experience to support effective learning of Life science?

Teacher Three: So, I would try to make sure that participation in class even though we are having problem here and there, I will make sure that I will try to link their own experiences to their new topic they are doing _____that is the only way they would be able to understand the topic. If they don't understand the topic from home, just to come in the class and start it in the class then it becomes difficult. The understanding, the understanding will be there but it will be limited but a least if I try to bring in their own experience from home then link to the new topic then in that case it will help them.

Teacher one: Thank you, thank you very much Teacher Three, this is the end of our interview.

Teacher Three: Thank you.

Appendix E1

Transcription of food testing

Teacher : We are going to do the food testing, whereby we are going to test the availability of starch glucose, protein as well as fat in the food. First of all we are going to test the starch. There are starch and glucose made from laboratory. We are going to see what will happen if you test starch and glucose from the laboratory. Then later on we are going to the food.

I am having an apple, beans, potatoes traditional spinach dry one, fresh spinach, ondjove, sun oil, omahangu soft porridge.

Teacher : Firstly we are going to test the starch but before we do that, we have to prepare the testing of glucose, because testing of glucose require us to boil water. Then while water is boiling we will test the starch.

Can anyone direct us on how we test the glucose by using the instruction you having with you there?

Learners : Take two test tubes and label them A and B

Teacher : Is that instruction for test glucose or for starch.

Learner : Oh, take a glucose powder and mix it with benedict's solution in a test tube. Boil the mixture in water both and observe colour change.

Teacher : Show the learners solution of benedict.

Learner : Is there no indication of measurement we are going to use

Teacher : Yes, good question. There are measurements we can use but at this moment they are not necessary, even in the instructions we are using did not indicate the measurements

Teacher : What the colour of the benedict solution?

Learners : Is blue

Learners : Light the burner and put some water in the beaker.

Learners : Is the beaker not going to bust?

Teacher : No, but you have to make sure that you put the test tube in the beaker while water is cold.

Teacher : While water is boiling, we are going to test starch, how we test starch?

Learners	:	Take two tubes and label them A and B respectively.
Teacher	:	But we are not going to have two test tubes because we are not going to test glucose, glucose is the one we are testing already, we are only going to use one test tube to test starch.
Teacher	:	Which chemicals are we going to use for testing of starch?
Learners	:	Iodine solution
Teacher	:	Make a solution of starch. (One learner mixes the powder of starch with water.)
Teacher	:	What is the colour of iodine?
Learners	:	Brown
Teacher	:	How many drops of iodine do we need to add in starch solution?
Learner	:	Three
Learners	:	(Count drops of iodine) one, two, three.
Teacher	:	What happen to the solution?
Learners	:	Colour change purple. When you are asking it , it looks purple.
Learner	:	Colour change to dark-blue but not purple.
Teacher	:	What is shown by colour dark blue?
Learners	:	(Silent)
Teacher	:	Colour dark blue shows the presence of starch.
Teacher	:	Oh, is the fire gone off?
Learners	:	No
Teacher	:	That one we are just going to observe the change of colour after the water boil
Teacher	:	Now. We are going to test whether there is starch in mahangu porridge. Are you recording what you have observed?
Learners	:	Yes
Teacher	:	Discuss whatever you have observed. You even discuss in Oshiwambo (Some discussions were done in Oshiwambo but the recording is done in English).

Teacher	:	We have to repeat the process of testing starch but now we are going to test mahangu soft porridge. Teacher asks what happen if you mix mahangu soft porridge with iodine?
Learners	:	Very surprised) oh, there is starch.
Teacher	:	We are now going to test if there is starch in macaroni; macaroni is crushed so that it becomes a solution. Do not eat that powder; it may not be safe because it was together with the chemicals. Do the testing of starch in macaroni.
Teacher	:	We are going to test the presence of starch in the glucose powder because you might say, if you add iodine to any solution the colour will change to dark blue.
Teacher	:	Add the iodine solution to the solution glucose; does the colour change to dark blue?
Learners	:	No, the colour did not change.
Teacher	:	Test the presence of starch in beans. Does the colour change to dark blue?
Learners	:	There is, but the colour is not real changed maybe if there is very Little
Teacher	:	Call one learner to cut a potato in small pieces and give to each group to test for starch) Jeremia cut this potato into pieces.
Learners	:	Add the iodine on the pieces
Teacher	:	Is there starch in potatoes?
Learners	:	Yes because the colour of the potato changed to dark blue colour.
Teacher	:	Let us test if there is starch in eenyandi.
Learners	:	Add the iodine solution
Teacher	:	Is there starch in eenyandi?
Learners	:	No because the colour did not change to dark blue colour.
Teacher	:	what happen to the colour of benedict and glucose?
Learners	:	The colour changed to brown colour. The colour of blue to brown shows the presence of glucose.
Teacher	:	By now, we are going to do the testing of protein. We are going to

use albumen part of an egg. (one learner break an egg and put the albumen in the test tube)

Teacher : How do we test the presence of protein in food?

Learner : Make a suspension of egg albumen and put it in a test tube up to about halfway. Add 5cm3 of Biurret reagent.

Teacher : Biuret is a solution made out from mixing sodium hydroxide and copper sulphate. Therefore by now we are only going to use one solution which is called biuret.

Learner : Add 5cm3 biuret to albumen in test tube.

Teacher : What happen?

Learner : Pale purple (almost yellow colour).

Teacher : The pale purple is called mauve colour. But this will be our homework to find out what exactly mauve colour look like.

Teacher : By how we are going to test presence of the protein in the beans. Beans are crushed so that it can become a powder, to be able to make a solution.

Teacher : Test the presence of protein in beans after testing tell what happened.

Learner : The colour change to mauve colour. This has shown that there is protein in beans.

Teacher : yes the outcome shows that there is protein. Scientists have shown that there is more protein in beans than in the meat.

Learner : Does it means when you testing for protein the always the colour is just look like that?

Teacher : Yes. If you test for the protein in any types of food no matter what colour it has the colour will change to show the presence of protein if there is.

Teacher : By now we are going to test presence of fat in food. What are we going to do?

Learners : Add water ¾ of the test tube and add alcohol and sunflower oil.

Teacher	:	Ethanol is the other name of alcohol (scientific name) what happen?
Learners	:	The colour change to milky colour, cloudy colour, yellow colour.
Teacher	:	Repeat the testing of fat by using ondjove. Tell what happened.
Learners	:	Colour changed to milky.

APPENDIX E2

June 2012

Work sheet for the test of nutrients available in different foods

Group number..... Nutrient tested.....

1. List all the materials needed for the testing of the nutrient and the nutrient you are testing.

   .....
   .....
   .....

2. State original colour of the solution you are using for the availability of the nutrient being tested for.

   .....
   .....

3. State colour change of the solution when added to food.

   .....
   .....

4. Make a conclusion for your observations

   .....
   .....
   .....
   .....
   .....
   .....
   .....

APPENDIX E3

June 2012

Work sheet for the test of nutrients available in different foods

Group number... Leaf Barasiwa II. b.d Nutrient tested... protein...

1. List all the materials needed for the testing of the nutrient you are testing.

   Testing tube
   Solubon Biuret

2. State original colour of the solution you are using for the availability of the nutrient being tested for.

   white

3. State colour change of the solution when added to food.

   Mauva colour

4. Make a conclusion for your observations

   when we mix the bean the colo
   ur chang and became ~~fre~~ so
   soft and like a gel

APPENDIX E3

June 2012

Work sheet for the test of nutrients available in different foods

Group number: [illegible] Nutrient tested: Oil/Fat

1. List all the materials needed for the testing of the nutrient you are testing.
   - Tube
   - Color
   - Water

2. State original colour of the solution you are using for the availability of the nutrient being tested for.

   Clear with Oil

3. State colour change of the solution when added to food.

   Clear Change to Milky

4. Make a conclusion for your observations

   The practical gave a the Fat and the oil is also fat because the Color have Change.

APPENDIX E3

June 2012

Work sheet for the test of nutrients available in different foods

Group number: Sthlie Annastibia Magdalen, Silvanus Nutrient tested: Glucose

1. List all the materials needed for the testing of the nutrient you are testing.
   - Beaker
   - Testing Tube
   - solution benedict's
2. State original colour of the solution you are using for the availability of the nutrient being tested for.
   Blue
3. State colour change of the solution when added to food.
   Green then to brown
4. Make a conclusion for your observations
   When the colour changed to Green and then to brown it removed blue and the other colour was formed agent giants.

APPENDIX E3

June 2012

Work sheet for the test of nutrients available in different foods

Group number: Stilie, Anrayabi9, Magdalen, Silanus Nutrient tested: Glucose

1. List all the materials needed for the testing of the nutrient you are testing.
   - Beaker
   - Testing Tube
   - solution benedict's
2. State original colour of the solution you are using for the availability of the nutrient being tested for.
   Blue
3. State colour change of the solution when added to food.
   Green then to brown
4. Make a conclusion for your observations
   when the colour changed to Green and then to brown it remained blew and no other colour was formed again again.

APPENDIX E3

June 2012

Work sheet for the test of nutrients available in different foods

Group number... Leaf Banana + Milk Nutrient tested Starch

1. List all the materials needed for the testing of the nutrient you are testing.

   Iodine

   pipette (Starch)

   - tubes

2. State original colour of the solution you are using for the availability of the nutrient being tested for.

   Milky

3. State colour change of the solution when added to food.

   dark colour

4. Make a conclusion for your observations

   At first the colour was Milky and it became dark blue when

Appendix F

FOCUS GROUP INTERVIEW

Focus group interview with learners (gathering tool).

1. Is life science one of your favourite subjects?
   a) Yes No
   b) Motivate your answer.

2. What have you learn in nutrition topic, you knew it before this topic was not taught to you?

3. Does your experience from home helped you to understand this topic better, if it so how does it helped you?

4. When you are given the homework do your parents help in doing it.
   a) If yes, how?

   b) If not, why not?

5 How did your parents help you in doing homework of finding out the benefits you can get from eating local food?

6 How did the homework assist you understanding the function of the nutrients such as carbohydrates protein, fat and minerals and vitamins?

7 Did you do food testing before in life Science special local food? If not how did feel when we were testing the local food together with the food we buy from the markets?

8 Can you tell what you have learn new from the food testing ?

Transcribe of the focus group interview

Teacher : I would like to welcome you to this focus group interview. I would like you to feel free to answer the questions I am going to ask you. You can even answer in your vernacular language if you feel that you cannot express yourself well in English at a certain point.

Learners : Ok

Teacher : Is life science one of your favorite subjects?

Learners : Actually yes

Teacher : Can you motivate your answer why you are saying yes.

Learner one : Basically, when you are talking about Life Science is more on life. Mostly what we learn in Life Science are things which we do each and every day.

Learner two : To my opinions I am saying this because Life Science include everything what we are doing in daily life, even learn us how our body functioning or transformation of disease from one person to another person.

Learner three : Oh, Life Science is just my favorite subject as well because it is teaching us to know about ourselves and whatever we do in daily lives.

Learner four : Life science is my favourite subject because in this subject you can be someone in future, you can be a scientist, a geologist and you can able to work in forest.

Learner five : It is because it is the easiest subject.

Teacher : What make it to be easy?

Learner five : Because what we learn in Life Science is basically what we do everyday within our surrounding.

Learner six : Oh…..hmm is what we do.

Teacher : The second question is what you have learnt in nutrition topic

which you knew before this topic was presented to you.

Learner three : We just learn that fruits that we eat contribute to the growth of our body we also find out that whatever we eat help our body to be healthy.

Learner one : Basically in nutrition topic we learn that……..

Learner two : We knew different types of food.

Teacher : Does your experience help you to understand the topic better?

What you do at home does it help you to understand life science better as you have said Life Science is whatever you do at home.

Learner one : Sometimes it may help us but mostly what we do at home we just do it generally when we come at school and learn more about that topic is where the experience comes.

Learner four : Yes it helps shaashi ngaashi moshilongwa omo otwi i longa mo tya momakunde namo omu na oprotein ndee miilongwa imwe oinima oyo kuna fiku wuyilonge.

Learner six : I have learn a lot of things such as when you eat at home you do not need to eat too much fat and which type of food you must eat too much. Then you should like kept every day you have to different of food and then and then……..

Teacher : And then…….

Learner one : Use balance diet.

Teacher : When you are given homework do your parents help in doing your homework?

All learners : Yes they do

Teacher : If yes how?

Learner two : Like telling us how certain food has deficiency disease in our body

Teacher : Do you mean how the lack of food can cause deficiency diseases in body?

Learner three : Aaye oshinima shimwe oshi li ashike ngaha kutya aakulunhu vetu vamwe ovalongwa oinima yimwe ngeenge ka tu yi u di te ohatu pukulula ngangaa. Nandi tye nee ngeno meme omupangi ota dulu ngaa okutya moshikulya omu omu na shike omu na shike.

Teacher : Ndee naava ina longwa ove shishi ashike kutya moshikulya eshi omuna shike?

All learners : Eno oo

Teacher : Ope na vamwe iha vadulu oku mu kwafela nee?

Learner three : Oomekulu otave ku kwa fa nee shike ngee ova kulupa?

Teacher : Otava dulu ashike oku kwafa. Okushishi ashike kutya okaana ngeenge oke na oshimela oha ka pewa oshikulya shi li pi naashi ina kapewa. Ngeenge owe mu pu la ota dulu ashike.

Learner 3&5 : Eeno ngaa ndee…….

Learner one : Otashi shiva ngaa ndee ope na ngaa oupyakadi shaashi oinima ei hai longifwa paife hayo kwali hai longithwa nale. Ngaashi nee ngeno topula omukulupe oshinima ha shi longifwa paife ngaha ohashi kala shindjuu kuye eku kwafe.

Teacher : How did the homework assist you to understand the function of the nutrients such carbohydrate, protein, fat mineral salts? That homework I gave you

Learner one : Oye tu kwafa lela tu shiive oinima ihapu

Learner three : Ngaashi ngaho momaxuku ka kwa li tu shii kutya ohamu ndi ekwafelo la sha ndee paife otwe shi shiiva ngaho nee.

Learner two : Oye tu kwafa tu shiive kutya oilya ilipi hai vatele shike.

Teacher : When you come to school do you link the knowledge to the one you learn at home?

All learners : Yes off course

Learner one : You mostly link it because you need to compare it with what you

have learn.

Teacher : Just few days we did food testing now, did you do testing before in your life, using local food?

All learners : No, that was the first time in our life.

Teacher : If you did not, how did you feel when we where testing food? (Local food and conventional food).

Learners : (Almost everybody) we felt good

Learner four : I feel good because now I know exactly in which food either local food or conventional foods there is starch, glucose fat and protein, this time I know more about our local food. I tell now that in eenyandi there is glucose but not starch.

Learner five : I real like the food testing because it can prove you wrong or collect. Before food testing we thought there is starch in eenyandi but the result of testing of food shows that there is starch. I even knew whether there is protein in beans. In our traditional beans if one the food regarded as less important or less quality when compare it with meat.

Learner six : I have learned many things…….

Learner two : Ame onde li longa mo kutya ngeenge to test ostarch olu vala li lipi To mono ngeenge omuna ostarch, noluvala lilipi tomono ngenge to testing protein, ile oglucose and fat. Naashi ho testing nasho ee nutrients nda yooloka.

Learner one : I learn a lot. Ka kwali ndishi nokuli kutya oikulya ohai testingwa ngahelipi, omunhu opo u mone kutya moikulya omu na onutrient I lipi, paife onda shiiva kutya oikulya ohai testingwa ngahelipi, oluvala lilipi tali hololа oukalimo wo protein ile ostarch.

Teacher : Mbela otashi dulika udule oku mona kutya moshikulya omu kashii nde omuna shike nande ino shi testinga?

Learner one : Ehee, osho kwame ota shi kala shipu nee shaashi ngeenge onda tula moka category yasho ohandi shimono.

Learner three : I learn a lot as well, just like others who have said they never knew how to test the food, I also learn how to test the food.

Learner four : Aye ame onde ilonga mo lela shi hapu. Ka kwali no ku li ndi shi ngee Ope na nhee starch no glucose I lipo yaningwa nale. Onde ya ashike ku shi mona eshi hatu ningi oexperiment. Naashi to ti ohatu longifa ostarch, okwali ngaa ndishi ohatu longifa ostarch ei yili moikulya, I have also learnt that you can not test with tongue when you are in the laboratory

Learner five : Nda mona ku tya mboli oikulya ei hatu li nayo oina ee nutrient a di she.

Teacher : Is there any comment about what we have done?

Learner two : Fye vamwe eshi twa u da hatu ka testing oikulya okwa ashike tushi ohatu kalya.

Learner four : I am just encourage teachers to do experiments because I have realized that through experiments we learn a lot comparing to the lesson presentation.

Learner one : Let me encourage teachers and fellow learners do to experiment and use everyday experience for learners. By now I can inform people who do not have money just to eat the available food because they contain all the needed nutrients. I am even going to encourage my community to grow enough of them local food.

Teacher : Thank you very much for your constructive ideas and for your time you have spend with me.

Appendix G

Semi structure interview (gathering tool) for the community members

1. Mention the types of food you eat throughout the year.
2. Why do you eat different foods?
3. Did you notice some food that you think has a good effect to the body?
4. Are there some foods that are prohibited not to be eaten by some people? If so, what are the reasons behind?

Transcription of semi-structured interview with community members on foods they eat transilated into English

Tate Nghishindimbwa

Mwiikeni: I hope the afternoon is okay.

Nghishindimbwa: Yes meme, I hope it is the same with you

Mwiikeni: Yes the afternoon is good. Thanks for allowing me to ask you few questions regarding the types of food you eat in your community.

Nghishindimbwa: Okay meme.

Mwiikeni: The first question, mention the types of food you eat throughout the year?

Nghishindimbwa: The foods that we eat are: Mahangu Porridge, traditional spinach, fish, Tradional brewed drink called (oshikundu). We also eat fruits like, wild berries, eenyandi, mushrooms. We also eat some food that only come around rainy season time like: Frogs and cat fish, it also depends on where you live, meat we also eat, but it is not that important.

Mwiikeni: Why do you eat different foods?

Nghishindimbwa: We eat different types of food so that we build our bodies with a balanced diet. We also eat different food to get energy to do our day to day work, and also to be healthy and prevent our bodies from different diseases. For example when you eat fruits you will prevent yourself from scurvy.

Mwiikeni: Did you notice some food that you think has a good effect to the body?

Nghishidimbwa: Yes, oily food like marula oil, olive oil, and dairy oil is believed to be good for eye nerves. And when you have poor sight at night you are told to eat marula oil (Ondjove) or olive oil. The state when you see clearly during the day and cannot see during the night, it is called night blindness. There is also salt that prevents a person from suffering from swollen throat. In the olden days when salt was scarce, people use to die because of swollen throats due to lack of salt in their food.

Mwiikeni: Is that so? How does that happen?

Nghishindimbwa: The throat just swells and the person dies, just like cattle nowadays, its throat just swells and dies.

Mwiikeni: Are there some food that are prohibited not to be eaten by some people? If so, what is the reason behind?

Nghishindimbwa: Yes, since long our tradition has prohibited some food some food not to be eaten. But if we look at it now, some things were just myths. Breast feeding mothers or expecting women and children were not allowed to eat some food. An expecting woman was not allowed to eat mopane worms because it was believed that the child will have an abnormal salivation disorder. A breast feeding woman was not allowed to eat game meat example Kudu because the child might not speak at the right time. There are some parts of animals that are not allowed to be eaten; example a pancreas of animals is not allowed to be eaten by women because they will just be all over men looking for attention. Kids are prohibited not to eat some birds because they migrate a lot with their of springs and so the kids might migrate a lot with their family when they grow up. Kids have also been prohibited not to eat eggs. A tongue of a cattle is not allowed to be eaten by two people because if it is shared by people, they will just be arguing all the time, it should only be eaten by one person and that person should be an elder.

Mwiikeni: Now do you believe the reasons you just said are true, will that something happen if you eat that food?

Nghishindimbwa: For me personally I believe it was just introduced to bring order in the nation; a food like a tongue is very delicious, and small. When houses got to be crowded parents came up with this myth so that they reserve the small and very delicious food to be eaten only by them, the older people especially the man of the house. About the eggs, it was just to prevent kids from stealing chicken eggs.

Mwiikeni: Don't you think there are nutrients needed by the people who are not allowed to eat those specific foods?

Nghishindimbwa: There is, but it must be done to maintain the law of tradition. Some meats like pancreas are very delicious.

Meme Kafute

Mwiikeni: Mention the types of food you eat throughout the year.

Kafute: The foods that we eat throughout the year are: Beans (fresh and dried ones), mealies, mahangu porridge, traditional wambo bread, palm fruits, palm wine and marula oil (ondjove).

Mwiikeni: Why do you eat all those food of different type?

Kafute: We eat different food because every food has got its function in the human body. Food is there to build the body, to give us vitamins, to help our brains function properly and also to help our blood to flow nicely in the body.

Mwiikeni: Are there perhaps some food that you noticed that if you eat that food you will get something good out of it?

Kafute: Food like mealies helps the body to be strong. Paw paws give the body vitamins, marula juice gives us vitamin c. Marula oil and olive oil helps the body and the eyes to be healthy, it also helps the brain to be functioning properly. Olive oil is also used as lotion to apply on our body and be looking nice. Milk helps to make our bones strong, more especially milk is very good to be eaten by the babies because it helps the body of the baby to develop strongly.

Mwiikeni: So there is a difference between food eaten by children and adults?

Kafute: Yes, but it does not mean adults must not eat milk. Adults also need milk for their bones to be strong, but children need milk more. When a person is making olive oil, they also get an oshiwambo dish called (Etapwati) that makes our body healthy and strong. There is also mopane worms that give vitamins to the body. The mopane worms can be dried and pounded to make fine so that it can be cooked and make porridge for the kids (orphans) and you will find them much bigger and healthier than the ones that are breast fed.

Mwiikeni: Other then mopane worms, are there food that can be given to infant orphans?

Kafute: Baby infants can also be given mahangu porridge. If there are goats, they can be given goat milk and they eat with mahangu porridge, that baby will just be as normal and will grow even bigger.

Mwiikeni: Are the some foods that are prohibited not to be eaten by some people?

Kafute: Yes, like game meat is prohibited to women that are breastfeeding or expecting women. Beans are not allowed to be eaten by people that have a disorder of fainting. Liver and eggs are not allowed to be eaten by children, its elder's food. Males are not allowed to eat fresh pounded mahangu since it will make them cowards.

Mwiikeni: Those food that are not allowed, are the no nutrients?

Kafute: There is, but the tradition prohibits us from eating that food. Some are prohibited because of health issue; people that suffer from some diseases are prohibited from eating some food. Like I stated that beans are not allowed to be eaten by people who suffer from the disorder of fainting. Liver, eggs and animal tongue are really good for the body and are the most needed by children, but because of culture and tradition children are not allowed to eat it.

Tate Silas

Mwiikeni: Good evening sir?

Silas: Yes madam, good evening?

Mwiikeni: Good. Thank you for giving me permission to ask you some questions regarding the food you eat.

Silas: Okay meme.

Mwiikeni: Mention the types of food you eat throughout the year.

Silas: We have different foods depending on the seasons of the year. The most important food is porridge, oshikundu, beans, fish. Beans, are not eaten alone as a complete meal, but you eat them as extra for after or before porridge. You also eat porridge with meat, spinach. We also eat fruits like wild berries, eenyandi, eenghwiyu, and also palm fruits.

Mwiikeni: Why do you think people eat different food?

Silas: Some foods are eaten to satisfy people. There is no specific scientist that told us that we get what in a specific food, but we noticed that if you eat porridge you will be able to do your work for a long time. Olive is not eaten too much but people make oil from it, and this oil helps the people to have healthy eyes. Now that we have scientists, they have figured out that olive oil gives us vitamin D. Marula oil (ondjove) is believed to have a lot of vitamins that helps in keeping our skin healthy and prevent from contracting different diseases. We also have mopane worms, mopane worms give us a lot of protein and it does not have any side effects like some other foods.

Mwiikeni: Are there some other food that are good for human body?

Silas: There are some foods that are vegetables related, the covers of such food prevent constipation. There are also some vegetables that help the blood in our body to be well enriched with haemoglobin.

Mwiikeni: Are there perhaps some foods that are prohibited not to be eaten by some people?

Silas: Yes there are some foods like foods that are meat related. Some parts of animals are not allowed to be eaten by some people. There are also some drinks that are prohibited not to be drunk by women.

Mwiikeni: Are there no nutrients in those foods that people are prohibited to eat? If there are, don't you think those people also need those nutrients?

Silas: Maybe in the past it was not really seen as to what nutrients you get from those specific foods, and again it was just a law to bring order in the nation. On many occasions, these laws were set up by the men, and so they did the laws to their advantage, the delicious parts of animals to be eaten by them. At some point I also think that perhaps those foods that have restrictions taste nicer and yet again they are not a lot. And so if it is said everyone in the house must eat, the man of the house might end up not getting anything because it is the women that do the cooking. So it is for that reason that those laws have been put in place.

Mwiikeni: Okay, thank you sir.

Tate Vatilifa

Mwiikeni: Mention the types of food that you eat throughout the year.

Vatilifa: Beans, oshikundu, porridge, wild berries, eenyandi, fish, milk, meat and spinach.

Mwiikeni: Why do you eat different foods?

Vatilifa: It is what the heart wants, and again it is those foods that build the body. If you only stick to one food consistently, it will bring no good to your body.

Mwiikeni: What nutrients do you get in a specific food? Mention the food and the nutrient.

Vatilifa: The porridge satisfies you quickly and again it keeps you healthy. Oshikundu gives people more energy, palm and olive oil keeps the eyes healthy.

Mwiikeni: Are there perhaps some food that are not allowed to be eaten by people?

Vatilifa: Yes, there are but for me, personal I think those are just myths to bring about order in the nation. This is so because, when the parents are not around, the children eat those foods and nothing happens to them.

Appendix H

A sample of section taken from the textbook

GROUPS OF FOODS ACCORDING TO THEIR FUNCTION

Carbohydrates and fats | Proteins | Vitamins, Minerals

Energy rich foods

Body building foods

Protective foods

Carbohydrates

Carbohydrates are sugar containing foods which are the main source of energy for the body. They have an average energy value of about 17 kilojoules per gram (17kJ/g). Examples of carbohydrates include starch, glucose, sucrose, lactose and maltose. Lack of enough carbohydrate in the diet may result in the development of an energy deficient disorder called **marasmus** which is associated with dehydration, body wasting (weight loss) and general weakness of the body and is common in children. Foods rich in carbohydrates include cereal foods (mahangu and maize meal porridge, bread, rice) potatoes, cassava, sweet potatoes and some fruits like bananas.

ACTIVITY

TESTING FOR STARCH IN A FOOD SAMPLE (IODINE TEST)

1. Take two test tubes and label them A and B respectively.
2. In test tube A, add glucose solution up to three-quarter full.
3. In test tube B, add starch suspension up to three quarter full.
4. Using a dropper, add three drops of iodine solution to each of the test tubes A and B, observe colour changes and answer the questions below.
5. Try tests 2 and 3 using Mahangu meal.

Questions

a) State the original colour of iodine solution.

b) State the colour change of iodine solution when added to test tube A and to test tube B.

c) Using results from tests indicated in step 5 (above), state the type of nutrient found in Mahangu meal.

d) Make a conclusion from your observations.