An investigation into how Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi in the Zambezi region of Namibia: A case study

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DECLARATION

I, Hildred M. Denuga (student number: 07D3501) declare that the work contained in this thesis is my own original work, and where I have drawn on the words or ideas of others, these have been acknowledged using reference practices according to the Rhodes University Education Department's Guide to Referencing**.**

Hildred M. Denuga Date:

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Signature

ABSTRACT

The Namibian government's language policy for schools has opted for English as the official language of education. But the use of English in Namibian schools has nevertheless presented certain challenges. Although the Ministry of Education has chosen English as the language of instruction from upper primary (Grade 4) up to the tertiary level, it has been found that English proficiency is poor among both learners and teachers.

It is against this backdrop that this study sought to investigate how Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi in the Zambezi Region of Namibia. The study explored Natural Science teachers' perceptions and experiences of code-switching, how they and their learners make sense of concepts in science classes when code-switching is applied, and lastly, how code-switching from English to Silozi enables or constrains learning in Natural Science classes. The main question is: How do Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi?

A qualitative case study underpinned by an interpretive paradigm was carried out at Zebra School (pseudonym) in the Zambezi Region of Namibia with two participant teachers. My unit of analysis was mediation of learning through code-switching, and data were obtained from lesson observations, questionnaires, interviews and document analysis. A variety of data gathering technique was employed for triangulation purposes to enhance the validity and trustworthiness of the data. During the data analysis process, data were grouped into common themes and subsequently organized into analytical statements in relation to the research questions.

It was found that code-switching was widely employed in Grade 7 Natural Science classes in the Zambezi Region. It was also found that teachers code-switch to help learners understand the subject content, to explain concepts, to emphasize points and to include learners' participation in the subject. The findings also revealed that some few teachers were against code-switching because examinations are written in English and the language policy does not recommend code-switching.

Notwithstanding this, since the majority of teachers do code-switch to support their learners' understanding in science classes, I recommend that education curriculum planners should include code-switching in the curriculum guidelines, and that the practice should be officially acknowledged as a legitimate strategy for teachers.

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DEDICATION

This thesis is dedicated to my late mother, Katrina Mahupelo Muhamubi and my late father Phineas Muhamubi Libuto who brought me up in a hard working life. I kept thinking of your advice that laziness will be embedded in your heart if you cannot devote yourself to working hard. Your words of wisdom have remained with me for my entire life until you departed from this world. Well done mom and dad let this thesis serve as an academic foundation for your offspring.

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

CHAPTER 1: SITUATING THE STUDY

> *Language alternation in multilingual school classrooms takes many forms; code-switching is often assumed to refer to a style of short-term alternation between languages: teachers or learners switch into an alternate language for a short stretch of talk and switch back. The code-switched utterance is limited in length. Teachers may do this frequently throughout a lesson (Clegg & Afitska, 2010, p. 5).*

1.1 INTRODUCTION

This study was carried out in order to investigate how Grade 7 Natural Science teachers mediate the learning of Natural Science through the use of code-switching from English to Silozi in the Zambezi Region of Namibia.

In this chapter, I introduce the study focusing on the following aspects: the background of my study, followed by the research goal and research questions, the theoretical framework underpinning the study, the methodology used, the potential value of the study, its limitations, a definition of concepts, the thesis outline and lastly, some concluding remarks.

1.2 BACKGROUND TO THE STUDY

1.2.1 The international context

The choices of official languages and media of instruction are shaped by political, social and economic forces and every country in which there has been a struggle for language supremacy has its own complex story to tell (Farrugia, 2006, p. 6).

Like in South Africa, research was done by Howie, van Staden, Tshele, Dowse and Zimmerman, argue that the Progress in International Reading Literacy Study and South African Children's Reading Literacy Achievements Report (PIRLS, 2011, p. 10) explained that active involvement of learners in reading and learning lessons is very important because it allows for the interaction between learners, teachers and the content they are exposed to as they are learning. Some African countries that participated in the survey obtained low scores

compared to other countries. South African learners also participated in the survey and it was found to achieve below international scores.

Mullis and Martin (2015, p. 3) in the study called Trends in International Mathematics and Science Study (TIMSS) posit that the study of Mathematics and Science in primary and secondary schools prepares students to become knowledgeable, productive individuals who are able to make a contribution as members of society, and allows them to enter challenging university-level studies that prepare them for a career in the fields of science, technology, engineering, and mathematics (STEM).

This group of students will become the next generation of scientists and engineers who will drive innovation and technological development in all sectors of the economy; thus, it is important for countries to understand the mathematics and science achievement of these students as they begin their university-level education.

According to Gonzales, Guzmán, Partelow, Pahlke, Jocelyn, Kastberg and Williams (2004), in their review of the highlights from the TIMSS report argue that TIMSS can be used to track changes in achievement over time. TIMSS provides an indication of the degree to which students have learnt concepts in the mathematics and science they have encountered in school. They noted that there was a general decline in science achievement scores from 1995 to 2003, and that the students performed much better in questions which required factual recall rather than reasoning and application. These facts show that learners find it difficult to learn science, particularly in areas where rationalization is required.

Shaakumeni (2012) posits that Namibia does not participate in TIMSS and PIRLS but uses what they call Standardized Achievement Tests (SATs). These tests were introduced in 2010 by the Ministry of Education to monitor the progress of learners in schools in subjects such as Mathematics, Natural Science and English. The reason for this monitoring was to identify content areas where teachers and learners need extra support to improve their performance.

1.2.2 The Namibian context

After independence in 1990, the Namibian government reformed its education system in order to address the four goals it highlighted of access, equity, quality and democracy in

education (Toward Education for All, 1993). To this end, the Ministry of Education and Culture (MEC) developed the language policy to ensure that English became the medium of instruction (Namibia. MEC. 2003, p. 1). According to the Namibian constitution article 3 (p.3), "the official language shall be English".

Despite this emphasis on using English as the official language of instruction, the constitution allows the use of mother tongue during the early years of schooling (Grade 1-4). After Grade 4, teachers are required to use English as the medium of instruction (Namibia. MEC, 2003, p. 4). Although, English is the medium of instruction, it is however a second language for most teachers and learners in Namibia. Kamati (2011) asserts that the use of English as a medium of instruction affects learners' understanding and performance in all subjects.

The Namibian language policy stipulates that learners should be taught through their mother tongue in their early years of schooling from Grade 1 to Grade 4. This, it is argued, is intended to enable learners to acquire the basic skills of reading, writing and concept formation. However, this does not directly address the issue of code-switching despite the fact that English is not the first language for the majority of the Namibian population (Kamati, 2011, p. 2).

However, my research study is motivated by my personal experience in the teaching profession. For the past 26 years I have observed that teachers (me included), code-switch during teaching and learning. I believe teachers code-switch so that learners can understand more easily in their classrooms.

As a teacher in one of the urban schools in the Zambezi Region town of Katima Mulilo Northern part of Namibia, I have observed that although most learners have attended kindergarten, they have had little exposure to the English language, in particular science terminologies. Each year there are learners who are transferred from rural schools by their parents and guardians to urban schools and these learners do not have good language proficiency in English.

For that matter, science teachers are faced with a dilemma when it comes to their teaching practice. The teaching and learning process requires that both the teachers and learners have a

good command of English as they will interact and communicate to each other. The way in which teachers communicate during science lessons has an impact on how learners learn in their classes given that science is taught in English as a second language. This might be a barrier for learners in understanding science because the terms that are used are unfamiliar to them (Ferreira, 2011, p. 105). If learners do not understand English, their participation in class will also be affected resulting in them being passive in the classroom (Ferreira, 2011).

It is recommended in the curriculum that teachers choose teaching strategies in the science classroom that enable learners to achieve basic competencies (Natural Science and Healthy Education syllabus, 2010, p. 3). Working in groups, in pairs or whole class must be well organized when learners are given a task to do. Learners learn best when they are actively involved in the learning process through a high degree of participation, contribution and production. This is in line with learner-entered education (LCE) as described in the Ministry's language policy documents (2003), including curriculum guides and the conceptual framework of the syllabus revision (2010). The approach ensures that the optimal quality of learning is put into practice.

To address the major four goals of access, equity, quality and democracy in education, the Namibian government's Ministry of Education adopted the Learner Centered Education (LCE). Under this approach, the learner is placed at the center of teaching/learning to enhance the quality of learning. LCE emphasizes that the learner should know, understand, and be able to do what is required of him/her.

According to Nyambe (2008), LCE refers to an approach where the teacher allows the learner to play an active role in their own learning. Constraining factors such as the lack of skills to apply LCE by the teacher in the classroom, overcrowded classrooms, and limited resources impede its successful application in the classroom.

A possible solution to this problem is the use of code-switching as mentioned in the epigraph above. Code-switching allows the learners to interact with each other and the teacher as well as their subject in order to develop their thinking skills and to help learners with limited English proficiency to understand the content of the subject.

Learner-centered approaches (LPA) are prescribed in the Natural Science and Healthy Education Syllabus. Part of the syllabus requires learners to learn about the digestive system found in the human body. Therefore, learners need to apply the concepts of the digestive system and to demonstrate certain competences after studying the digestive system. The syllabus states that the learners should be able to:

- *Define digestion as the breakdown of food substances into soluble substances;*
- *Describe the different forms of digestion;*
- *Discuss the importance of chewing food;*
- *Define enzymes as the biological catalysts (proteins) which speed up or slow down reaction but do not get used up during the reaction; and*
- *State the end- products of starch, fat and protein digestion*.

Natural Science and Healthy Education Syllabus, (2010, p. 44).

According to Kamati (2011), an interesting comparison of Grade 10 examination results was made and it clearly indicated that the average scores for first language subjects such as Oshindonga, Oshikwanyama, Otjiherero, Rukwangali and Silozi were relatively higher than the average scores for English as a second language and other content subjects taught through the medium of English.

The main reason why the averages for the home language are so high is that learners are instructed in the language they know and understand and feel comfortable with. This strengthens the point that learners will do much better when instructed in the language they know best. One of the reasons for poor performance in other subjects can be attributed to the fact that English is used as a medium of instruction.

Mouton (2007), Kamati (2011) and Shilamba (2012) carried out studies on code-switching in different regions in Namibia. They all found out that code-switching was widespread in their regions because learners were finding it difficult to understand terminologies and concepts in science subjects taught through English as the medium of instruction. They all recommended that further studies in code-switching should be carried out in other regions of Namibia. I therefore, have taken the initiative to carry out the same research on code-switching in the Zambezi region where I come from.

1.3 RESEARCH GOAL AND RESEARCH QUESTIONS

The main goal of this research study was to find out how Grade 7 Natural Science teachers mediate learning through the use of code-switching from English to Silozi. To achieve this goal, the following main question and sub-questions were asked.

1.3.1 Main Research Question

How do Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi?

1.3 2 Sub-questions

1) What are Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi?
2) How do Grade 7 Natural Science teachers help learners make sense of concepts through code-switching from English to Silozi?
3) In what ways does code-switching from English to Silozi enable or constrain the learning of concepts?

1.4 THEORETICAL FRAMEWORK

This study was underpinned by Vygotsky's (1978) theory of Mediation of Learning and Social Constructivism. In his theory, Vygotsky used language as a tool for communication in order to attain crucial learning and thinking. In a school environment, Vygotsky (1978) states that learners develop within a zone of proximal development (ZPD) and this involves social interactions, dialogue, and mediated activity between learners and their teachers. The ZPD is described by Vygotsky as the distance between the actual developmental level 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. Vygotsky thus views interaction with peers as an effective way of developing skills and

strategies. He suggests that teachers use cooperative learning exercises where less competent children develop with the help from more skillful peers within the ZPD.

Within social constructivism, learning is constructed by individual as new information interacts with their existing knowledge. There are multiple ways learners may construct their meaning from a given context. McRobbie and Tobin (1997, p. 194) state that in a social sense, while knowledge is personally constructed, the knowledge constructed is socially mediated as a result of cultural experiences and interaction with others in that culture within the community.

Coupled with Vygotsky's theory, Schulman's (1986) pedagogical content knowledge (PCK) was used in this study. According to Shulman (1987, p. 15), PCK refers to "the capacity of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by the students"

Shulman (1986, 1987) proposed that teachers' professional knowledge is comprised of a variety of categories, with one of these categories being PCK. Shulman conceptualized PCK as including 'the most powerful analogies, illustrations, examples, explanations, and demonstrations - in a word - the ways of representing and formulating the subject that makes it comprehensible for others (Loughran, Mulhall & Berry, 2004, p. 371).

Shulman claimed that teachers needed strong PCK to be the best possible teachers. He asserted that teachers had a unique way of looking at practice and his intrigue with the manner in which they did so encouraged an examination of teachers' pedagogical thinking in ways that, it was anticipated, would reveal what teachers must know to best teach their content to students (ibid).

1.5 DATA GATHERING TECHNIQUES

The following data gathering techniques were used to generate data in this study, namely,

- Document analysis;
- Questionnaires;
- Observations; and
- Interviews (semi-structured and stimulated recall interviews).

A variety of data gathering techniques were used to enhance the validity and trustworthiness of the data in this study, this is a process called triangulation (see Section 4.3).

1.6 LIMITATIONS OF THE STUDY

This is a case study of only two teachers in my region and so the results cannot be generalized due to the small size of the sample. That is, they do not represent the population of teachers in the Zambezi Region. However, insights were drawn on how teachers mediate learning of concepts through code-switching from English to Silozi. I found that the use of a recording device changed the behavior of participants, particularly in the first lesson where Mrs. Lattey (pseudonym) did not code-switch.

1.7 DEFINITION OF KEY CONCEPTS

The following definitions describe the key concepts which have been used in this study.

1.7.1 Code-switching: is referred to as the use of more than one language in the same conversation.

1.7.2 Mother tongue: is the first language which a child learns to speak in his/her home.

1.7.3 Mediation: is the method used by the teacher to help the learners to achieve desirable subject content.

1.7.4 Mediation tools: the means through which the mediation of learning is achieved.

1.7.5 Social constructivism: is a theory which advances that knowledge is acquired through interactions in a social context.

1.7.6 Pedagogical content knowledge (PCK): refers to the ways in which teachers present subject content.

1.7.7 Teaching strategies: the methods that a teacher uses to scaffold learners to master the scientific concepts in the classroom.

1.8 POTENTIAL VALUE OF MY STUDY

The language policy is a highly contested issue in Namibia. This study is significant in that it will add new perspectives and insights that might help resolve some of the contested areas of the policy including that of code-switching.

There appears to be no training for teachers to equip them to deal with teaching through the medium of an additional language, therefore, this study will help to provide some insights as to how this can be achieved and the value of code-switching as a meditational tool in science classes.

Furthermore, the study will be of potential value as it will be used by the curriculum developers in the Ministry of Education in Namibia to transform their policy with regard to the language of science and code-switching in particular.

Finally, this study will also help to improve my own practice on how to use code-switching effectively and sparingly during my Grade 7 Natural Science lessons.

1.9 THESIS OUTLINE

This thesis consists of six chapters including the introduction.

Chapter 1 presents the introduction, the background of the study, potential value of my study, the theoretical frameworks that underpin the study, the research goal and research questions, the data gathering techniques used, the limitations of my study, and lastly a brief outline of the definition of key concepts used in the study.

Chapter 2 reviews the literature relevant to this study, particularly in relation to code-switching during the science lessons. The theoretical frameworks underpinning the study are also discussed in more detail.

Chapter 3 describes the methodology I employed in this study to guide the research process. The various data gathering techniques are presented, it explains the reason for selecting the qualitative research methodology. The research site and research participants are also discussed. The methodological framework of constructivism that guided the research process is clarified. Furthermore, the motive behind the use of document analysis, the questionnaires, observations and interviews is given. Ethical considerations, validity of the data and the limitations of the study are discussed. Lastly, an overview of the data analysis procedure is laid out.

In **Chapter 4**, I present a narrative account of the data generated from document analysis, observations, semi-structured interview, stimulated recall interviews, teachers' lesson plans, learners' textbooks, learners' workbooks and summaries. I have presented this data in my research participants' own words, and add a few comments to strengthen my presentation.

In **Chapter 5**, I discuss the findings presented in Chapters 4 and 5 derived through coding. The interpretation of the findings is also presented in this chapter. I end by attempting to make meaningful knowledge claims related to the research questions. In my discussion I integrated literature from my Chapter 2 pertinent to my main research question and sub-questions.

Chapter 6 discusses and presents a summary of the findings which emerged from the main themes which were derived through coding from data presented in Chapter 4. Recommendations based on the research and areas for future investigations as well as the limitations of the study are provided. My brief personal reflections based on my journey during this process will be discussed.

1.10 CONCLUDING REMARKS

In this chapter, I sketched the context or background of the study, followed by the research goal and research questions, the theoretical frameworks underpinning the study, methodology, the potential value of the study, limitations, definition of concepts and the thesis outline has been provided.

In the next chapter, I discuss relevant literature to this study, in particular, literature in relation to code-switching during science lessons.

CHAPTER TWO: LITERATURE REVIEW

The relationship between language, education and economic development lies in the link between language and education on the one hand and education and development on the other. No one would deny that language plays a very central role in education; it is mainly through the interactions between the teacher and the learners and among the learners themselves that knowledge is produced and acquired in the teaching-learning process (Bunyi, 1999, p. 338).

2.1 INTRODUCTION

The main goal of this study was to investigate how Grade 7 Natural Science teachers mediate the learning of science concepts through code-switching from English to Silozi. This chapter is thus a review of the literature relevant to this study, in particular, literature in relation to code-switching during science lessons. To ensure that my investigation makes a significant contribution to the mediation of code-switching where language is used to facilitate mediation, it was necessary to investigate what others have researched on the use of code-switching in the science classrooms.

To begin, I give a brief outline of the requirement of language instruction in the Namibian language policy. I then discuss various definitions of code-switching from different researchers in order to have a broad conceptualization and understanding of code-switching in science teaching.

I attempt to explore different sources in the Namibian context and internationally to find out what their views are on code-switching in their context, whether it enables or constrains learning. Furthermore, I also explore what other literatures are saying about the use of language in the classroom, particularly the use of code-switching in the science classrooms. I introduce the theoretical frameworks that underpin the study and end this chapter with some concluding remarks.

2.2 THE LANGUAGE POLICY FOR SCHOOLS IN NAMIBIA

The Ministry of Basic Education developed the language policy to ensure that English became the medium of instruction (Namibia. MoE, 2003, p. 1). According to the Namibian constitution article 3 (p. 3), 'the official language shall be English'. Despite this emphasis on using English as the official language, the constitution allows the use of mother tongue/first language during the early years of schooling (Grade 1-4). After Grade 4, however, teachers are required to use English as the medium of instruction. Although English is the medium of instruction, it is a second language for most teachers and learners in Namibia. This affects learners' understanding and performance in all subjects including the science subjects (Kamati, 2011)

The Namibian language policy further states that learners should be taught through their mother tongue in their early years of schooling from Grade 1 to Grade 4 in order to acquire the basic skills of reading, writing and concept formation. However, it does not directly address code-switching despite the fact that the majority of the Namibians are not first language speakers of English (Kamati, 2011, p. 2).

The following criteria were taken into consideration when the policy was developed and are still valid today:

- The expectation that the language policy should facilitate the realization of the substantive goals of education;
- The equality of all national languages regardless of the number of speakers or the level of development of a particular language;
- The pedagogical reason is ideal for learners to study through their mother tongue, particularly in the early years of schooling when basic skills of reading, writing and concept formation are required; and
- The need for learners to be proficient enough in English, the official language, at the end of seven-year primary school cycle in order to gain access to further education as well as to a language of wider communication. (ibid, p. 1)

Where teachers and learners share a common home language, there is frequently a gap between language policy and practice, therefore code-switching by teachers and learners is a common strategy to achieve a range of social and pedagogical goals (Probyn, 2009, p. 123).

2.3 DEFINITION OF CODE-SWITCHING

Ayeomoni (2006, p. 91) describes code-switching as "the mixing of words, phrases and sentences from two distinct grammatical (sub) systems across sentences boundary within the same speech event". He further explains that code-mixing is the embedding of various linguistic units such as affixes (bound morphemes), words (unbound morphemes). In his study conducted in Nigeria, he referred to code as a verbal component that can be as small as a morpheme or as comprehensive and complex as the entire system of language. Gumperz (1982) further explains code-switching as exchanges of discourses. The discourses have characteristics of being single unitary interactional systems.

Rose and Van Dulm (2006) refer to code-switching as alterations of language within a single conversation, often involving switches within a single speaker's turn or a single sentence. They also refer to code-switching as borrowing, which entails 'the incorporation of lexical elements from one language in the lexicon of another language. Rose and Van Dulm's (2006) paper focused on code-switching between English and Afrikaans in the classroom interactions of a secondary school in the Western Cape in South Africa. The main aim of code-switching identified by Rose and Van Dulm (2006) was the incidence and a function of code-switching by teachers and learners, that code-switching plays a role in building relationship between teachers and learners.

Another aim identified by Rose and Van Dulm is that code-switching can also help in maintaining adequate communication by learners in the classrooms, thus bringing understanding of what has been taught. Code-switching in the classroom is also used to discipline learners when they misbehave by warning them in a familiar language.

Azlan and Narasuman (2013, p. 458) define code-switching as the shifting that occurs "between two or more languages simultaneously or interchangeably within one

conversation". They further elaborate that language instructors who support bilingual instruction in the form of code-switching believe it to be extremely useful to students in many different aspects, especially in the teaching of beginner students (ibid).

2.4 STUDIES ON CODE-SWITCHING

Azlan and Narasuman (2013) submitted that, although English was the dominant language used for communication in Malaysia; code-switching supported learning in such a way that students' understanding of the concepts was better. They observed that teachers may code-switch because of lack of facility with a language. Bilingual and multilingual speakers code-switch if they cannot find the appropriate terminology in the second language, as well as to emphasize points and to show identity with the group. Shin (2010) supports this identification aspect as he maintains that it allows speakers to reveal their social and cultural identities.

In a research conducted by Shilamba (2012) in Namibia, she found that teachers used code-switching frequently from English to the local languages (Oshiwambo) in mathematics classrooms. She further observed that: "the reasons why teachers code-switch is that the majority of learners' language proficiency is not good" and that: "teachers code-switch to promote the performance and participation of their learners, to explain concepts and to emphasis points" (Shilamba, 2012, p. iii).

According to Shilamba (2012), issues of language in general, and code-switching in particular, should be discussed and debated openly and widely. She also submitted that teachers and school board members should be consulted and brought into the discussion arena while the Ministry of Education and policy makers should recognize the value of code-switching and consider its inclusion in the teaching and learning policy at all levels. This is in line with Reyes (2004, p. 94) whose research showed that educators of second language learners facilitate discourse practices in the classroom according to students' first language and second language.

Another study conducted by Jegede (2011, p. 52) in Nigeria, found that Nigerian mathematics primary school teachers and learners used code-switching in the languages they understand

better in order to enjoy its educational benefits in multilingual and bilingual classrooms where learners have low English proficiency and limited material resources in their mother tongue. He further argued that, although English is the official language of teaching and learning in Nigeria, in the five schools where he did his research on code-switching, the findings indicated that teachers code-switched to their local language and the language of the learners for the following reasons: the lesson will be more effective and learners will be able to share their interests; to use local language to explain the subject, to let the learners fully participate in the lesson, improve learners' academic performance, code-switching makes learners understand the contents thoroughly, and code-switching helps learners to have an interest in mathematics.

In their study conducted in China, Chen and Ting (2011, p. 299) outlined some reasons for code-switching as: "for interpersonal reasons such as addressee specification, objectification and personalisation, for bridging comprehension gaps, for marking salient information and instructions, for teachers to incorporate students' input and text information into the lesson or with objectification to allude to authority beyond that of a teacher". An investigation of teachers' discussions using Gumperz's semantic model of exchange on code-switching showed that the most common function of code-switching was duplicated (Chen and Ting, 2011).

This shows that code-switching is needed all over the world where English is the second language of learners in the science classrooms for better understanding of the science terminologies.

According to Vorster (2008), in his study conducted in two schools in Botswana, there is an urgent need to find strategies to assist multilingual learners who are taught by means of English as the language of teaching and learning (LoLT) in coping with subject matter, especially as learners show different levels of English proficiency. One important strategy is code-switching. The possibility of using a glossary, notes and tests given in English and Setswana as scaffold for the code-switching was investigated in a qualitative study. In the Vorster study, the teaching of a geometry unit was undertaken in which notes, a glossary and tests in English and Setswana were used to assist the learners. The teachers used a strategy of code-switching. Interviews with the learners and the teachers revealed that learners had a

positive attitude towards the use of both languages in written work. Moreover, Liebscher and Dailey-O'Cain (2005, p. 235) further explain that teachers should see code-switching as an advantage and that the use of L1 is good and meaningful in order to encourage L2 acquisition.

Mouton (2007), in her study on code-switching which was conducted in Namibia, gave a number of reasons why code-switching is taking place in and outside the classroom. Firstly, the speaker may not be able to express himself/herself in one language so he/she switches to the other language to make up his/her deficiency in the language. Secondly, switching may occur when an individual wishes to be part of a social group. The last reason she gave was that code-switching occurs when a speaker switches to convey his/her attitudes through variation in the formality of speech to show that they are, for example, unhappy about something.

Clegg and Afitska (2010) argue that code-switching is pedagogically useful. Their study highlighted important functions of teacher code-switching as: firstly, teachers need code-switch for explaining and elaborating on concepts. In African classrooms this is possibly an indispensable strategy. Not using the strategy limited learners' ability in the medium of instruction and made it difficult to provide an acceptable degree of access to the curriculum. Secondly, code-switching may also increase classroom participation. Thirdly, code-switching is useful for affective and social purposes: teachers need to establish good classroom relationships; for most teachers first language (L1) is the best medium for maintaining the class solidarity which underpins effective learning. Fourthly, code-switching is useful for classroom management purposes to ensure the smooth running of the lesson and for maintaining and sustaining pace and interest. And lastly, teachers need to use the L1 to make connections between new conceptual material and the local context and culture of learners.

In most cases, code-switching occurs as a result of a teacher‘s assumption that the class (or specific learners) have not understood the lesson or concepts, because not all learners in the classroom are confident enough in English as a medium of instruction and as the language of learning and teaching.

This is one factor which distinguishes classroom code-switching from code-switching as an integral characteristic of communication in bilingual communities, where a variety of social, psychological and discourse factors trigger a switch (Baker, 2001). According to Baker, in most classrooms code-switching is participant-related. In other words, it is stimulated by what the speaker perceives as a need of the interlocutors in a conversation (Auer, 1995). Code-switching into (L1) also serves the purpose of emphasizing a concept or drawing attention to it (Probyn, 2009). This function often coincides with clarification – the fact that the teacher switches into 1st language (L1) marks the concept as important, as well as increasing the comprehension of it.

However, Probyn (2009, p. 50) refers to code-switching as 'smuggling the language' into the classroom since this is not officially included in the policies. In her study she investigated some ways to overcome language obstacles during teaching and learning of science particularly in the South African context. In her findings she suggested that code-switching from English to the vernacular language may help with cognitive reasoning in response to learners' limited English proficiency. She recognized, however, that code-switching is not in agreement with the language policy. Her findings, therefore, reveal that there is a gap between theory and practice when it comes to reality in classroom. This is supported by Cook (2001) when saying code-switching was not welcomed in traditional L2 classrooms.

Kamati (2011, p. 53) argued that learners' low level of English language proficiency was quoted in the interviews as one cause for the Junior Secondary Physical Science teachers in the Oshana Education Region to code-switch. El-Saghir (2010, p. 5) supported this by saying, personal and social factors play a significant role in code-switching, such as language proficiency, for example, gaps in the lexical repertoire of the speaker. Hence, code-switching is an important tool for teachers to achieve teaching goals in content based lessons which involves learners who lack proficiency in English.

In the Namibian context too, code-switching as a teaching and learning strategy has its own challenges. As indicated by Probyn (2009), code-switching is not recognized as a legitimate strategy. For example, the teacher may try to explain the concept, but in the process may misinterpret it, because there is no training for teachers to comply with the teaching through

the medium of an additional language. Such a view shows that for effective code-switching to take place, there is a need for the teachers' ability to develop in this regard.

From the literature reviewed in this chapter, many studies demonstrated the benefits of code-switching in the classroom, such as:

Code switching for academic reasons includes:

- Explaining and clarifying subject matter;
- Building up learners' understanding of subject matter;
- Assisting learners in interpreting subject matter;
- Confirming learners' participation;
- Supporting classroom communication; and
- Supporting exploratory talk.

Code switching for classroom management purposes explored the following issues:

- Classroom discipline, for example, reprimanding learners;
- Dealing with late comers and disruptions;
- Gaining and keeping learners' attention; and
- Giving general instructions to the learners (Shilamba, 2012).

Brock-Utne (2001) points out that reasons for code-switching may be expressed differently but more importantly, teachers show concern for the understanding capability of their learners. Brock-Utne (2001) recommends that using a language for learning, for example, as a medium of instruction is different from learning a language. She recommends that it is better to have good instruction in a language *per se* (such as English in the Namibian situation) and the other subjects should concentrate on content and teachers could code-switch in order for their students to understand the content.

Pollard (2002, p. 4) also posits that: "Code-switching serves not only to enhance communication in the teaching/learning process but can also help to maintain and develop the languages of a bilingual. She further said such code-switching is used to elaborate, to emphasize, to specify an addressee and to clarify for effective communication". This is approved by Reyes (2004, p. 78) when he said code-switching varies according to discourse

function, to include or exclude someone from a conversation, to convey intimacy and emphasize a message.

The conceptual knowledge embedded in the learner's main language forms important prior knowledge. The main language of learners supplies a support system to facilitate the interaction among learners and with the teacher, while their English proficiency is developing. Two language strategies are currently implemented. The first is to use only English in the teaching and learning of science. This strategy is for example found where the teacher cannot speak the indigenous language or where many indigenous languages are present in a class. In the second strategy, namely, code-switching, both the main language(s) of the learners and English are used to facilitate understanding (Vorster, 2008, p. 34).

With this background to this study, I sought to find out Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi; whether code-switching helps learners to make sense of concepts in science classes or not; and whether code-switching from English to Silozi enables or constrains learning in Natural Science?

Although there has been much research done on code-switching and its effects on the education of bilingual learners around the world, there are few studies conducted here in Namibia on code-switching. Hence, the purpose of this study is to add to this knowledge.

2.4.1 Natural Science teachers' perceptions and experiences about CS

Mastura et al. (2013), Shilamba (2012), Jegede (2011) argued that even though English is the dominant language used for communication and teaching and learning, teachers code-switch because the learners' language proficiency is low. Teachers code-switch to support learning so that learners can understand the concepts better, as well as to emphasize points and to make learners to get interested in the subject.

2.4.2 How Natural Science teachers make sense of concepts in science classes when code-switching

Pollard (2002, p. 4) also posits that: Code-switching serves not only to enhance communication in the teaching/learning process but can also help to maintain and develop the languages of a bilingual learner. Pollard (2002) adds that such code-switching is used to elaborate and to emphasize statements. Clegg and Afitska (2010. p. 18) state that code-switching is pedagogically useful. Teachers code-switch for explaining and elaborating on concepts, and code-switching may also increase classroom participation. Teachers need to establish good classroom relationship and lastly teachers need to use first language (L1) to make connections between new conceptual material and the local context and culture of learners.

Probyn (2004, 2009) posited that, using a learner's mother tongue might help them understand the concepts. Probyn further states that where teachers and learners share a common home language, teachers tend to switch to the learners' home language a practice known as code-switching.

I find code-switching as described by the literature is used by the teachers in the Zambezi Region to help their learners make sense of concepts. When teachers share the same language with learners, they tend to code-switch to the language they understand in explaining concepts, and hence learners will be able to formulate their own hypothesis.

2.4.3 Ways in which code-switching enables or constrains learning in Natural Science classes

Brock-Utne (2001) pointed out that the reasons for code-switching may be expressed differently but more importantly, teachers show concern for the understanding capability of their learners. They are concerned that all learners should be able to participate in the lessons. Some of the surveyed teachers feel that code-switching constrains learning. The reason for this is because most learners cannot express themselves in English so they want to write the answers in the local language which does not have a large enough vocabulary to deal with

scientific terminology. However, examinations need to be written in English which becomes a problem.

I find that the Zambezi Region teachers code-switch to make it possible for their learners to understand the content of their subject. They are doing so to improve the learners' examination results.

2.5 HE ROLE OF LANGUAGE IN TEACHING AND LEARNING

Lemke (1989) contends that classroom education, to a large degree, consists of talk, which is the social use of language to enact regular activity structures and to share systems of meaning amongst teachers and learners. He further elaborates that language is used to develop, in monologue and dialogue, the meaning relations and special ways of speaking and writing of particular school subjects. In support, Clegg and Afitska (2010) point out that to ask teachers or learners who share two languages to avoid using them in the classroom is to ask them to avoid something which is a natural language practice in their community and can enhance their ability to learn.

It is widely accepted that language plays an important role in the thinking and learning of science. The language of instruction serves as an obstacle when learners attempt to discuss the science terminology. Therefore, the use of proper language, inter-personal relations, learners' prior everyday knowledge and/or practical work should be relevant for learners to express their ideas accurately (Shilamba, 2012).

Lemke (1989) explores how language is used in secondary schools to communicate and construct meanings in science. He highlights the fact that learning science, which includes Natural Science, involves learning how to talk science meaningfully. He suggests that to talk science means learning to use specialized conceptual language for reasoning and problem solving, which many teachers find challenging. In addition, he clarifies that learning science (Natural Science) also means developing the capacity to communicate in the language of science and act as member of the community of the people who do so. These issues, in the Namibian context, seem to be the learners' main challenges, but equally they are the teachers'

challenges. So much depends on teachers being experienced in handling these issues in order to mitigate the learners' difficulties.

2.6 TEACHING NATURAL SCIENCE TO LEARNERS IN A SECOND LANGUAGE

Kocakulah, Ustunluoglu and Kocakulah (2005) conducted a study in Turkey to investigate the effect of teaching science to students in a native and foreign language. They used a conceptual understanding test to test the two focus groups in order to determine the differences between students who took the science course in native (Turkish) and foreign language (English). Their results revealed that more students who were taught in their native language gave completely correct and partially correct responses than students who were taught in the foreign language. The second result showed that students who were taught concepts in a foreign language, namely, English, had more misconceptions than those who were taught the same concepts in their own mother tongue. Therefore, Kocakulah et al. (2005) claim that learning science in a foreign language which was English in the context of their study limits the learners' understanding of the scientific concepts for high school learners.

The way in which teachers communicate during science lessons can have an impact on how learners learn. Science is taught in English in most countries and yet in many of these countries, English is a second language. This may cause barriers for learners in understanding science when taught in a classroom because the terms used in science are unfamiliar to them (Ferreira, 2011, p. 105) which would make them passive learners in the classroom.

In the study conducted by Ferreira in South Africa (2011, p. 105-106), she submitted that, "code-switching is often used in English Second Learners (ESL) classroom situations and involves going from one language to another in mid-speech when both speakers know the same languages. Ferreira further argues that studies in second language acquisition have repeatedly shown that a second language is best learned through content when learners have a purpose for learning and when language use is authentic, rich and meaningful. Teaching and learning does not focus primarily on language learning but on using the second language to teach the subject content. I now discuss the theoretical frameworks underpinning my study.

2.7 THEORETICAL FRAMEWORKS

This study focused on understanding how the Grade 7 Natural Science teachers mediate learning about the digestive system through code-switching from English to Silozi. It was informed in both its design and analysis by the following perspectives, namely, mediation of learning and social constructivism as explained by Vygotsky (1978) as well as the theory of pedagogic content knowledge (PCK) by Schulman (1987). These theoretical frameworks allowed me to critically examine how Grade 7 Natural Science teachers mediate learning through code-switching. I now discuss each of these theories in detail below.

2.7.1 Mediation of learning

The notion of mediated learning was initiated by Vygotsky (1978) and developed further by Feuerstein (1991), as both of them were highly interested in the social activity of learners and how it influences their learning process (Presseisen & Kozulin, 1992). Although both Vygotsky and Feuerstein had a social approach towards mediation, Feuerstein elaborated on this with his theory on Mediated Learning Experience (MLE). This study, however, will focus on the Vygotskian approach to mediated learning and will be discussed in more detail in the following paragraphs.

Mediation of learning, according to Presseisen and Kozulin (1992, p. 1), is the "subtle interaction between teacher and learner in the enrichment of the student's learning experience" and an "important key to survival and success". Mediation refers to the fully understanding of knowledge in sharing experiences with each other as well as organizing of concepts in the minds of the learners (ibid.).

Vygotsky (1978) suggested three major classes of mediators; material tools, psychological tools, and other human psychological processes. So far, all these tools focus on the role of language. Vygotsky believed that when learners interact with one another socially, it will adjust the child's way of thinking and the mode of his/her behavior. Vygotsky also claims that language is the medium through which concepts are acquired into the human mind. The grasping of these theories is only possible when they are explained by using language in a suitable context.

SeokHoon (1997, p. 1) refers to the term *mediating learning* (ML) as the process by which a mediator organizes and interprets the world to a child. SeokHoon further argues that many problems in learning are the result of insufficient or inadequate mediated learning experience (MLE).

Although the Namibian Curriculum (2010, p. 12) states that, "language is the most important tool for thinking, the most important means of communication and one of the most important aspects of identity", it does not recognize the use of local language more especially from the upper primary grades (Grade 5-7) in the science classrooms which is my area of study. Vorster (2008) submitted that there must be some ways to support learners in the use of their main language in combination with English to enhance conceptualization in mathematics.

Therefore, there is an urgent need to find strategies to assist multilingual learners who are taught in English as the language of teaching and learning (LoLT) so that they can cope with subject matter, especially as learners show different levels of English proficiency. One important strategy is code-switching. The use of two or more languages, usually English and an indigenous language, has now become recognized feature in multilingual classes in South Africa (Vorster, 2008, p. 33).

McLeod (2013) summarizes Vygotsky's theory as flows:

- Vygotsky places more (and different) emphasis on the role of language in cognitive development;
- Vygotsky places considerably more emphasis on social factors contributing to cognitive development; and
- Vygotsky places more emphasis on culture affecting/shaping cognitive development-this contradicts Piaget's view of universal stages and content of development.

Drawing from Vygotsky's work, McLeod posits that language plays two critical roles in cognitive development:

- It is the main means by which adults transmit information to children; and
- Language itself becomes a very powerful tool of intellectual adaptation.

Vygotsky also sees 'private speech' as a means for children to plan activities and strategies and therefore aid their development. To him, language is therefore an accelerator to thinking and understanding. So, McLeod's suggestion is that, teachers and students should collaborate in learning and practice the four skills of summarizing, questioning, clarifying and predicting. Vygotsky further refers to tools of intellectual adaptation as these allow children to use the basic mental functions more effectively/adaptively, and these are culturally determined in memory mnemonics such as mind maps (McLeod, 2013).

2.7.2 The Zone of Proximal Development (ZPD)

Vygotsky (1978) describes the Zone of Proximal Development (ZPD) as the difference between the actual development level as determined by individual problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration with more knowledgeable peers.

The above definition implies that children who cannot carry out a task on their own, would be able to do so with the help from someone who has experience in that task. In other words, interaction with peers will help to assist a child to develop new skills. Hence, teachers should use a variety of methods such as co-operative learning so that less competent learners can mingle with more skillful peers to increase their ability to understand. Teachers should therefore determine the ZPD of individual learners in order to encourage them to achieve new levels with tasks beyond their actual level of development, and assist them in such a way that they will be able to reach that new level of development. It is in the ZPD that scaffolding, a term used by Brunner and Ross (1976) plays a crucial role. Through scaffolding, teachers assist learners to complete the tasks given. Similarly, when learners work in collaboration with each other they enter another level of development whereby through discussion about tasks could lead them to the solution of a problem and later on develop appropriate knowledge.

2.7.3 Constructivism

This study is anchored by the constructivist and socio-cultural theories. Constructivism is a perspective based on the understanding that learners are not "account deposits" (Freire, 1993,

p. 99). Instead, learners in science can effectively construct science concepts if the proper mechanism is put in place. In this study, I focused on social constructivism since the theory uses language to address teaching and learning as learning cannot take place without language.

2.7.4 Social constructivism

Social constructivism may be defined as a perspective which believes that a great deal of human life exists as it does due to social and interpersonal influences (Owen, 1995). Social constructivism is based on the idea that knowledge is constructed by the learner himself/herself socially. It also emphasizes that learners construct their own understanding by reflecting on their individual experiences and by relating the new knowledge with what they already know. The process requires the application of knowledge, skills and values (Moll, 2002, p. 9). Learners create meaning from different experiences as they interact socially. Social constructivism places the learner at the centre of learning. It also takes into account their everyday experiences. In this way social constructivism moves from memorization to understanding by relating content to learners' experiences (Moll, 2002).

McRobbie and Tobin (1997) view social constructivism as having the social and personal aspects of learning. According to them, the social plane has to do with meaning being constructed by individuals in a social space as new information interacts with their extant knowledge. Furthermore, that learning is personal and subjective and only exists in the minds of the knower. However, learners should be encouraged to test their understanding with peers and listen to and make sense of the ideas of other learners (McRobbie & Tobin, 1997).

According to Hodson and Hodson (1998), Vygotsky's work was rooted in his concern to understand the social context of cognitive development and in particular the role of language in the development of higher cognitive functions and that language is central to the mediation of learning. Therefore, the role of language in the classroom situation is very useful as the learners are socially interacting with one another. As a meditational tool, language creates the possibility of thought, organizes the thinking processes, reflects and shapes the human society in which it is used (Hodson & Hodson, 1998).

It is through using a language where a lot of mistakes are encountered in science lessons (Probyn, 2009). Intermixing of learners from different groups and their cultural backgrounds also affects the learners in achieving the required language (ibid). Language is not only crucial to learning but also the process of thinking because learners use language every day to communicate.

2.7.5 Socio-cultural perspective

In this study, the socio-cultural theory of learning was used to explain why and how teachers code-switch to the local language which is Silozi in their science classrooms in the context of this study. The social cultural perspectives in science are underpinned by the understanding that "human activities take place in cultural context and are mediated by language and other simple systems, and can be best understood when investigated in their historical development" (John-Steiner & Mahn, 1996, p. 2). For example, in a community, the members use certain cultural artifacts and these are designed in line with how they understand the environment around them. Take the case in which they use clay to mold earthen ware pots, after it has been moulded, they use fire to enhance its mechanical properties. The earthenware pot is used by community members to preserve seeds since when they close the opening no light comes in which will would make the seeds degenerate. This principle is also used in western science but an aluminum foil is put as a lining inside the packet where seeds are stored.

Since some of the terminology in their cultural practice is not available in English, teachers need to code-switch in order to explain the process. The classroom is the social unity where all learners learn how to speak English. Teachers should make sure the use of English in their science classroom is addressing these terms which are used by community members as they discuss science processes. If learners do not grasp English language correctly, it will result in them not constructing the concepts taught. The end result is poor performance in their examinations, because question papers are set in English.

The role of the teacher in a socio-cultural context 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 (Shimwafeni, 2012).

In addition, Hodson and Hodson (1998) submitted 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 and learning should be seen as guided and modeled participation.

2.7.6 Pedagogic Content Knowledge (PCK)

Shulman (1987, pp. 7-8) 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" (ibid).

Shulman (1987) points out that, in order to teach all students according to today's standards, teachers need to have a deep and flexible understanding of their subject matter so they can help students create useful cognitive maps, relate one idea to another, and address misconceptions. Teachers need to see how ideas connect across fields and to everyday life. This kind of understanding provides a foundation for pedagogical content knowledge that enables teachers to make ideas accessible to others. According to Schulman's theoretical framework, teachers need to master two types of knowledge's: (a) content, also known as "deep" knowledge of the subject itself, and (b) knowledge of the curricular development.
Shulman (1987) created a Model of Pedagogical Reasoning which comprises several concepts that a teacher should know in order to mediate learning. These are: comprehension, transformation, instruction, evaluation, reflection, and new comprehension.

Comprehension refers to the teachers and how they understand what they teach to the learners in order to achieve the educational purposes, for example, to help students to gain literacy and to enable students to use and enjoy their learning experiences.

Transformation distinguishes the knowledge base of teaching at the intersection of content and pedagogy in the teacher's capacity to transform content knowledge into forms that are pedagogically powerful and yet adaptive to a variety of abilities and backgrounds. Transformation requires that the teacher knows four procedures to follow before he/she starts teaching. These are preparation whereby the teacher should choose the right text for teaching. Presentation refers to how she/he presents the key ideas by using analogies, explanations and how she/he demonstrates the lesson to teach learners.

Instruction selection comprises of variety of teaching acts, this includes classroom management, group work, discipline, asking questions and discovery and inquiry instruction. **Adaptation** is the process of modifying student materials and activities to reflect the characteristics of student learning styles. Lastly, is **evaluation** where teachers need to think about testing and evaluation as an extension of instruction (Schulman, 1987).

In support of Shulman's ideas, Probyn (2004) submitted that teachers need to develop whole class questioning skills to promote higher order thinking, while providing linguistic and contextual support. She also suggested the use of the chalkboard to record the main points, new concepts and their meaning during the lesson which can serve as a reference point as well as to provide written language input and support that can be used interactively with the learners.

In addition, Probyn (2004) argues that all teachers need to understand the role of language in learning including the importance of learner talk (Lemke, 1990) in order for effective mediation to prevail. She also claims that teachers need to plan their lessons in order to meet their learners' needs for cognitive challenges and language support.

According to Solís (2009), Shulman defined pedagogical content knowledge as teachers' interpretations and transformations of subject-matter knowledge in the context of facilitating student learning. Solís (2009, p. 4) define pedagogical content knowledge as a "special combination of content and pedagogy that is uniquely constructed by teachers and thus is the "special" form of an educator's professional knowing and understanding".

He further states that pedagogical content knowledge is deeply rooted in a teacher's everyday work. Instead, it is not opposite to theoretical knowledge. It encompasses both theory learned during teacher preparation as well as experiences gained from ongoing schooling activities. Therefore, when teaching subject matter, teachers' actions will be determined to a large extent by the depth of their pedagogical content knowledge, making this an essential component of their ongoing learning.

Furthermore, Kind (2009) purports that within PCK mediating factors such as presentation of content, goals and students' contexts are taken into account. This knowledge is a combination of subject matter knowledge (SMK) and effective teaching skills. Kind (2009) continues to explain that PCK integrates numerous aspects such as, instructional approaches, subject specific learning, learners' difficulties, the nature of science, curriculum knowledge, SMK, context and socio cultural factors (ibid).

2.8 CONCLUDING REMARKS

In this chapter, I outlined the requirements for the language of instruction in the Namibian language policy. I explored various definitions of code-switching from different researchers in order to draw information together.

I have attempted to describe different sources that include the Namibian context and internationally to find out their view about code-switching in their context, whether it enables or constrains learning. Furthermore, I have also looked at what other studies say about the use of language in the classroom particularly on code-switching in the science classrooms. I now discuss the methodology used in this research study in the next chapter.

CHAPTER 3: METHODOLOGY

> *A case study provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by presenting them with abstract theories or principles. Indeed a case study can enable readers to understand how ideas and principles can fit together. Case studies can penetrate situations in ways that are not always susceptible to numerical analysis* (*Cohen, Manion & Morrison, 2011, p. 289).*

3.1 INTRODUCTION

The main goal of this study was to investigate how Grade 7 Natural Science teachers mediate learning of the digestive system through code-switching from English to Silozi. This topic was chosen in order for learners to understand the digestive system and get clarity on any misconception of the topic.

In this chapter, I discuss the methodology and describe the research paradigm that guided my research process in the study. The reasons that prompted me to select the interpretive paradigm and qualitative case study as approaches are debated as the research goal and research questions that guided the data gathering process. My research site and research participants are explored and the data gathering and analysis process explained. Issues such as validation, ethical consideration, and limitations of my study are highlighted. Some concluding remarks are provided.

3.2 RESEARCH DESIGN

This study was based on an interpretive paradigm, where the central endeavor in the context of the interpretive paradigm is to understand the subjective world of human experience. To retain the reliability of the phenomena being investigated, efforts are made to understand the person from within. Researchers begin with individuals and set out to understand their interpretations of the world around them. Researchers seek to understand how this glossing of

reality goes on at one time and in one place and compare it with what goes on in different time and places (Cohen, Manion & Morrison, 2011, p. 17-18).

Within the interpretive paradigm, a case study approach was employed and I now discuss this below.

3.3 CASE STUDY

According to Creswell (2012, p. 465), a case study is an in-depth exploration of a bounded system (e.g., activity, event, process, or individuals) based on extensive data collection. Case studies can establish cause and effect ('how and why'); and one of their strengths is that they observe effects in real contexts, recognizing that context is a powerful determinant of both causes and effects, and that in-depth understanding is required to do justice to the case (Cohen et al., 2011, p. 289).

According to Merriam (2002, p. 8), a case study is an intensive description and analysis of a phenomenon or social unit such as an individual, group, institution, or community.

I used a case study because it uses a range of methods for data gathering (e.g. document analysis, questionnaire, and classroom observation). Furthermore, it possesses the ability to collate and synthesize data from different sources, to make inferences and interpretations based on evidence, to know how to test inferences and conclusions (Cohen et al., 2011, p. 296). For this reason, I found that a case study is appropriate for my study in order to gain some insights into how teachers mediate learning through code-switching from English to Silozi particularly in the Zambezi region where I live and teach. My unit of analysis was therefore how Grade 7 Natural Science teachers mediate learning through the use of code-switching from English to Silozi.

3.4 RESEARCH GOAL AND RESEARCH QUESTIONS

The main goal of this study was to investigate how Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi.

To achieve this goal, the study was guided by the following questions:

Main question:

How do Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi?

Sub-questions:

1. What are Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi? (I used questionnaires and interviews to answer this question).
2. How do Grade 7 Natural Science teachers help learners make sense of concepts in science classes when code-switching from English to Silozi? (Observations and interviews were used to answer this question).
3. In what ways does code-switching from English to Silozi enable or constrain learning in Natural Science? (Observations and interviews were used to answer this question).

3.5 RESEARCH SITE AND PARTICIPANTS

This study was conducted in the Katima Mulilo town of Zambezi region at Zebra (pseudonym) Primary School, in the Northern Eastern part of Namibia. The school is not far from the school where I am currently teaching. I opted for this site because I live in Katima Mulilo. As a result, it was easy for me to reduce transport costs. Furthermore, the rapport I had established with the teachers at this school made things easy for me and they were willing to work with me.

Doing research at this school was not a matter of comparing the two teachers but to gain some understanding of how they mediate learning through code-switching from English to Silozi. The learners' first language at this school is Silozi and only a few speak different dialects. The main language used for teaching and learning is English. Though English

remains the medium of instruction for teaching and learning, teachers code-switch from English to Silozi most of the time during their Natural Science lessons.

Table 1: Teachers' Profiles

	Name	**Qualification**	**Experience**	**Subject teaching**
1	Mrs. Lattey	Basic Education Teachers' Diploma in Mathematics and Science. (BETD) and Higher Education Diploma in Science Education. (HED)	18 years	Mathematics and Natural Science and Health Education
2	Mr. Wormmy	Basic Education Teachers' Diploma in Mathematics and Science.	18 years	Mathematics and Natural Science and Health Education

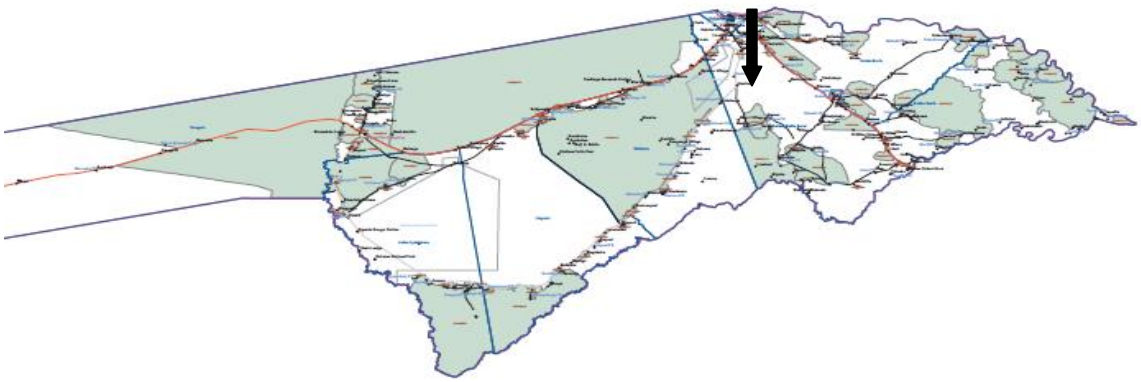


Figure 1: The map of the Zambezi region of Namibia's North Eastern areas

Above is the map of the Zambezi Region in Namibia, the arrow indicated above shows the two schools situated in the town of Katima Mulilo. The two schools are my school where I am currently teaching and the school where I did my research.

3.6 SAMPLING

The selection of participants in this study was purposeful sampling. According to Creswell (2012, p. 206), researchers internationally select individuals and sites to learn or understand the central phenomenon. To select a purposive sample, one must have a clear reason (ibid). I chose to use this sampling strategy because I wanted to gain some insights into the experiences of my research participants in my region.

3.7 RESEARCH PROCESS

This study was conducted in two phases. The first one was a pilot and the second one was the main study. I conducted a pilot study where I observed a teacher teaching a Life Science lesson; it was video recorded and later after the lesson, we watched the video together with the subject teacher. I tried to find out when the teacher code-switched and the experience of the teacher on code-switching. In the main study I observed two Grade 7 Natural Science participant teachers during teaching in the classroom. Both these teachers are experienced Natural Science teachers with their teaching experience ranging from 18 years and they have been producing good results at their schools. The results from the pilot observation and the main study observations have been analyzed.

3.8 DATA GATHERING TECHNIQUES

There are several types of data gathering instruments that are used more widely in qualitative research than others. The researcher can use field notes, participant observation, journal notes, interviews, diaries, life histories, artifacts, documents, video recordings, audio recordings and so forth (Cohen et al., 2011). Researchers need to vary the methods used to gather research data in order to see if they are corroborated across these variants (Kamati, 2011, p. 22). Therefore, in this study I used document analysis, interviews, observations and

questionnaires to answer my research questions. All the lessons observations were videotaped with the permission of the participants. I now discuss each of the data gathering techniques in detail.

3.8.1 Document Analysis

Documents once located and examined do not speak for themselves but require careful analysis and interpretation" (Cohen et al., 2011, p. 253). In this case, these authors propose that documents should be understood in relation to the "semiotics of text production, how meaning is made in text, how readers take meaning from text, the status of authorial intention versus the reader's interpretation, the role of the community of discourse in the reception of text" (ibid).

Maree (2012, p. 82) further states that "document as a data gathering technique focuses on all the types of written matter that may shed light on the phenomenon that you are investigating".

Therefore, the documents like, the syllabus, textbooks, teachers' lesson preparation and learners' workbooks were analyzed to find out whether they yielded similar results to my research questions, and whether teachers included code-switching in their lesson preparations and whether learners understood certain concepts when code-switching from English to Silozi is used.

In analyzing the following documents, I therefore, came up with the following findings bellow:

- The Natural Science and Health syllabus Grade 5-7 (2010);
- The two Natural Science and Health Education textbooks (Grade 7);
- The teachers' lesson preparations; and
- The learner's work books and summary books.

From the analyzed documents, I found that they are written in English, and there is no provision for code-switching incorporated in them. However, the syllabus gave me some clarity on the content to be taught on the topic of the digestive system. The teachers' lesson

preparations helped me to find out how teachers prepare their lessons. In fact, I realized that they do not include code-switching, instead code-switching comes automatically as they are teaching to help learners understand the subject content.

With the documents analyzed, it was easy for me to gain insight into how the Grade 7 Natural Science teachers mediate learning through the use of code-switching by explaining difficult concepts, increasing participation, emphasizing points as well as self-expression in the language learners understand well. So, the documents which I analyzed helped me to answer my research question 2; How do Grade 7 Natural Science teachers help learners make sense of concepts in science classes when code-switching from English to Silozi? I now discuss each document individually as follows.

3.8.2 The Natural Science and Health Education Syllabus Grade 5-7

This syllabus is divided into three columns, representing the theme/topic, learning objectives and basic competencies. Topic 8: **The human body** is subdivided into 8.1, the different system of the human body, 8.2 the digestion, 8.3 the excretion and 8.4 the nervous systems and the drugs. For the purposes of this study, I will only concentrate on 8.2 as this was the subtopic I observed teachers teaching for my study.

According to my analysis of the syllabus, the basic competencies might be confusing as there is no mention of every day prior knowledge, yet it is stated in the Natural Science and Health Education Syllabus Grade 5-7 (2010, p. 3) document that "learning at school must involve, build on, extend and challenge the learners' prior knowledge and experiences". The basic competencies do not require the drawing of the digestive system which may cause confusion especially for the novice teacher. The Natural Science and Health textbook includes a drawing but the teacher may be confused about how much prior knowledge to draw on as it is stated in the syllabus that: "Learners learn the best when they are actively involved in the learning process through a high degree of participation, contribution and production" (ibid). The outline below provides a summary of the basic competencies on the topic of digestion in the syllabus:

Table 2: Basic competencies for the topic digestion set out in the Natural Science and Health syllabus for Grade 5-7

THEMES AND TOPICS	LEARNING OBJECTVES: Learners will:	BASIC COMPETENCIES: Learners should be able to:
8.2 Digestion	▪ Understand how food nutrients are made available to the body. ▪ Know different forms of digestions. ▪ Realize the importance of chewing food. ▪ Know the importance of enzymes in the digestion of food.	▪ Define digestion as the breakdown of food substances. ▪ Describe the different forms of digestion. ▪ Discuss the importance of chewing food. ▪ Define enzymes as biological catalysts (protein) which speed up or slow down a reaction but do not get used up during the reaction. ▪ State the end products of starch, fat and protein digestion.

3.8.3 Textbooks

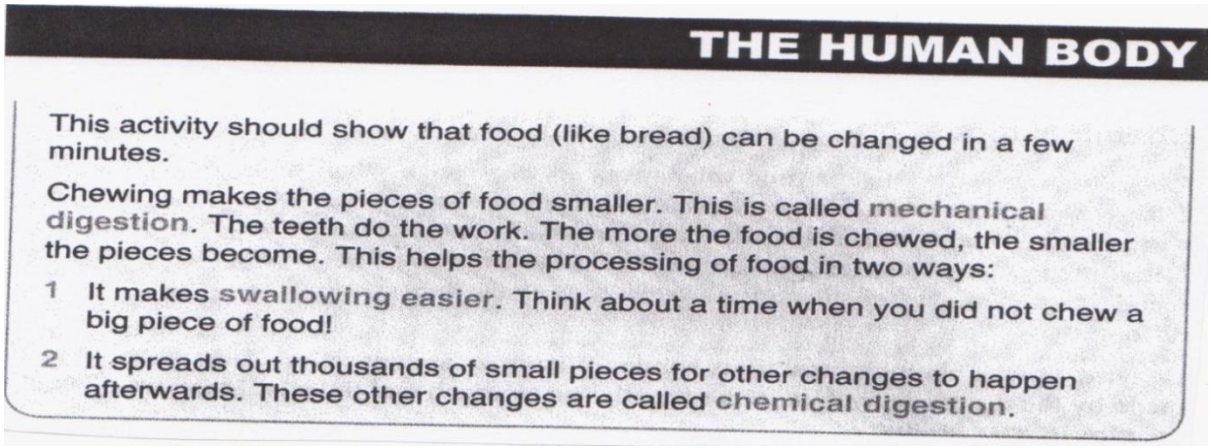
I analyzed the two textbooks which I was told by the participant teachers were the textbooks they were using to teach Natural Science in the classroom in order to mediate learning. These are:

- Natural Science and Health in context Grade 7 by Elphick, Olivier, Tyson and Beljon (2005); and
- Go for Natural Science and Health Education Learner's Book Grade 7 by Alan Darwin (2008).

3.8.4 Natural Science and Health in Context Grade 7 (2005): Textbook 1

The two teachers teaching Natural Science and Health Grade 7 use the above mentioned textbook. The textbook covers a lot of topics but I will concentrate on the topic of the human body, particularly the digestive system which I observed. The main reason for observing this topic was to find out how Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi which is my main research question. The textbook is well aligned to the new syllabus which was introduced in 2010. I found that this textbook was user-friendly for both teachers and learners. Furthermore, activities are given to learners in

order to motivate their interest in the topic as they discuss them. Despite the activities done by learners, the textbook does not have a provision for code-switching, only teachers do.



THE HUMAN BODY

This activity should show that food (like bread) can be changed in a few minutes.

Chewing makes the pieces of food smaller. This is called mechanical digestion. The teeth do the work. The more the food is chewed, the smaller the pieces become. This helps the processing of food in two ways:

1 It makes swallowing easier. Think about a time when you did not chew a big piece of food!

2 It spreads out thousands of small pieces for other changes to happen afterwards. These other changes are called chemical digestion.

Figure 2: Shows an example of an activity done by learners

3.8.5 Go for Natural Science and Health Education Grade 7 (2008): Textbook 2

Both teachers indicated that they use the above mentioned textbook. The text bookhas a lot of activities which learners can engage with when they are given clear instructions by the teacher. Even though the textbook has a lot of practical activities to do, it is not aligned to the new syllabus and does not encourage use of code-switching. The summary that appears in the textbook is not as detailed as the first one analysed above.

3.8.6 The teachers' lesson preparations

In Namibia lesson preparation is compulsory for all teachers and teachers are thus required to write plans for their lessons in advance every day before the lesson commences. The lesson preparation serves as a guide for teachers in order to ensure that they adhere to what they should deliver in the classroom. Even though the teachers usually prepare their lessons very well every day, their preparations do not indicate the use of code-switching from English to Silozi. One of my participant teachers indicated that when he prepares his lesson plan, he makes sure it should include code-switching from English to Silozi. However, during my observations I observed that code-switching was used only when the teacher realized that

learners did not understand certain concepts or when they wanted to emphasize some points during the lesson.

3.8.7 Teacher 1 and 2 (T1& T2)

The lesson plans for teacher 1 and 2 were well written according to the requirements of the preparation forms provided by the Ministry of Education. Similarly, the objectives were well articulated according to the basic competencies in the syllabus. Nonetheless, I found that the advisory teachers (AT) who designed have not designed them in detailed fashion. For instance, there is insufficient space for them to write detailed preparations.

At Zebra Primary school, each learner has his/her own summary and activity workbook given by the teacher. This includes the Natural Science textbook in context. The only textbook which they do not have is Natural Science and Health (2008). This textbook is only used by the teacher. The workbook is used to complete activities given by the teachers. By the time I observed the lessons, I managed to check the activities they were doing, especially on the topic of the digestive system I was observing. I observed that the activities were very good and did not only test knowledge with understanding but a variety of questions were given and it was often expected from learners to apply their new knowledge to everyday experiences. I also tried to find out whether learners code-switch from English to Silozi as they were writing. According to some teachers, learners answered questions in Silozi when the teacher had code-switched to Silozi his or her lessons.

The questionnaire is a widely used and useful instrument for collecting survey information, providing structure, often numerical data, able to be administered without the presence of the researcher, and often being comparatively straightforward to analyse (Cohen et al, 2011, p. 3). I now explain the findings gathered from the questionnaires below.

3.9 QUESTIONNAIRES

According to Cohen et al. (2011), a questionnaire is a widely used and useful instrument for collecting survey information, providing structured, often numerical data, being able to

administer without the presence of the researcher. Furthermore, "paper-and-pencil questionnaires can be sent to a large number of people, including those who live thousands of miles away" (Leedy & Ormrod, 2010).

In my study I used questionnaires consisting of closed and open-ended questions in order to find out some baseline data on the teachers' perceptions and experience of code-switching from English to Silozi. Closed questions are quick to complete and straightforward to code, while open-ended questions enable participants to write a free account in their own terms, to explain and qualify their responses and avoid the limitations of pre-set categories of response (Cohen et al., 2011).

In the questionnaires that I used, teachers indicated their answers by ticking the correct boxes when answering closed questions, while they wrote in detail when answering open-ended questions. I handed out 70 questionnaires to 30 primary schools in Katima, Sibbinda and Kongola circuits (see Appendices 21-23 for questionnaire). From those 70 questionnaires only 47 questionnaires were returned (67%).

3.10 OBSERVATIONS

I used observations as my main data gathering technique in this study. The purpose of observing the two Grade 7 Natural Science teachers was aimed at answering my second research question which is: How do Grade 7 Natural Science teachers help learners to make sense of concepts in science classes when code-switching from English to Silozi? According to Creswell (2012, p. 213), observation is the process of gathering open-ended, firsthand information by observing people at a research site. On the other hand, observation is regarded as an essential data gathering technique by many scholars as it holds the possibility of providing us with an insider perspective of the group dynamics and behaviors in different settings (Maree, 2012, p .84).

In this study, I observed at least three Natural Science lessons per teacher. This helped me as a researcher to see the extent to which these teachers used code-switching during the delivery of their lessons. Thus, these three lessons helped me to gather the information I needed for

my research and the video recording was done by a colleague so that I could observe and take some notes while the teachers were teaching. Thereafter, we reviewed and watched the video recorded lessons with one of the teachers for me to carry out a stimulated recall interview as proposed by Lyle (2003).

Table 3: Shows the observation schedule i used to record the occurrence of code-switching as teachers were teaching

Purpose for code-switching	**Frequency**	**Frequency total**
(a) To explain the concepts	16	16
(b) To emphasize points	4	4
(c) To capture learners' attention	2	2
(d) To clarify statement or questions	4	4
(e) For classroom management and discipline.	2	2
(f) Make connections with learners' own context	1	1

3.11 INTERVIEWS

Leedy and Ormrod (2010, p. 188) argue that "face-to-face interviews has an advantage of enabling the researcher to establish rapport with potential participants and therefore gain their cooperation". The interview is a flexible tool for data gathering and it enables verbal, non-verbal, spoken and heard. "It is not an ordinary everyday conversation but it is often question-based, with the questions being asked by the interviewer. It is a constructed and usually a specifically planned event rather than naturally occurring situation, and this renders it different from an everyday conversation. Therefore, the researcher has an obligation to set up and abide by, the different rules of the game in an interview" (Cohen, et al., 2011, p. 409). In this study I conducted both semi-structured and stimulated recall interviews which I discuss below.

3.11.1 Semi-structured interviews

A semi-structured interview is a data gathering technique in which "the researcher asks questions to the interview and records answers from only one participant in the study at a time but allows open ended discussion" (Creswell, 2012, p. 218). According to Maree (2012, p. 87), a "semi-structured interview is used in research to corroborate data emerging from other data sources". It does allow for probing and clarification of answers.

I conducted individual interviews with the two Natural Science teachers I selected at the school to find out whether code-switching enables or constrains learning, how they help learners make sense of concepts when code-switching from English to Silozi is used, and to find out whether teachers are facing language challenges when explaining certain science concepts or not. To get insights on teachers' beliefs and feelings about code-switching practices of the lesson observed, I used an interview schedule adapted from Shilamba (2012).

3.11.2 Stimulated recall interviews

Lyle (2003, p. 861) states that, "stimulated recall interview is an introspection procedure in which (normally) videotaped passages of behavior are replayed to individuals to stimulate recall of their concurrent cognitive activity". I did the stimulated recall interviews while watching the videos together with one of the teachers.

After the lesson observations, it took time to get hold of my two research participant teachers to watch the video as I did the transcription of the lessons with the research participants. Mainly, the teachers postponed the dates to come together for video transcribing and for stimulated recall interviews.

During the interview, I managed to get hold of one teacher whom I interviewed after watching the video together. The other teacher was always too busy and so I could not find time to watch the video together with him.

Table 4: Showing the tools, methods and purpose for data gathered

Stage	Method used to gather data	Data to be gathered	Purpose of gathering the data
1	Document analysis e.g. language policy, syllabus, lesson plan, textbook and workbooks.	Checking useful information about code-switching. Checking what the syllabi say about code-switching. Checking how the teacher plans his/her lesson whether there is a provision for code-switching. To get relevant information about code-switching in the textbook. In workbooks, I will find out whether learners do write some science words in Silozi.	Find out what they say about the use of English and mother tongue in natural science. Checking how the teacher plans his/her lesson whether there is a provision for code-switching. To get relevant information about code-switching in the textbook. In workbooks, I will find out whether learners do write some science words in Silozi in the science classrooms.
2	Questionnaires	Information about mediation of code-switching when teaching natural science through English/Silozi.	To find out their perceptions and experiences about code-switching from English to Silozi.
3	Interviews: Semi-structured	To find out what teachers already know about code-switching.	To get more information of when and how teachers code-switch to Silozi in their lessons.
4	Observations: Observe Natural Science at least four lessons	Live data that will emerge during the lessons. Look at the process of code-switching. When does the teacher code-switch.	To find out and get a clear picture on code-switching through English/Silozi in the natural science class.
5	Interview: Stimulated Recall	Teachers mediating learning through code-switching.	To see the ways the two teachers mediate learning through code-switching when teaching N/S.

3.12 PILOTING

Piloting is also important in research to find out whether the instruments to be used are working well before they are used, and to eliminate ambiguities or difficulties in wording

(Cohen et al., 2011). I did a pilot at my school, where I observed a colleague teaching a Life Science topic. This was done during the course of the first term. I also asked another colleague to videotape the lesson. As he was videotaping the lesson, I took some field notes. I also asked a friend, who is an expert to check my questionnaire so that I could make some amendments where possible before I piloted it to some teachers. After piloting it to some teachers, they developed an interest in the questionnaire to the point where teachers who are talking in their local languages in the staffroom, when they mix words with English another one will shout and say; " *You are now code-switching*" and teachers start laughing.

3.13 DATA ANALYSIS

Cohen et al. (2011) argue that transcription is a crucial step in interviewing, for there is potential for massive data loss, distortion and the reduction of complexity. Creswell (2012) views transcription as the process of converting audiotape or field notes into text data. In this study, data were gathered by transcribing audio taped video and tape recorders so that I did not lose information in the process of recording. During the data analysis process, data were colour-coded and categorized into themes and sub-themes and this was done in relation to my research questions.

According to Kamati (2011, p. 27), qualitative data was analyzed by means of content analysis. Content analysis is a method that involves comparing, contrasting and categorizing data in order to draw meanings from the data. Therefore, I grouped the teachers' views and their experiences on the use of code-switching from English to Silozi in Natural Science lessons, the challenges teachers faced when code-switching from English to Silozi to mediate learning, and how teachers dealt with those challenges were all compared, contrasting and categorized according to my research questions namely: Teachers' perceptions and experience about code-switching from English to Silozi; How Grade 7 Natural Science teachers help learners make sense of concepts in science classes when code-switching from English to Silozi; Ways in which code-switching from English to Silozi enable or constrain learning in Natural Science.

The theoretical framework underpinned this study are the mediation of learning, social constructivism and the socio-cultural perspective or theory of Vygotsky (1978) in combination with Pedagogical Content Knowledge (PCK) (Schulman, 1987). The constructivism theory states that learners construct their own knowledge when they are provided with opportunities to discuss with others in the social setup and in a language they understand better. The theories therefore, helped me to understand how scaffolding takes place in the science classrooms when teachers mediate learning through code-switching from English to Silozi.

3.14 VALIDITY

According to Cohen et al. (2011), "Validity is an important key to effective research. If a piece of research is invalid then it is worthless. Validity is thus for both qualitative and quantitative/naturalistic research". Moreover, validity of a measuring instrument is the extent to which the instrument measures what it is intended to measure (Leedy & Ormrod, 2010, p. 28).

In this study, I used triangulation to validate my data. Triangulation can be defined as the "use of two or more methods of data collection in the study of some aspect of human behavior" (Cohen et al., 2011, p. 195). Different methods for gathering data were also used to explain and interpret data, namely, document analysis, questionnaires, classroom observations, interviews (*semi structured* and *stimulated recall interviews*). After transcribing, I gave the transcripts to the two teachers for member checking. Likewise, the stimulated recall interviews helped with the validation of data.

3.15 ETHICAL CONSIDERATIONS

Whereas there are many ethical issues that qualitative researchers should adhere to when conducting research, respect for audiences and the use of non-discriminatory language issues should be taken into consideration when conducting a research study (Creswell, 2012). Before conducting this study, I asked permission in writing to carry out my research on the site I had chosen. I therefore wrote a letter to the Director in the Ministry of Education (see

Appendix1) in my region (Zambezi) that outlined the purpose of my research at the chosen school.

I also asked permission from the school principal where I conducted my research study (see Appendix 3). I negotiated and asked for permission from the two Grade 7 Natural Science teachers (see Appendices 5 and 6) because the focus of my study was on teachers with the view to find out how they mediate learning through the use of code-switching from English to Silozi. I explained the purpose of the study to all participants. All participants in this research study were treated with respect and dignity. Confidentiality and anonymity were upheld throughout this study. Where a participant wanted to withdraw from participating, he/she was free to do so but none withdrew. Voice-videotape was used with the agreement of the participants.

During the time I approached my participant teachers to give them their agreement letters regarding observing them, one of the participant seemed to be uncomfortable with the videotaping, thinking that I might show it to other people and that she might be judged as a bad teacher. But later I explained to her that the main purpose of videotaping was for me as a researcher not to lose information, because by listening only to the teacher and taking notes, I was going to lose more information since the teacher might talk faster than I could do the writing. Later on she understood and agreed to be videotaped.

3.16 LIMITATION OF THE STUDY

One possible limitation was that the teachers reduced the amount of code-switching from English to Silozi from the way they normally use it when I was observing their lessons, more especially for Teacher 1 who did not code-switch at all in her first lesson. To counteract this, teachers were encouraged to teach the way they normally do.

3.17 CONCLUDING REMARKS

In this chapter, I described the research paradigm underpinning my study. The reasons that prompted me to select the interpretive paradigm and qualitative case study as approaches are

also discussed. The research goal and research questions that guided my data gathering process were emphasized. My research site and research participants were discussed as well as my data gathering and analysis procedures. Validation, ethical considerations and limitations of my study are explained. Lastly, some concluding remarks have been provided. In the next chapter I discuss the data presentation and the analysis of my study.

CHAPTER 4: DATA PRESENTATION AND ANALYSIS

Qualitative data analysis involves organizing, accounting for and explaining the data. There is no single or correct way to analyse and present qualitative data; how one does it should abide by the issue of fitness for purpose (Cohen et al., 2011, p. 537).

4.1 INTRODUCTION

The main aim of my study was to understand how Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi. In this chapter, I present the data that emerged from my data gathering techniques, namely, document analysis, questionnaires, lesson observations, pre-interviews and stimulated recall interviews. These data sets were supported through the viewing of recorded videos and photographs. As indicated in the epigraph above, I present my data in themes that emerged from the data gathering process which were influenced by my research questions. The data aimed at answering the following research questions:

Main question:
How do Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi?

Sub-questions:

- What are Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi?
- How do Grade 7 Natural Science teachers help learners make sense of concepts in science classes when code-switching from English to Silozi?
- In what ways does code-switching from English to Silozi enable or constrain learning in Natural Science?

4.2 QUESTIONNAIRES

The questionnaire is a widely used and useful instrument for collecting survey information, providing structure, often numerical data, being able to be administered without the presence of the researcher, and often being comparatively straightforward to analyse (Cohen et al., 2011, p. 377) (see Appendices 21-23 for the questionnaire). I now explain the findings gathered from the questionnaires below.

4.2.1 Teachers' home language

Out of 47 teachers who participated in my survey, 98% of them indicated that they speak **Silozi as their home language, and they thus speak the same language as their learners.** Among the teachers who speak Silozi as their home language, 2% of the teachers indicated they speak a different language from another region which is Rukwangali from Kavango. Below is a graph showing the number of teachers and their home language.

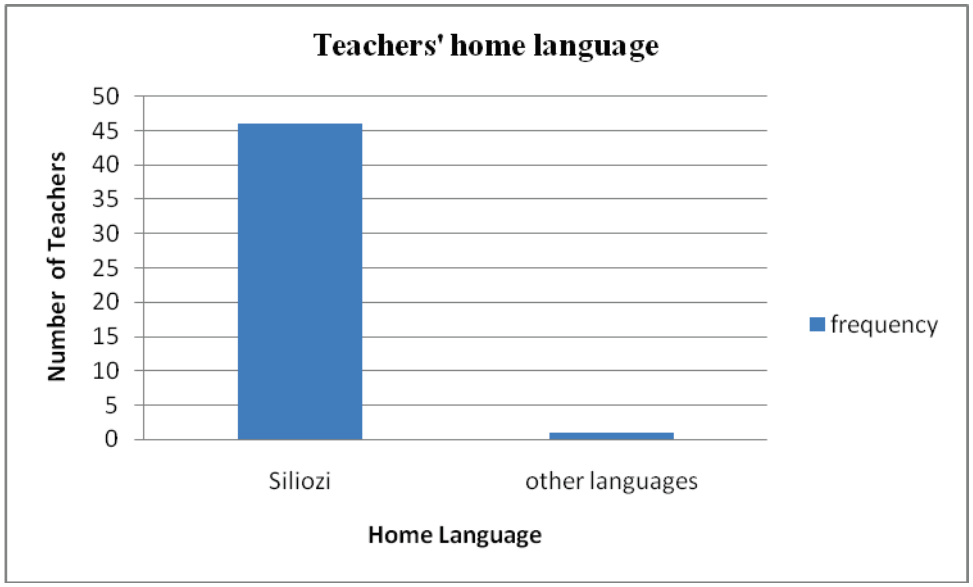


Figure 3: Learners' home language

I decided to ask the question about learners' home language even though my focus was on teachers precisely because I wanted to find out whether teachers speak the same language as the majority of learners and whether code-switching was necessary if most learners speak

Silozi. The question which was asked about the learners' home language indicated that all learners in the three circuits where the survey was carried out speak different vernaculars. Some learners speak Silozi, Subiya, Sifwe, Totela, Mbalangwe, Mbukushu, and Siyeyi but are all taught in Silozi as their first language. Silozi is used mostly in the classroom when they interact with the teachers, and when working on the activities in groups. In contrast, they use Silozi and their vernaculars while outside the classroom as well as when they are playing and communicating.

Even though learners differ in their vernaculars, the good thing is that they understand each other in most languages except in Siyeyi and Mbukushu. In these two mother tongues some of the learners do not understand the language; therefore, those learners using these mother tongues have to switch to Silozi in order for their friends to understand them. These two vernaculars (Siyeyi and Mbukushu) have clicks in them which make them difficult to understand. What I observed is that most of the primary schools in different regions do not speak a range of languages. This is common to the secondary school learners. In the Zambezi Region there are only two private schools and English is compulsory according to their language policy.

4.2.2 Teachers' perceptions and experiences about code-switching

In order for me to get a clearer picture of Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi, I decided to get the number of the teachers who code-switch and those who do not. Later on, I probed the views of teachers who code-switch and those who do not as shown in the following subsections.

4.2.3 Proportion of sample that code-switch

As indicated earlier, of the 47 who completed the questionnaire some 36 (77%) said they code-switch and 11 (23%) do not. Below is the graph showing the percentage of teachers who code-switch and those who do not and the sample of reasons they provided for code-switching including samples of reasons for not code-switching.

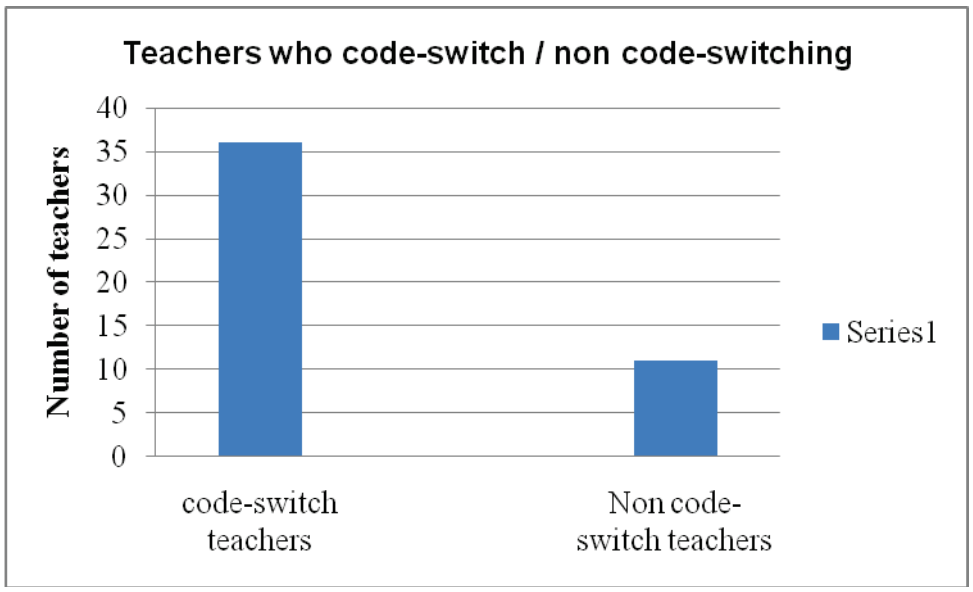


Figure 4: Teachers who code-switch and those who do not code-switch

Views of teachers who code-switch from English to Silozi

- In case I realize that my learners do not understand especially during compensatory lessons;
- For learners to understand the learning content better and also to arouse learners' interest during teaching and learning situation;
- It helps me understand this makes it easier to explain too. I use it because I have realized that it works and have improved the participation rate of my learners;
- Due to learners' poor background in English, it is hard for them to understand most English words, it is necessary to explain particularly in vernacular before switching to English;
- I switch because when I used to explain in English learners seems not to understand when I switch to a local language you will see that learners seems to be understanding and get interested as you are explaining;
- When learners are involved in activities which require co-operation and discussions with their peers in order to give clarity to concepts;
- When I realize that my learners are not perceiving what is expected of them and English also is not our mother tongue even though it is the official language; and
- To give local explanations and practical examples that meets the learning environment.

Views of teachers who do not code-switch from English to Silozi

- Learners are supposed to get used to the language of science as this might also help in the examination when there is no teacher to explain the terminologies used;
- During examination, it will be difficult for learners to write answer in English if they will be used to a local language during lessons;
- Very difficult to find the proper terms for science in Silozi, e.g. transpiration, xylem vessels, phloem vessels, translocation, etc.;
- There are no tests in the local language; moreover the vocabulary of the concepts in my language is limited; and
- Normally communicating with them through questioning, instruction explaining and giving feedback after that are given individual task or group task activities can make them understand.

4.2.4 Teachers' general views on code-switching

There was need for me to interrogate more to adequately respond to the question: *What are Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi?* The **respondents** were asked to give their general views on code-switching. Inferences on teachers' responses also gave me the necessary information for the research question: *In what ways does code-switching from English to Silozi enable or constrain learning in Natural Science?* Here are some of their responses:

Teachers' general views on code-switching

- Positives – About code-switching
    - It is good because learners understanding can be broadened in science. Code-mixing should be reviewed in a positive light;
    - It works because some learner who do not understand proper English benefit from this code-switching;
    - It is good because even those learners who are unable to comprehend in English will also benefit when code-switching is used;

- Different concepts need to be interpreted in the language for learners to know and understand what is being taught;
- It helps the teacher and learners achieve the basic competencies;
- Because it can help learners to express themselves in English very well when concepts are explained and understood in local language. This can help learners to use English even around the school premises;
- For rural areas where learners do not have access to laboratories, television, newspapers and magazines, I would prefer code-switching in my lessons for understanding;
- It has its ups and downs. It helps learners if they did not understand clearly. But again learners will get used to be taught in both English and Silozi while it's just supposed to be in English;
- It is good and applied in short seconds or minutes for understanding of learners;
- It is a good idea as it involves all learners and gives clear picture to the teacher whether the basic competencies was achieved or not, to deal with remedial teaching; and
- It must be used to the minimum level because if used to the maximum level, learners might write the concepts in their local language which becomes a problem during examination.

Downside of code-switching

- It promote failure rate, learners cannot express their views in English;
- Because they can do the same when writing the examination;
- There will be some mistakes in explaining basic competencies because people who drafted syllabi contacted more resources on different topics;
- Communication will be a problem because we have lots of indigenous languages;
- It adds to the confusion of the learner when the teacher brings the concept it rejects real learning in Natural science;
- I think all teachers should use English in the lesson all the times because it can help learners to express themselves in English very well. This can help learners to use English even around the school premises;

- Not a good thing because learners won't master well the language of science and even terminologies;
- It must not be implemented in Namibia since communication will be a problem because we have lots of indigenous language;
- Learners should be taught in English from Grade 1-7, all Natural Science lessons should be in English to avoid poor understanding of English during lessons; and
- It is not good because learners do not benefit more by not getting the proper explanations of the basic competencies. There will be some mistakes in explaining basic competencies because people who drafted syllabi use more resources on different topics.

4.2.5 Teachers' perceptions on code-switching: Does it enable or constrain learning?

Respondents were asked a direct question: In what ways does code-switching from English to Silozi help or not help learning? The idea was to dig deeper in order for me to get information for the last two research question (see Section 4.1).
Some of the points raised by teachers are as follows:

Positive responses-enable learning

- It helps the learners to get the meaning of different concepts, they don't forget;
- It helps learning by translating questions or concepts to a local language in order to understand and interpret concepts and questions well;
- It's good because learners will improve in the language because I experience that some learners fail Natural Science for various reasons, e.g. they cannot read and write English well; and
- Code-switching helps learners to understand difficult words that are in English, when those words are translated, they will find it easy to understand what they have been taught.

Below I presented a graph of teachers who prefer Natural Science to be taught in English or in both English/Silozi. 72, 3% of teachers prefer Natural Science to be taught in English only.

Teachers prefer Natural Science to be taught in English only.

- It is the medium of instruction so Natural Science should be taught in English;
- It is a curriculum requirement;
- It improve learners to master content easily;
- Examinations are set in English; it will be easy to answer questions in examinations;
- Learners will improve in the language because they fail Natural Science in the examination because they cannot read and write in English;
- To improve not only science knowledge but spoken language; and
- Scientific words are difficult to be translated to Silozi.

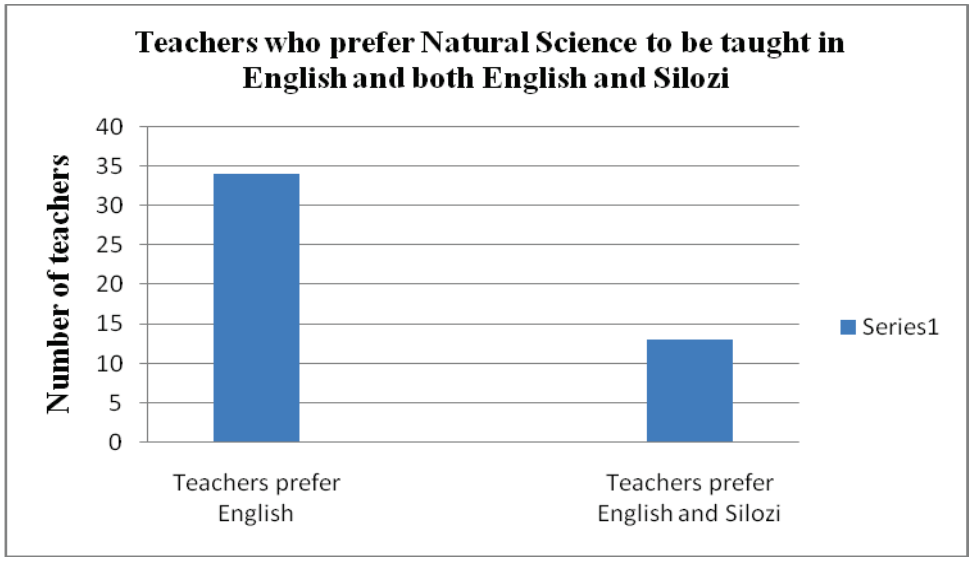


Figure 5: Preferred language to teach Natural Science

Among all the teachers who responded that Natural Science should be taught in both English and Silozi based their responses on learners' understanding of concepts. This answers my second research question: "How do Grade 7 Natural Science teachers help learners make sense of concepts in science classes when code-switching from English to Silozi"?

Of the 28% of teachers who prefer Natural Science to be taught in both English and Silozi their views reflect.

Teachers prefer Natural Science to be taught in both English and Silozi.

- It gives more opportunity to the learners to participate in the classroom;
- Learners will understand the subject better since English is a second language;
- Local language forms the foundation for acquiring the additional information or clarity;
- To help individual learner to understand in their preferred language;
- To make clear explanations of concepts; and
- Learners will understand and achieve the basic competencies.

4.2.6 Negatives – constrains learning

Some teachers insist that code-switching should not be applied in the teaching and learning process hence it constrains learning. Below are their views in this regard.

Negatives of teachers on code-switching

- Does not help, some scientific words are very difficult to be translated to Silozi, e.g. hydrochloric acid, enzymes, proteins *etcetera*;
- It does not help because there are no biological concepts in our local languages; the concepts are hard to understand;
- Code-switching from English to a local language does not help learners because they will not know or understand the concept or terminologies of the subject, they write in English during examinations so they need to understand every explanation you do in English; and
- Code-switching cannot be dependent or make it as a habitual methodology to tackle Natural Science; however, those who regard as useful may be they find it to be useful.

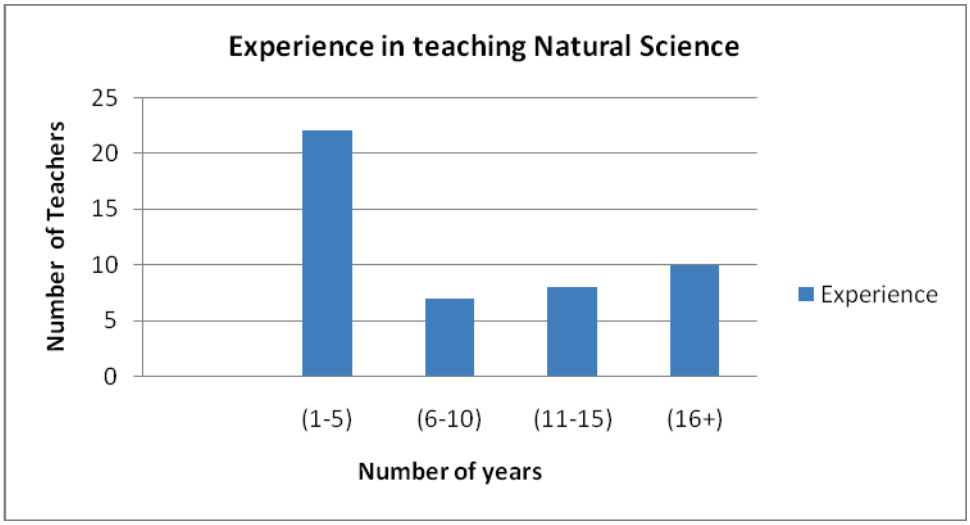


Figure 6: Teacher's experiences in teaching Natural Science

The graph above shows the teachers' experiences in teaching Natural Science subjects in their various schools. Most teachers 47% of them indicated that they have 1-5 years' experience as teachers, 15% teachers said they have taught for 6-10 years. 17% indicated to have been teaching for 11-15 years while 21% of the teachers indicated to haven taught Natural Science for more than 16 years. From this graph, I found that the most teachers who are teaching Natural Science are inexperienced teachers, though the majority of teachers did Natural Sciences subject as their major courses when they were doing their Basic Education Teachers' Diploma (BETD). I am still not convinced that they know the subject well because they are still novice teachers who need more workshops and supervision in the subject.

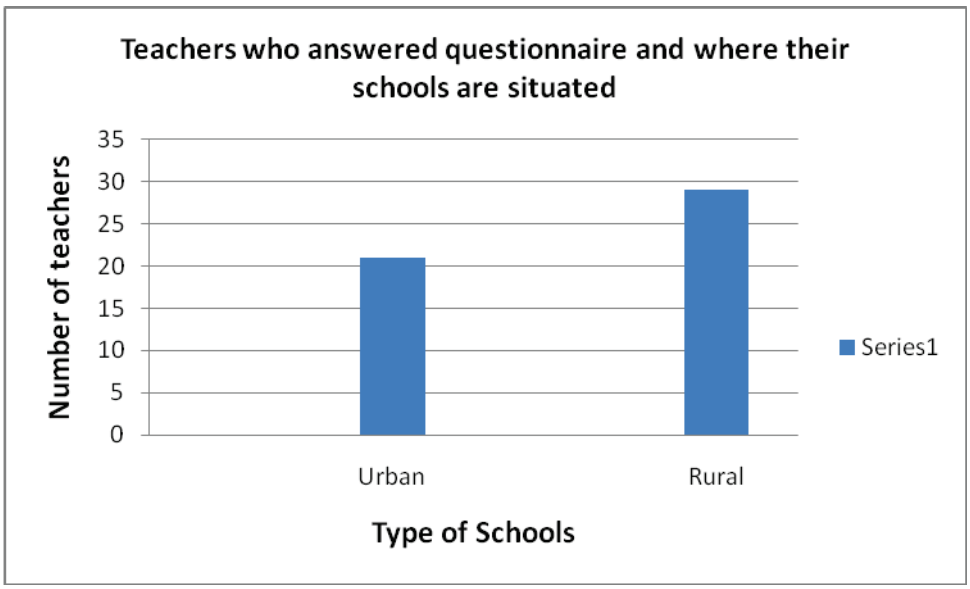


Figure 7: Teachers who answered questionnaire and where their schools are situated

The above graph shows the number of teachers who participated in my study and where their work places are situated. 62% of teachers who participated are teachers from rural schools. Most teachers in rural schools depend on code-switching in their science classroom lessons to mediate learning. They indicated that they code-switch because their learners' English proficiency is low. In urban schools 38% of teachers responded to my questionnaires. They also indicated that they code-switch in their science classrooms to help learners understand the content of the subject.

4.2.7 Time spent on code-switching in 35 minutes

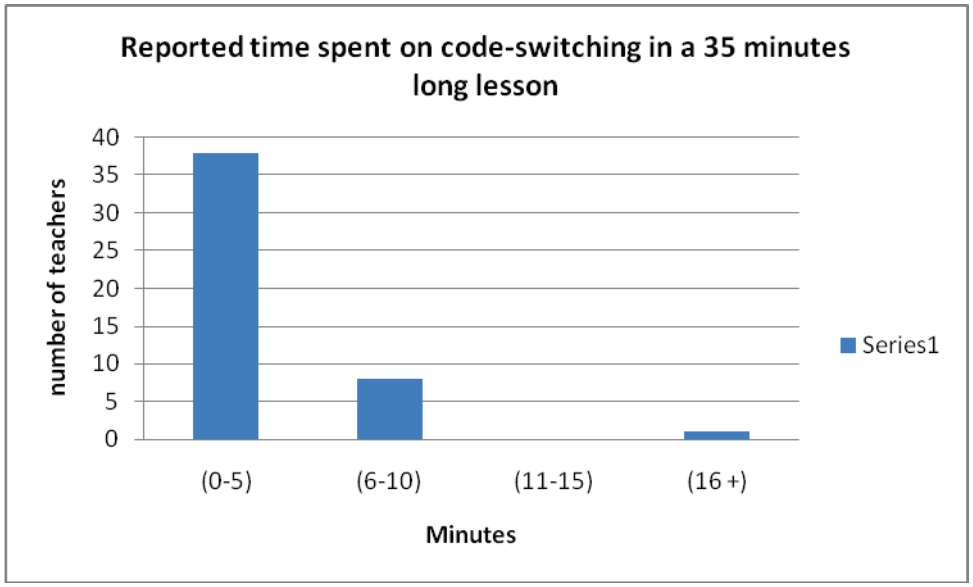


Figure 8: Shows time spent on code-switching

Figure 8: above shows that 81% of teachers indicated that they do code-switch from 0-5 minutes, 17% spend 6-10 minutes code-switching, none of the teachers indicated that they code-switched for 11-15 minutes and only 2% indicated that they code-switch from 16 minutes onward. Meanwhile, when looking at Section 4.4.7 above it shows that most of the teachers are inexperienced teachers in teaching Natural Science and yet they are the ones who code-switch for only five minutes.

In my opinion, I find that these teachers might be afraid of being caught red-handed while code-switching to the local language when they know that code-switching is unauthorized. For those who code-switched more often it depended on the topic they were teaching and whether it needed more time to code-switch or not.

4.2.8 Challenges experienced by the teachers in the classroom when code-switching from English to Silozi

In a bid to strengthen my knowledge on teachers' experiences on code-switching, I thought it worthwhile looking into the challenges that they face in the process. Teachers expressed the following in this regard**:**

Shows responses on challenges faced by teachers when code-switching in the classrooms.

- It is time consuming, we always waste time explaining twice and that makes us teach less topics;
- It is a challenge especially if you as a teacher don't know how to explain that specific thing in the local language and you only know it in English;
- There are less or limited resources to be used than when learning in English. There are fewer books written in local languages compared to those in English;
- Most of the learners when they speak English they tend to shy and show negative attitudes towards learning;
- Very difficult because there are no proper terms in Silozi, to explain the given scientific words, e.g. atoms being the smallest building blocks of matter;
- Learners tend to become addicted to speaking in local languages leading them to have low courage to speak English;
- Most learners cannot express themselves in English; they want to write answers in the local language which is not good expressions; and
- In terms of assignments and projects, learners need to find out information from other sources such as internet and library books of which we don't have them.

4.2.9 Ways to deal with the challenges mentioned above

To get a fuller picture on how Grade 7 Natural Science teachers mediate learning through code-switching from English to the Silozi, I decided to generate data on how teachers deal with the challenges related to code switching. The following are some of the ways raised by teachers:

Shows ways how teachers deal with the above mentioned challenges.

- Encouraging learners to use English as a medium of instruction;

- Sometimes I teach in the afternoon, and before teaching the lesson I ask the learners to read through the topic so it will be easier to explain once they have a background of what will be taught already;
- The other way is to make sure that the teacher has to gather more information and develop own teaching aids, which is also time consuming;
- By consulting with other teachers especially language teachers for help before the lesson. Some learners are fluent in Silozi and they sometimes come in when stopped or looking for appropriate words;
- I do emphasize the value of co-operative learning, I do acknowledge what each learner contributes to the class, accept it and build on it in whatever language is used;
- The only solution is to avoid local and English language in the class, and sticking to English by using the simplest English possible. This will also bring laziness in the comparing of the science terminology including wrong spelling; and
- I always warn them not to write any answer in vernacular, and I always mark them wrong.

4.3 INTERVIEWS

The interview is a flexible tool for data collection, enabling multi-sensory channels to be used: verbal, non-verbal, spoken and heard (Cohen et al., 2011, p. 409). The next technique I used to gather the data was the interview.

4.3.1 Pre-interviews

I did the pre-interviews with my two research participant teachers, Mr.Wormmy and Mrs. Lattey at Zebra Primary School (pseudonyms). The interviews were carried out before the main research commenced. The purpose was to find more about how these two Grade 7 Natural Science teachers mediate learning through code-switching from English to Silozi (see Appendix 31 for my interview questions).

I will now present the responses from each of my participant in the table form as follows:

Table 5: Shows pre-interviews with my research participants

Questions	**Mrs. Lattey:**	**Mr.Wormmy:**
What is your perception about code-switching?	To win the learners' understanding and participation in teaching and learning process	To encourage learners who don't understand English better to help them understand what you are trying to emphasize
What is your experience about code-switching?	When using code-switching, learners understand the lesson better and they will not forget. They get more involved in the lesson and they give more views and express themselves	It helps learners to understand the lesson better more especially when point are putting across
Do you code-switch from English to Silozi in the classroom?	Yes, I do code-switch sometimes so that my learners can understand what I am teaching.	Sometimes I do when I discover that some of them don't understand the lesson, I switch to Silozi
Does code-switching from English to Silozi occur in the teaching and learning?	When there is a concept which learners don't understand which is not familiar or too scientific for them to understand	When I come to the end of the question and learners don't understand then I apply code-switching
Does code-switching from English to Silozi enable effective learning in Natural Science?	Yes, because learners understand well when you code-switch and they don't forget once they have been told in their local language.	It does not enable because they don't write the examination in Silozi but in English
What are the constraints	Switching from English to Silozi	No terms that will be

of code-switching in the Natural Science lessons?	takes time (time consuming) because you are explaining the lesson or concepts for the second time	asked in Silozi, if you code-switch you mislead the learners in the examination
What ways do you deal with these constraints?	I do change methods when I am teaching the lesson so that learners can understand	I plan my lesson so that I can include code-switching
What ways do you help learners to make sense of concepts in science when code-switching from English to Silozi?	I help learners to explain concepts in Silozi for them to understand, I use a variety of methods when teaching to capture their interests	By explaining and using teaching aids, learners will understand

4.3.2 Stimulated recall interviews

The stimulated recall interview (SRI) has been used extensively in educational research in teaching. It is an "introspection procedure in which (normally) videotaped passages of behavior are replayed to individuals to stimulate recall of their concurrent cognitive activity" (Lyle, 2003, p. 861).

The main purpose of conducting stimulated recall interviews was to reflect on what emerged from the videos taken during the lesson presented by Mrs. Lattey. After I had observed my two participant teachers, I decided to conduct stimulated recall interview with them as proposed by Lyle (2003). Unfortunately, I could not conduct stimulated interview with one of my research participants due to the fact that he had a lot of commitments but instead I managed to carry out a stimulated recall interview with one participant. Here is what we discussed.

4.3.3 Stimulated recall interview with Mrs. Lattey

Questions that emerged during interviews with my participant teacher

a) Why did you not code-switch in your first lesson?
b) What prompted you to code-switch from your second lesson up to your last lesson?
c) How do you mediate learning in your lessons?
d) What is your personal view and experience of code-switching?
e) Have you ever heard or seen the Namibian language policy?
f) Teacher's reflection on the lesson

The above questions will be explained individually bellow.

Table 6: Shows some post-interviews with one of my research participants

QUESTIONS	RESPONSE
a)Why did you not code-switch in your first lesson?	"I did not code-switch because the Ministry of Education does not allow code-switching in the classroom. Another reason is that, our Head of Department (HoD) does not support code-switching, if he found you being code-switch you will be called to the office to be answerable for that".
b)What prompted you to code-switch from your second lesson up to your last lesson?	"After I have seen that my learners could not get me clear, I decided to code-switch so that they can understand well. And at the same time it is good to practice code-switching because learners participates very well in the language they understand. At the same time if I want to emphasize some points I do code-switch quickly and go back to English so that the HoD should not get me using the local language".
c)How do you mediate learning in your lessons?	"I use learner centered education (LCE) whereby learners are given activities to work in their groups, they discuss and find solution to their activity, where they get stuck, I will intervene by helping them to get what they are looking for". She added that, even though we are not allowed to code-switch, I do so

	for sake of my learner understanding".
d)What is your personal view and experience of code-switching?	▪ To win my learners' understanding and participation in teaching and learning process; ▪ To encourage learners who doesn't understand English better to help them understand what you are trying to emphasize; ▪ It helps learners to capture their attention in the lesson better more especially when point are put across; and ▪ When using code-switching, learners will follow the lesson very well and they will not forget.
e)Have you ever heard or seen the Namibian language policy?	Yes, very sure because I have not only heard about it but seen and read it, It states that English shall be the medium of instruction start from Grade 5- 12, that's why I didn't code-switch in my first lesson, also our HoD discourages code-switching saying that it is against the Namibian policy".
f)Teacher's reflection on the lesson	My lessons went well because my learners participated very well and I am happy to see how I presented my lessons, it was quite good. I suggested that on the issue of prior everyday knowledge which I overlooked, it was an eye-opener for me; I will now be asking learners what they know, starting from their homes then into the classroom.

When she was asked to give suggestions for improving her situation, she said the lack of a science laboratory remains a challenge at their school and requested that the Ministry of Education should listen to their request for a science laboratory for them which they apply for every year. Learning materials are another challenge they face, and teachers have to improvise in order to capture their learners' understanding. She suggested that the Ministry of Education could supply the science learning materials which teachers should be using instead of them having to draw some diagrams to be used when teaching.

4.4 LESSON OBSERVATIONS

As stated in Chapter Three, I used observations as my next data gathering technique. I observed some live lessons in order to get responses to my research questions as to how Grade 7 teachers mediate learning through code-switching from English to Silozi. I therefore observed three lessons for Mrs. Lattey and each lesson was 35 minutes long. All the three lessons were videotaped.

For Mr.Wormmy, I also observed three videotaped lessons of 35 minutes each. As all the lessons were videotaped, I was able to take notes even though I discovered that teachers spoke faster than I could write down the information. Nevertheless, together with videotaping all the information was gained.

As I was observing the two teachers teaching, I was able to see how they endeavored to help their learners to make sense of Natural Science concepts in the science classes when code-switching from English to Silozi which was my focus of study. Observations also enabled me to get to know the perceptions and experience of the Natural Science teachers about code-switching from English to Silozi (see Appendix 18 for the classroom observation form I used).

After the lesson observations with Mrs. Lattey, it took time to watch the videotaped lessons with her because she kept on postponing and I had to respect that. When the time came we watched the video together, and she was given the opportunity to reflect on her lessons. Feedback was then given to her in expectation that this would assist in improving her teaching skills. This answers my third question: In what ways does code-switching from English to Silozi enable or constrain learning in Natural Science?

4.4.1 Teacher 1: Mrs. Lattey

Lesson 1 (35 min)

The teacher started her lesson by introducing us (the researcher and the video camera man) to her learners. She also told her learners to feel relaxed and act normally, and went on to

explain the purpose of our visit. Learners started whispering to each other in their local language while I was listening, saying, *Ni bata kuipona fa TV*. "*I want to see myself on the TV*", they thought the video camera man was taking the videos for the presentation on the TV. In general learners were happy to see us. The teacher asked some questions on the previous lesson, to stimulate their interest in the lesson and to find out what the learners knew about the previous lesson. Later she introduced the new topic to the class as *the digestive system.*

She started with her new lesson topic. The lesson was mainly question and answer method and the teacher did not code-switch from English to Silozi. I did not ask her the reason why she did not code-switch because I also wanted to see whether she would code-switch on her own. From my own observation I found that by starting the lesson asking what learners learnt the previous day was quite a good strategy to elicit learners' prior knowledge.

She then pasted flash cards on the chalkboard which listed the parts of the digestive system. Thereafter, she told the learners to read them aloud.
All the learners read the flash cards loudly.
TA: The teacher pasted the chart with the structure of the digestive system on the chalkboard. She asked the learners to pick a flash card and paste it on the part the part that correctly matched the name on the chart as shown below.

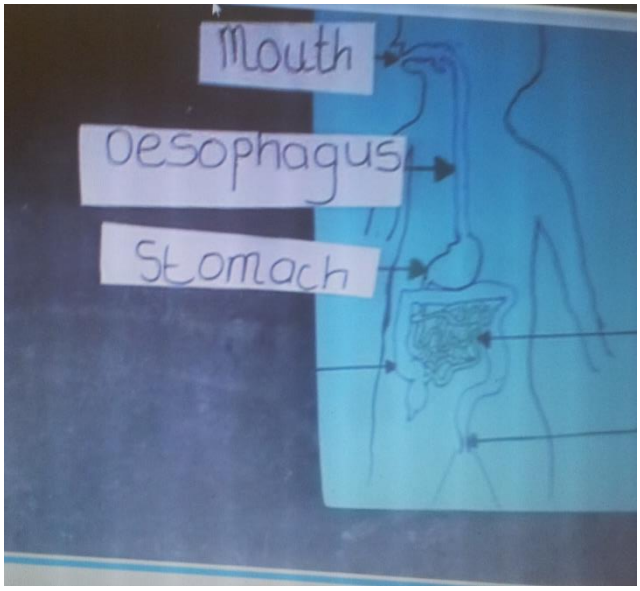


Figure 9: Pasted chart with flash cards on the chalkboard

I also noticed that when learners were discussing in their groups the teacher's question of "What is digestion"? They were discussing in Silozi, and then translated the answer in English when they reported to the class.

Lesson 2 (35 min)

The teacher introduced the lesson by asking questions about the previous lesson, for example, what is digestion? One learner answered the question by saying, "*Digestion is the process of breaking down food into soluble substances*". The teacher was connecting learners to what they already knew to the unknown. She gave the example that, if you eat an apple, you cannot swallow the apple as it is but it has to go through digestion and that is when it will go into our bodies.

Here the teacher supported mediation by contextualizing an example of a familiar apple to their everyday life.

The teacher then asked learners to write the definition of digestion in Silozi to find out whether they understood or not. Here are the responses of the various groups.

Ki mukwa wa kulubaluba lico kuli bias bunolo. It is the method of breaking down food to make them soft.

Ki nzila ya kulobaka lico mwatuntoto tunyinyani to tukona kukena hande mwamubili. It is the way of breaking down food into smaller pieces so that they should enter our bodies.

Ki mukwa wa kuluba lico kuli eza zebunolo kwakukena mwamubili. It is the way of breaking down food to make it soft so that it should enter our bodies.

Ki mukwa wa kutafuna lico kuli bisabunolo kuli likone kukena hande mwamubili. It is the way of chewing food to make it soft so that it should be taken by the body.

The teacher explained the definition to learners from English to Silozi as well.

Process- *Ki mukwa*

Breaking- *Kulubaluba*

Simpler substances- *Kulibisabunolo.*

Main lesson

The teacher introduced the main lesson for the day: **Two forms of digestion.** She wrote the topic on the chalkboard: Mechanical digestion and Chemical digestion. She asked the learners to explain the difference between mechanical and chemical digestion.

The teacher gave definition of mechanical digestion as the breakdown of food into smaller pieces. She then asked the learners to explain the definition in Silozi. She supported learning by telling the learners to explain concepts and sentences in Silozi. Below are some of the learners' responses.

Shows teacher 1 code-switching from English to Silozi in the classroom

L: *"Ki kulobaka lico kuli eza tubindibindi"*. It is to break down food into pieces.

T: Good, (*tubindibindi* is smaller pieces)

T: Mechanical digestion is happening in your mouth, it starts breaking down food without mixing it with the saliva.

T: Chemical digestion is the breaking down of food into soluble/simpler substances not pieces like in mechanical digestion.

L: *Ki kulobakalico*. (Breaking down food)

T: You can use *kulubaluba. (Crush)*

L: *Ki kulubalubalicokulilibezebunolo.*To crush the food so that it become soft.

T: Ki kulubluba lico kuli libeze bunolo hahulu ku eza kuli your body can absorb. (To crush food so that it should become very soft)

T: Writes a table on the chalkboard as follows: To show the types of food nutrients and where they can be found (Natural Science and Health Education textbook, p. 125).

Food nutrients and where they found	
Proteins	Meat, eggs
Carbohydrates	Breads, porridge
Fats	Peanut butter, margarine
Vitamins	In all vegetables and fruits
Minerals	Calcium, e.g. milk, vegetables

TT: Proteins are being digested by enzymes, proteins are not taken as they are in food but they are been digested (*Kulubwalubwa).*

TT: *Haunga mbonyi ye omile kui beya mwachika ni kukakala kucokola, kana ikacokoka hande*? When you take dry maize, put it in the mortar and pound it, is it going to be pounded well?

LLL*: Batili*. No.

T: *Kiñi so kabata kubeya mwateni kuli mbonyi icokoke hande*? What will you need to add in order for your maize to be pounded well?

LLL: *Ki mezi.* It's water.

TT: Good, water will help you to pound your maize well.

TT: An enzyme is also acting like water, without enzymes to be released your food in your stomach will not be well digested.

The teacher mediated learning by explaining concepts and some sentences in Silozi for learners to understand better. The teacher also used the question and answer method to mediate learning. The main aim was that learners should be able to know the two different forms of digestion. The lesson was quite good since the learners participated well. The teacher also used analogies to explain how food is digested in the human body by relating maize and water to enzymes and food in the stomach (see Observation transcript line 168-178).

Lesson 3 (35 min)

Know the importance of enzymes in the digestion of food

The teacher greeted learners as usual. She then asked them about the assignment she had given them the previous day to enquire about the meaning of enzymes in Silozi from their parents and guardians. The aim was to find out whether there is a meaning for enzyme in Silozi so that she could learn from them as well. Here are their responses.

LL: They don't know it in Silozi; they just know it in English as enzymes

T: Remember we eat food for growth, energy and repair our bodies. That food should be digested (*Kulubwalubwa*) is when we are going to get substances we need by the bodies. To get substances we need by the bodies. Yesterday we got the names for these things we need for our bodies

T: What is the collective name of them?

L: Nutrients

T: Yes, that is what our bodies need (*Ki minuno*) fats

T: What is *minuno*, explain

L: *Minuno kili ka ze nunisa mubili*. Things that makes our bodies fat

T: *Nutrients kili ka ze matafaza mubili*. Nutrients are those things that keep the body healthy

In lesson 3, the main focus was on mediation of learning so that learners were able to define enzymes as biological catalysts which speed up a reaction but are not used up during the reaction. In lesson three, the teacher told learners to write some terms on the chalkboard, and I realized that learners were writing down the incorrect spelling. The teacher managed to correct the incorrect spelling by asking other learners who knew the spelling to correct them. Lastly, she used an activity to help learners make sense of the concept of enzymes and code-switching was used to emphasize some points and to explain concepts for learners to understand.

4.4.2 Teacher2: Mr. Wormmy

Lesson 1 (35 min)

Below shows teacher 2 code-switching from English to Silozi in his lessons

This lesson started by building on the previous lesson. He wanted to connect learners from the lesson they already knew to the new lesson in order to find out their prior everyday knowledge.

T: Today we are going to learn about one of these systems which is **the digestive system**. He writes it on the chalkboard

The teacher displayed the poster of the alimentary canal on the chalkboard. He explains how the food moves from the mouth to the anus for them. E.g. the food starts from the mouth → *(mulomo*) oesophagus → (*kimumizo*) →Stomach→. Enzymes will now act on the food, the food goes to the small intestine from there to the large

intestine, and food which is not needed by the body comes out of the anus as waste food, pointing out the parts of the digestive system.

T**: The Alimentary canal** (the teacher writes the sub-topic on the chalkboard)

T: Protein, (*Kilika mañi zabutokwa ze lu fumana mwa maproteins).* What important nutrients do we get from proteins?

T: Who can define digestion for us? Sikute.

T: **Conclusion**

T: Ok, open your book on p. 126, there is a picture of the alimentary canal, draw and label it in your exercise books

T: Tomorrow you are going to learn about **the importance of chewing food.**

In this lesson the teacher introduced the topic by writing it on the chalkboard and later he pasted the poster of the alimentary canal on the chalkboard. He then explained how food moves from the mouth to the anus to the learners. He also asked the learners to come up and point out names of the parts of the alimentary canal. In my opinion, it was a good lesson because the teacher mediated learning in a number of ways, by writing on the chalkboard, by explaining the pathway through which food moves and by asking learners to identify the different parts. The teacher was able to capture the learners' understanding and knew which of the learners did not grasp the work by asking questions on the lesson they had learnt. The lesson ended with an activity which he gave the learners to do at home. Code-switching helped the teaching and learning process as it enabled the learners to understand the concepts in Natural Science.

Lesson 2 (35 min)

T: **The importance of chewing food**

T: What do you think is the importance of chewing food? Why do we chew food?

L: To break food into smaller pieces.

T: When you take food and put it into your mouth then digestion starts, e.g. if you take an apple without breaking it into pieces, will you be able to swallow that apple?

LLL: No.

T: The importance of chewing food is to break down food into smaller pieces so that it should be taken in by your body.

T: Ok, I will give you the example of the forms of digestion. E.g. Mechanical digestion is when food is broken down into pieces. While chemical digestion is when food is now mixed with enzymes and changes into liquid and is taken in by the body.

T: (*Ha mu sikaeza* digestion *mwa* Grade 6?) Didn't you learn about digestion in Grade 6?

LLL: (*Lu iezize*) we did

T: It is just a continous (*ye kafumana mane kuyofitakwa university)* which you will get up to the university.

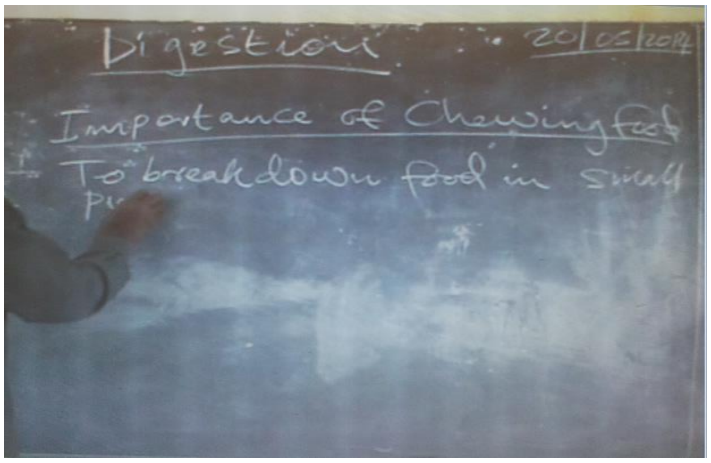


Figure 10: Shows the teacher writing a summary on the chalkboard

The teacher started the lesson by asking some questions on the previous lesson. He introduced the new lesson which was on the importance of chewing food. The teacher asked the learners why people chew the food that they eat and what are they using to chew that food. He gave an example of an apple by asking in Silozi *"Ha u ca apple inge u sa itafuni kana u ka imiza? (Freely translated:* "If you eat an apple without chewing it are you going to swallow it?". Code-switching was used to capture the learners' interest. Therefore, the teacher was relating the content of the subject to the learners' life experience. As I was observing, I noticed that the learners were very interested in the topic as most of them raised their hands as the teacher was asking questions.

Lesson 3 (35 min)

T: What is the importance of chewing food?

L: Is the process of breaking down food into smaller pieces.

T: There are three categories of foods, what are there?

LL: Fats, Protein and Carbohydrates

T: **End product of foods**. He writes it on the chalkboard

TT: Today our lesson requires us to know what the end product is when you eat food which contains fat. What enzyme will change this food into what substance; these foods will change into another substance which must be soluble to your body. What enzymes are going to act on these types of this food? So we have to know the end product of starch. When we talk about starch, we talk of carbohydrates. We have to know the end product of protein and fats.

T: *Mafelelezo a product ya starch kiifi?* What is the end product of starch?

LLL: No answer

T: The end product of starch is maltose or glucose.

T: Fats, what is the end product of fat? Musunga (learner's pseudonym)

T**:** Amylase

T: Amylase is found in your saliva, where most of digestion is taking place that is where we get these enzymes.

T: (*Ha mu buzelipuzo*) Let me give you a chance now to ask questions.

LLL: No questions

T: Let me give you a task so that you should come and present it tomorrow in your groups. Open on page 156 (Go for Natural Science), there are questions, work on those questions at home today and come and present them to the class in your groups tomorrow.

TT: This lesson, learners, requires you to know the end product of the foods you are eating that contain fats, carbohydrate and proteins. The lesson was introduced by building on the past lesson which was taught. The teacher to learner interaction was observed when the teacher engaged learners in a question and answer method which encouraged learners to be active participants and to be able to discuss and answer questions. Learners also were given some words by the teacher to spell in order to encourage them to learn the spelling of words as they are reading. The lesson ended by giving the learners an activity to do at home. To my opinion this was done in order to engage learners in their books at home. There was less code-switching in this lesson used to mediate learning.

4.5 CONCLUDING REMARKS

In this chapter I have presented and analyzed the data that I obtained from my research site as described in Chapter Three, on how Grade 7 Natural science teachers mediate learning through the use of code-switching from English to Silozi. I have included part of the video transcript in this chapter to strengthen my presentation. I analyzed the teachers' lesson preparations, the textbooks used by the teachers and learners, the syllabus and the learners' workbooks and summaries in order to probe for more information on the use of code-switching.

In the next chapter I discuss and interpret the findings which I will explain according to the themes that emerged from my data.

CHAPTER 5: FINDINGS AND DISCUSSION

Some researchers feel that it is important to keep the flavor of the original data, so they report direct phrases and sentences, not only because they are often more illuminative and direct than the researchers' own words, but also because they feel that it is important to be faithful to the exact words used (Cohen et al., 2011, p. 539).

5.1 INTRODUCTION

In the previous chapter, I presented and analyzed data gathered using document analysis, questionnaires, interviews (pre-interviews and stimulated recall interviews), and lesson observations. In this chapter I discuss the results of my research findings in the way they were presented in the preceding chapter. The research findings are presented in the following themes which emerged from my data and were determined by my research questions shown below.

To recap, the following research questions were addressed in this study.

1) What are Grade 7 Natural Science teachers' perceptions and experience of code-switching from English to Silozi?
2) How do Grade 7 Natural Science teachers help learners make sense of concepts when code-switching from English to Silozi?
3) In what ways does code-switching from English to Silozi enable or constrain the learning of concepts?

5.1.1 Natural Science teachers' perceptions and experience of code-switching from English to Silozi

The data in this section revealed that teachers believed that code-switching helps learners to understand the concepts, creates participation in the lessons, and learners expressed their views in the language they understand better (Clegg & Afitska, 2010, p. 10). They said, "One frequent function of teacher CS recognized by most observers is to clarify a concept: teachers switch into the L1 in order to make clearer what they have said in L2. Switching is often

triggered by the teacher's assumption that the class (or specific learners) have not understood". To this end, Bunyi (1999, p. 344) posited that, "Language is another problem we have especially in lower primary schools because the children come without any knowledge of English, they take a long time before they can understand and communicate in English".

The literature review also revealed that although, English was the dominant language used for communication in Malaysia; code-switching supported learning in such a way that students understood the concepts better (Mastura et al., 2013). From my observation, the perceptions and experience of most teachers are that they believe learners will not learn much if they are taught in English alone. They emphasized that code-switching will facilitate their learners' understanding hence they believe the English language proficiency for their learners is low and that they need help in order to cope with the situation.

5.1.2 How Natural Science teachers make sense of concepts in science classes when code-switching from English to Silozi?

According to Probyn (2004), when teachers and learners share a common language the tendency of teachers to code-switch is very high. The learners' language plays a powerful role to enable learners to explore their views and ideas, however, the use of code-switching helps learners to express themselves in the language they understand better. Therefore, in the lessons I observed at Zebra Primary school, I find that teachers used code-switching regularly during their teaching and learning to facilitate understanding and promote self-reliance. They switched to Silozi when they came across the concept which learners did not understand in order to enhance learning.

In this case, teachers argued that; there are some of the terms which learners may not understand in English where clarity can only be given in the language they understand. Learners would understand different concepts and would be able to understand their meaning. It is good practice, they believe, hence learners will improve in the language. Because some learners fail Natural Science for various reasons, for example, they cannot read and write English well. Liebscher and O-Cain (2005) supported Probyn by saying teachers should see

code-switching as an advantage and the use of L1 is good and meaningful to encourage L2 achievement.

5.1.3 Ways in which code-switching enables or constrains learning in Natural Science classes

The data gathered in this section was drawn from the responses of teachers in answering the questionnaires. Most of the teachers argued that code-switching provided more opportunities to the learners to participate in the classroom believing that learners will understand the subject better since English is a second language. Local language forms the foundation for acquiring the additional information or clarity in order to help individual learners to understand in their preferred language. When learners understand the concepts they will achieve the basic competencies. This is supported by Youkhana (2010) who says that code-switching can have a positive effect when teachers code-switch make connections from the known native language to the unknown target language.

Some teachers argue against the use of code-switching in the teaching and learning process saying that it constrains learning in Natural Science. They pointed out that local languages lack adequate terminologies to teach and learn science subjects. So, since English is the medium of instruction, teachers and learners should use it. When code-switching from English to a local language, learners tend to answer examinations in their local language because they are used to switching. Cook (2001) supported this idea by saying that code-switching has not been accepted into the second language classrooms.

Probyn (2009) explained that the use of code-switching was as a result of languages where mistakes are encountered in science lessons. Intermixing of learners from different groups and their cultural backgrounds also affects the learners' achieving the required language (ibid). She therefore found that code-switching is an important tool to use in the science classrooms in order to enhance learning since our learners' language proficiency is not good enough.

Clegg and Afitska (2010, p. 13) mentioned that, "Both teachers and researchers have not been trained to use L1 in the L2-medium classroom". Probyn (2009, p. 123) argues that the

potential use of two languages in the classroom in a structured and systematic way to support learning has not been generally recognized or developed. However, code-switching practices are often covert with teachers unlawfully using the vernacular in their classrooms.

To help facilitate the analysis process, examples of data for this chapter were chosen according to the following categories:

- Direct quotes for code switching in Silozi are used to show teachers' emphasis;
- The teachers' support material used to mediate the learning by explain concepts of support material in Silozi;
- Code-switching was used to mediate learning;
- Use of analogies presented in Silozi to capture learners' interest and understanding;
- Prior everyday knowledge to find out what learners already know. The teachers were repeating questions in Silozi for clarity;
- Challenges faced by the teacher when mediating learning by code-switching and how the teacher dealt with such challenges; and
- Teacher to learner and learner to learner interaction in the mediation process.

5.1.4 The Namibian language policy and code-switching

The Namibian National Curriculum (2010) and the Namibian National Language Policy (2003) state that; "learners shall learn in their mother tongue during their first grades 1-3 of schooling, Grade 4 will be the transitional year when the change to English as medium of instruction must take place. From Grade 5-7 English will be compulsory as the medium of instruction in all subjects".

The policy shows a clear indication that the there is no code-switching allowed in the teaching and learning process more especially in the upper grades, Grade 5-12. However, teachers code-switch illicitly to support their learners in understanding the subject content (Probyn, 2009).

5.2. PART A: THE SURVEY: CLOSED-ENDED QUESTIONS

The survey by questionnaire was carried out with 70 questionnaires sent to Grade 7 Natural Science teachers in Katima, Sibbinda and Kongola circuits in Zambezi Region. Out of 70 questionnaires given to the teachers, only 47 teachers participated in my research (67%). I will present their responses as follows.

5.2.1 Teachers' home language

The survey opined that 98% of teachers who participated speak Silozi as their home language, thus their learners. Out of percentage of the teachers who speak Silozi as their home language, 2% of those teachers speak Rukwangali language of Kavango. Therefore, since the majority of teachers indicated that they speak Silozi the language which their learner speaks, it is easy for them to code-switch to enhance understanding.

5.2.2 Learners' home language

From the data findings learners indicated to speak different dialects likes of Silozi, Subiya, Sifwe, Totela, Mbalangwe, Mbukushu, and Siyeyi as referred to in Figure 4.1 but are all taught in Silozi as their first language.

Learners differ in their vernaculars as reflected in the findings but have problems in understanding Siyeyi and Mbukushu therefore, afore mentioned two languages learners have to switch to Silozi for their friends to understand them.

5.3. PART A: THE SURVEY: OPEN-ENDED QUESTIONS

My survey questionnaire contained two open-ended questions which related to my research questions. The first one is: In what ways does code-switching from English to Silozi language help or not help learning?

The second one is: What are your general views about the use of code-switching in Natural Science lessons?

Below are the teachers' responses to the first question.

Most teachers believed that code-switching from English to Silozi helps learning in Natural Science classrooms; they argue that it helps learning in the sense that when explaining some difficult concepts it allows for a better understanding of the subject matter. One respondent said; "*In the language learners understand better it will make them to pass*".

5.3.1 Summary of findings to open-ended question 1

The data in this section revealed that the teachers who indicated that code-switching helps learning in the Natural Science subject highlighted that code-switching helps learners to understand concepts and it helps them to participate in the subject.

Some teachers said that code switching is a good practice, learners with poor English proficiency will understand the content of the subject and it will help them to cope both in the classroom and world.

Those teachers who indicated that code-switching cannot help learning in the Natural Science disclosed that code-switching is not the medium of instruction so Natural Science should be taught in English. It is a curriculum requirement and examinations are set in English so teachers must use English across the curriculum in order for learners to be able to answer questions in examinations.

Some teachers stated that when using English learners will improve in the language since they fail Natural Science in the examination because they cannot read and write well enough and that some scientific terms are difficult to translate into Silozi.

5.3.2 Summary of findings to open-ended question 2

Teachers provided more reasons on their general views about the use of code-switching during the Natural Science lessons. Some teachers felt that a positive use in applying code-switching in the classroom was that it shows the active participation of learners in the lesson in order to enhance learners' performance. Some teachers viewed code-switching as a good

practice, more especially those teachers teaching in rural areas where learners do not have access to laboratories, television, newspapers and magazines to develop understanding, and that when code-switching to Silozi it enabled learners to have a better command of English.

On the other hand, some teachers agreed that code-switching promotes failure rate as learners cannot express their views in English and they cannot master some of the concepts. Code-switching has a negative impact on the learners because they cannot do the same when writing the examination and that it encourages laziness.

5.4 GENERAL VIEWS ABOUT THE USE OF CODE-SWITCHING IN NATURAL SCIENCE LESSONS

Here are some of the teachers' views, personal feelings and opinions on the use of code-switching. The main aim was to find the answer to my research questions.

Some teachers indicated that code-switching should be recognized since it helps learners to understand the content of the subject. It is a good idea as it involves all learners and gives clear picture to the teacher whether the basic competencies have been attained. For rural areas where learners do not have access to laboratories, television, newspapers and magazines, the teachers prefer code-switching in their lessons. Teachers still argue that code-switching is good because even those learners who are unable to comprehend in English will also benefit when code-switching is used.

Teachers proposed that they should use English in their lessons all the time because it would help learners to express themselves in English. This could help learners to use English even around the school premises.

5.5 PART B: OBSERVATIONS AND INTERVIEWS WITH MY TWO RESEARCH PARTICIPANTS

After carrying out the survey, I observed two Grade 7 Natural Science participant teachers while teaching 3 lessons each in their classrooms. Later I conducted a stimulated recall

interview with one of them. Below is the finding of the observations and interview which were carried out.

5.5.1 Observations

What I observed was that teachers used code-switching frequently to:

1. To explain concepts;
2. To emphasize points;
3. To clarify statements;
4. To maintain learners' attention;
5. Classroom management and maintain discipline; and
6. For teacher/learners interaction.

I will now explain each of the following sub-topics above as observed**.**

5.5.1.1 To explain concepts

During observation, teachers used code-switching in their teaching and learning to explain concepts which learners could not understand well so that they should be clear to them. According to Hodson and Hodson (1998) urgue that in social constructivism language is identified as one of the tools that enables understanding and acquisition of new knowledge. In this study, the teachers indicated that they code-switched from English to Silozi to explain new concepts to learners in that way meaning is made clear to them and they will be able to remember those concepts.

5.5.1.2 To emphasize points

Matura et al. (2013) observed that teachers may use code-switching because of a lack of facilities. For instance, bilingual and multilingual speaker's code-switch if they cannot find the appropriate terminology in the second language, as well as to emphasize points and to

show identity with the group. Pollard (2002) states that code-switching serves not only to enhance communication in the teaching and learning process but to elaborate, to emphasize and clarify and in short for effective communication. The teachers in this study used code-switching to confirm some statements to identify concepts as important and to encourage the learners to pay attention to those specific word(s) or statements either by repeating the statements or words. Such statements or words may be used in tests or examinations so they emphasized these points by speaking in the language learners understand better (Silozi).

5.5.1.3 To clarify statements

For learners to be able to show an interest in the subject, the teachers should use the language they understand well especially when the teachers and learners are sharing the same local language as Probyn (2009) stated. Teachers in the study indicated that they explain more in Silozi when they ask questions and give their learners tests to write so that learners can understand the instructions. They fear that if learners cannot understand the instructions of the question, learners may end up answering or writing the wrong answer which might lead to failure.

5.5.1.4 To maintain learners' attention

Still and Pollard (2002) said that linguistic insecurity may be eased by code-switching into the language that is most comfortable for the speaker. Therefore, teachers indicated that when the learners are not participating, the teachers code-switch to Silozi to get the learners' attention. As teachers spoke to their learners, they kept on asking them "*Kana ki kuli mwa utwa luli*"? Meaning, *do you really understand*? This resulted in learners who were not paying attention listening to the teachers during the lessons.

5.5.1.5 Classroom management and maintaining discipline

A well trained and a typical teacher has to maintain discipline in his/her class when learners misbehave. Code-switching plays a big role here to make sure that learners are following the

teacher's instructions. Classroom management and discipline were maintained by warning learners to keep quiet and listen. For those learners who kept on writing in the lesson, the teacher warned them in Silozi to stop writing. I noticed that learners did stop writing, perhaps because the instruction was given in their mother tongue.

5.5.1.6 Maintain the learners' attention with question tags

To maintain the learners' attention with question tags means the teachers code-switched by asking questions to find out whether learners were paying attention or not as they were teaching.

The teachers used code-switching to capture their learners' attention and gave them time to ask questions in Silozi whenever they seemed not to understand the content. This was done so that they were not shy to ask questions in the language they know.

5.5.1.7 Teacher-learner interaction

Pollard (2002) argues those students who were able to code-switch freely in the classroom were faced with fewer language barriers when discussing the subject matter. Using mother tongue which is Silozi in the context of this study helped the teachers to interact with their learners in the classroom. Learners felt free when they discussed issues and solved science problems in their mother tongue. For the teacher to get more of what he/she needs from the learners, he/she has to code-switch to a local language where learners will express themselves without restraint.

I observed that when learners were given an activity to do in their groups they discussed in their local language which is Silozi but when reporting on the activity, they reported in English.

As the two teachers were code-switching to Silozi, I noticed that learners were participating well, and they were free to make contributions during the lessons. I also realized that since

English is their second language, some learners were shy to express themselves as per Mr. Wormmy in line 146 video transcriptions who told the learner not to be shy.

5.5.2. Brief summary of interviews

Mrs. Lattey pointed out that she code-switches when she realizes that her learners do not understand. She indicated that she normally tests this by asking questions on the lesson and when she finds out that her learners cannot participate in the lesson, she code-switches. She also is of the opinion that code-switching helps her learners' understanding despite the fact that her HoD discourages her from using it. She agreed that she is aware of the Namibian policy and all the content therein, but she is code-switching to help the learners understand the lessons.

5.6 DISCUSSIONS

In this section I discuss the main aspects in relation to my literature reviewed in Chapter Two. I draw attention to the techniques that I used to obtain responses to my research questions and present what is illuminated by the findings of my study.

5.6.1 Level of code-switching

Most studies revealed that code-switching is done in most countries where English is the second language. To support this, Shilamba (2012) argues that code-switching is a wide spread phenomenon and is prevalent in Namibia. My survey indicates that 77% of teachers do code-switch while 23% do not. This is supported by Reyes (2004) when he posited that his research should help educators of second language learners facilitate discourse practices in the classroom according to students' first language and second language.

5.6.2 Reasons for code-switching

Many researchers have highlighted that code-switching is the order of the day in science classrooms. Therefore, the literature has exposed a number of reasons why teachers code-switch in the classroom as follows:

1) To explain and elaborate on concepts;
2) To establish good classroom relationships with the learners;
3) Code-switching makes learners to understand the contents thoroughly;
4) To show identity with the group;
5) To emphasize points;
6) To let the learners fully participate in the lesson; and
7) To improve learners' academic performance.

My findings revealed that teachers code-switch in their classrooms in order to explain concepts, to emphasize points, to maintain understanding, and to increase learners' participation in the classroom. This indicates that code-switching is prevailing in science classrooms without the Ministry's approval something that Probyn (2009) emphasized earlier on. Chen-On Then and Hie Ting (2009) support this by indicating that teachers code-switch in science classes to achieve teaching goals.

5.7 STRATEGIES USED BY THE PARTICIPANT TEACHERS TO MEDIATE LEARNING

5.7.1 The use of teaching methods in the digestive system

When I observed lessons in the classrooms, I noticed that the two participant teachers tried to use a learner centred approach. Learners were divided into groups which made them engaged in classroom talk which characterises learner centeredness. The two teachers mainly used the question and answer method. Learners participated well more especially when they were told to explain statements and concepts in Silozi. The teachers asked both closed and open-ended questions to find out whether learners understood the content of the subject. Furthermore, follow-up questions were used which were aimed at scaffolding the learners. This is line with the tenets of learner centred education (Nyambe, 2008).

5.7.2 Using teaching and learning materials (LTSMs) to make sense of code-switching of the digestive system

Both Mrs Lattey and Mr. Wormmy used charts of the digestive system which they had drawn and pasted on the chalkboard. The chalkboard was one of the materials used by the teachers to explain concepts which they wrote in Silozi. Even though there are many teaching and learning materials which the teachers could have used during the teaching and learning process, namely; audios, textbooks, chalkboard, projectors, and posters, they used the textbooks because the school does not have any teaching aids as there is no laboratory. Concepts in the textbook which were not clear to the learners were explained by code-switching so that learners were not left behind.

5.7.3 The use of prior everyday knowledge (PEK) during code-switching of the digestive system

Shulman (1987) posits that teachers need to understand the subject matter very well and flexibly so they can help students create useful cognitive maps, relate one idea to another, and address misconceptions. Teachers need to see how ideas connect across fields and to everyday life. This kind of understanding provides a foundation for pedagogical content knowledge that enables teachers to make ideas accessible to their learners.

During the observations and lesson presentation both the teachers used learners' prior everyday knowledge to teach the topic of the digestive system. The learners were asked what they learnt the previous day on the topic. This was the indication that teachers applied prior everyday knowledge before the lesson commenced (see Appendix 18).

5.7.4 Learners' participation during the teaching and learning of the topic digestive system

I found that learners were actively involved in the lessons more especially when the teacher code-switched to Silozi. Learners seemed to understand more in their local language. They could express themselves clearly, raising their hands so that the teacher could see them and point at them to explain the answers. The findings revealed that code-switching should be

used by teachers to improve the learners' understanding and performance in the science classroom and particularly in the topic of the digestive system.

5.8 CHALLENGES TEACHERS EXPERIENCED DURING TEACHING AND LEARNING THROUGH CODE SWITCHING IN TEACHING THE DIGESTIVE SYSTEM

Even though the question of challenges was not one of my main research questions, I realized that I should include it in my questionnaire. Although some teachers mentioned that code-switching is time-consuming, they take time to teach and explain again in the learners' mother tongue. During my observation I saw that when a concept is posed, some learners who do not understand the meaning need the teacher to explain it in Silozi. Later on I realized that learners were not pronouncing the words correctly as the teachers asked them to mention some words in the lesson, learners themselves would say, "*I don't know how to pronounce it*". Then the teacher would tell them to spell the word. The learner would then spell the concept or word correctly (see Appendix 21).

Mrs. Lattey used the tactic of asking other learners for help when she noticed that learners pronounced the term incorrectly. If no learner knew the answer, she intervened by pronouncing it correctly and told the learners to follow as she repeated the terms (see Appendix 20).

Both Mr. Wormmy and Mrs. Lattey mediated learning by assisting learners in various ways. For instance, if the learner did not know how to pronounce a concept, Mr. Wormmy would ask the learner to spell it, and I noticed that the learners were spelling the terms correctly.
These teaching strategies helped to motivate interest amongst the learners and they became active participants in the classroom which helped them to make sense of the topic of the digestive system.

5.9 CONCLUDING REMARKS

In this chapter I provided the descriptive summary of my findings. It emerged that learning new concepts in English second language takes a lot of time. Code-switching is done so that learners understand and retain the concepts. If code-switching is not done this becomes difficult for learners to assimilate and accommodate new knowledge. The implications are that teachers are forced to repeat their lessons. To this end, teachers in this study indicated that they code-switch to help learners make sense of science concepts and to improve performance and participation in the classroom.

The next chapter summarizes and concludes the study and makes some recommendations for future studies.

CHAPTER 6: SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

The summary will identify the key factors, key issues, key concepts and key areas for subsequent investigation. It is a watershed stage during the data collection, as it pinpoints major themes, issues and problems that have arisen, so far, from the data and suggest avenues for further investigation. (Cohen et al., 2011, p. 568)

6.1 INTRODUCTION

In the previous chapter I discussed the findings of the study. In this chapter I present a summary of the findings on how Grade 7 Natural Science teachers mediated learning through code-switching from English to Silozi. I conclude the study by providing some recommendations regarding educational policy and further study.

6.2 SUMMARY OF FINDINGS

The findings of this study revealed, in response to the first question in my questionnaire, that 98% of teachers speak Silozi as their first language even though there are different dialects. So, the majority of teachers speak the same language as their learners. I therefore, see that this could be the reason why most teachers code-switch during their lessons in the Zambezi Region. According to Probyn (2004, p. 50), where teachers and learners share a common home language, teachers tend to switch to the learners' home language.

I find that 77% of teachers code-switch for various reasons, notably to explain concepts: because not all learners understand science terminology presented in English, teachers have to explain in the language that they do understand. Apart from explaining concepts, teachers code-switch to emphasize what is important and to ensure that learners know exactly what is required of them. Furthermore, teachers code-switch to clarify statements especially when they sense that learners are not concentrating in class so that they can be re-focused on the lesson being taught. The study also revealed that teachers switch to the language learners understand to ensure that they are well-disciplined. It helps them feel that he/she is the

manager in the classroom, and that his/her presence is respected. The relationship between teachers and learners is very important in the classroom. When the teacher code-switches learners come closer to them and feel free to voice their concerns in the language they understand well, rather than in English where they will be restricted by their limited grasp of the language. Herein lies the importance of socio-cultural theory as emphasized by Vygotsky (1978), when teachers code switch they provide a mediating medium that enhances the understanding of the concept. This provides the learners to talk aloud about how experts think, which enhances learning process.

From observation of the two participant teachers, I discovered that they were code-switching in order to mediate on concepts, emphasize points, maintain learners' attention, clarify statements, for classroom management and discipline. During my observations, I noticed that Mrs. Lattey who for instance did not code-switch in her first lesson code-switched more than Mr. Wormmy in her second and third lessons.

The findings also indicated that both teachers used a learner-centred approach (Nyambe, 2008) during their teaching of the topic of the digestive system. Group work activities were given to enhance learners' understanding and teachers used question and answer methods with them. The methods the teachers used helped the learners to grasp the lesson content regarding the digestive system. I found the teaching strategies used by the teachers important in that they assisted the learners to grasp the work which they were being taught.

However, 23% of respondents indicated that they do not code-switch in their teaching and learning process. Those teachers stipulated that they do not code-switch because the Namibian language policy does not indicate that teachers should code-switch during their lessons particularly in the science classrooms. In the context of this study, it seems these teachers did not want to code-switch illegally as highlighted by Probyn (2009) in her study she conducted in South Africa. Another reason they gave was that, the national examination is always written in English so code-switching is like training learners to get used to Silozi but when they are used to it will make them to answer questions in Silozi.

It has been assumed by other teachers that code-switching does not improve the learners' performance for a number of reasons such as: textbooks, examinations, question papers and

all natural science activities are written in English, the national language policy does not recommend the use of code-switching in upper primary schools, so learners must learn full time in English not to code-switch.

The study further found that 72% of the teachers who participated in the study prefer Natural Science to be taught in English for a number of reasons; viz., textbooks, examinations, question papers and all natural science activities are always written in English. They still argue that code-switching will confuse learners in the examinations and this will lead to poor performance by the learners, learners will also imitate the teachers and ask questions in Silozi. This will hinder them from mastering the English language.

The findings showed that 28% of teachers prefer Natural Science to be taught in both English and Silozi for the following reasons: it provides more opportunities for learners to participate in class, it helps learners to understand better since English is a second language, and it assists teachers in explaining natural science concepts clearly.

When the two teachers were asked whether they knew about the Namibian language policy, they agreed that they knew it all too well. Nevertheless, they said that the limited ability of their learners to understand English makes them code-switch because they want their learners to understand the subject content.

6.3 OTHER TEACHING STRATEGIES USED BY THE TEACHERS TO ENHANCE TEACHING AND LEARNING THAT EMERGED FROM THE FINDINGS

The teachers wanted their learners to understand the topic of the digestive system clearly, so they used a variety of teaching strategies.

6.3.1 The use of charts and code-switching

I observed that the two teachers used charts to enhance learners' ability to understand the topic of the digestive system. In explaining the concepts, Mrs. Lattey used flash cards which she put up on the chalkboard; she explained these to the learners in Silozi and English. An example is when she explained oesophagus meaning *mumizo* in Silozi. In contrast, Mr.

Wormmy did not prepare flash cards but used a stick to point out features on the chart and explain their meaning in Silozi. Example is he explained word(s) like stomach means *mba* in Silozi.

I found the teaching strategies used by the two teachers to be effective since the learners participated readily. I thus could also see that interaction with the teachers was very good. As a result, learners understood the topic well.

6.3.2 The use of analogies and code-switching

When I was observing the two teachers teaching about enzymes, I noticed Mrs. Lattey telling the learners about dry maize. She asked her learners the following question: "When you take dry maize and put it in the mortar while thinking of pounding it, what will you need to add to it so that you can pound it nicely?" The learners told her that you will need to add water.

She then told the learners to take note that enzymes acted like water: without enzymes being released, food in the stomach would not be digested. From my observation, I found that the learners understood the teacher's analogy between maize and enzymes since it was explained in Silozi. When some learners were asked to explain what they had heard, they explained it just as well as the teacher had, which indicates that the code-switching did indeed assist the learners in understanding the analogy.

Mr. Wormmy told the learners about an apple: if you eat an apple, that apple must be absorbed. It will not be absorbed in solid form but it will be absorbed in a liquid form, created by chewing it to enable it to be absorbed by the blood. Here the teacher was explaining the notion of chewing food so that learners could understand how food is absorbed in the body.

6.4 Recommendations

The following recommendations emerged from the findings of this study:

- The Ministry of Education should admit that code-switching exists in all primary schools, particularly in the Zambezi Region and they should formulate a policy that includes code-switching;
- The Ministry of Education should organize workshops to guide teachers on how to use code-switching in their science classrooms;
- Learners' home language should not be ignored in primary schools as a nation without its own culture is an unconscious nation. Therefore the Ministry of Education should see to it that learners' home language is used, at least at times, so that they are not allowed to forget their culture;
- When formulating the language policy, the Ministry of Education should consider involving practicing teachers because teachers are the ones who have to deal with the challenges of language in the classroom;
- The University of Namibia and its branches all over Namibia responsible for training teachers should also include code-switching in their curriculum to help surmount the language barrier;
- Further studies on code-switching should be carried out in the Zambezi Region in order to strengthen the use of code-switching in science classrooms; and
- For further studies, learners should be included as participants in order to get their views on the use of code-switching by teachers.

6.5 RESEARCH LIMITATIONS AND CHALLENGES

Before I conducted my observations, one of the participant teachers asked me whether the video recording I would make would be presented somewhere. I realised that my participant teachers were not comfortable with being videotaped. I thus handled the situation by calmly telling them that the research was very confidential, and that I would not 'expose' them anywhere: I would not even allow them to watch each other's lesson presentations.

In the classroom for the first time, learners were not comfortable with me and my cameraman and they were shy to talk aloud, despite being told beforehand about our visit. The teacher kept on telling them to speak out. Some learners could not talk in front of the camera and

tended to put their heads down. But as the days passed by, I noticed that they began to get used to the camera.

Recovering filled-in questionnaires was a challenge that I faced. I thought taking the questionnaires to schools myself without using the circuit office to deliver them for me, would be of help in getting them back in good time. Strategically, as I was delivering my questionnaires I was able to collect the teachers' cell phones numbers.

To my surprise, things did not work out as planned, as it took some months before the questionnaires were returned to me. I had to follow up by phoning teachers and/or driving to their schools and in this way was able to retrieve 47 out of 70 questionnaires (67%).

Another challenge I faced was the conducting of the stimulated recall interviews with my participant teachers. It took almost three months from the time I observed my lessons to get one teacher to do a stimulated recall interview. Even though we agreed on times and dates to watch the recorded video together, it never materialised with the other teacher. They kept on postponing and giving excuses that they were busy with their school work. I tried to be patient with them until I managed to get hold of one teacher whom I interviewed. I did not manage to interview the other teacher because of his constant excuses and evasions. This may marginally have affected the quality of my data.

6.6 PERSONAL REFLECTIONS

During my journey in this research process there were times when I felt I should just give up since I was fully committed at school with large numbers of learners (not to mention my household chaos). I thought I could not cope with the heavy load on my shoulders, and time management was a challenging factor. However, my supervisors' encouragement, motivation and support helped allay my fears, each time I thought of quitting.

The MEd course has helped me to develop personally, academically and professionally. When I started I did not know how to carry out research, since in the BEd (Hons) course we did a minimum research of (10-page project in Environmental Education). Being a novice

researcher requires patience, eagerness and fortitude to meet any challenge that comes your way. In the data-gathering process I faced challenges: after I had observed my lessons, my research participants were giving me a lot of excuses so as to avoid stimulated recall interviews with them. From that I learnt that doing research is a process that requires patience, and a willingness to learn beyond the immediate expectations that it generates.

The research has enabled me to find out that teachers in the Zambezi Region and even country-wide in Namibia code-switch from English to their local languages – when I thought I was perhaps the only one code-switching in my teaching! I learned that many factors contribute to successful teaching and can influence meaningful learning.

6.7 CONCLUSION

Code-switching is a widespread practice in our Namibian schools. It is not done as a deliberate departure from policy but because of the difficulties associated with English language proficiency that teachers are facing in their classrooms. Teachers consulted in this study find it useful to mediate learning with the use of code-switching. Those teachers who do not support code-witching maintain that the national language policy does not mandate code-switching and that examinations are written in English, and that there is therefore no need for code-switching.

Before I conducted this study, I thought that code-switching only occurs when teachers lack the appropriate terminology in English, or else when a person wants to mix language since she/he is now educated and is sufficiently familiar with English to code-switch when she/he wants to. I never knew it was a serious concern that needs to be researched. Essentially, this study has helped me to understand that code-switching, especially in the classroom, helps learners to understand the content of the subject better; it also helps to maintain discipline in the classroom and to capture the learners' interest in the lesson. This is in line with Youkhana (2010, p. 20) who claims that with the help of code-switching we can build a bridge from the known, our native language, to the unknown, the target language. Previous research suggests that code-switching has a significant role to play in the foreign language classroom. Even if

we wish to avoid the native language in the classroom it will always be a part of the consciousness of the teachers and learners, so why not try to benefit from it?

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APPENDICES

Appendix 1: Permission letter to the Director of Education; Ngoweni Region.

P.O. Box XXX

Ngoweni (Pseudonym)

Namibia

14 March 2014

The Director

Ngoweni Regional Council

Directorate of Education

Private Bag YYY

Namibia

Dear Sir

Re: Permission to observe some Natural Science lesson presentations at Zebra Primary School. (Research Study)

I am hereby requesting for a permission to conduct a research study at the above mentioned school as from 19-23 May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi: A case study.**

I made arrangement verbally and in writing with the two Natural Science teachers teaching Grade 7 at the above mentioned school to be my research participants in my study. They have indicated to participate willingly. Once permitted, I will observe and videotape four lesson presentations from each teacher, the lessons videotaped will be played in the presence of the teachers, and observed at their free time. I will look at lesson plans, learners' written work and share my experience with the teachers during our discussions.
All participants in my study will be treated with respect and dignity. Confidentiality and anonymity will be upheld. Where participant wants to withdraw, she/he will be free to do so.

Your co-operation in this regard will be highly appreciated

Yours Sincerely

Hildred M. Denuga (Mrs.)

Appendix 2. Letter to the Inspector.

P.O. Box XXX

Ngoweni

Namibia

14 March 2014

The Inspector

Ngoweni Regional Council

Directorate of Education

Private Bag YYY

Namibia

Dear Sir

Re: Permission to observe some Natural Science lesson presentations at Zebra Primary School. (Research Study)

I am hereby requesting for a permission to conduct a research study at the above mentioned school as from 19-23 May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi: A case study.**

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All participants in my study will be treated with respect and dignity. Confidentiality and anonymity will be upheld. Where participant wants to withdraw, she/he will be free to do so.

Your co-operation in this regard will be highly appreciated.

Yours Sincerely

Hildred M. Denuga (Mrs)

Appendix 3. Letter to the Principal Zebra P.S

P.O. Box XXX

Ngoweni

Namibia

14 March 2014

The Principal

Zebra Primary School

Private Bag YYY

Namibia

Dear Madam

Re: Permission to observe some Natural Science lesson presentations at Zebra Primary School. (Research Study)

I am hereby requesting for a permission to conduct a research study at the above mentioned school as from 19 to 23 May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi: A case study.**

I made agreement verbally and in writing with the two Natural Science teachers teaching Grade 7 at the above mentioned school to be my research participants in my study, and they have indicated to participate willingly. Once I am permitted, I will observe and videotape four lesson presentations from each teacher, the lessons that has been videotaped will be played in the presence of the teacher, I will interview the teachers observed at their free time, look at lesson plans, learners' written work and I will share my experience with the teachers during our discussions.
All participants in my study will be treated with respect and dignity. Confidentiality and anonymity will be upheld. Where participant wants to withdraw, she/he will be free to do so.

Your co-operation in this regard will be highly appreciated.

Yours Sincerely

Hildred M. Denuga (Mrs.

Appendix 4. Letter to the Principal Yetu Senior Sec. School.

P.O. Box XXX

Ngoweni

Namibia

14 March 2014

The Principal

Yetu Senior Secondary School (Pseudonym)

Private Bag YYY

Namibia

Dear Madam

Re: Permission to observe some Natural Science lesson presentations at Zebra Primary School. (Research Study)

I am hereby requesting for a permission to conduct a research study at the above mentioned school as from 19-23 May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi: A case study.**

I made agreement verbally and in writing with the two Natural Science teachers teaching Grade 7 at the above mentioned school to be my research participants in my study, and they have indicated to participate willingly. Once I am permitted, I will observe and videotape four lesson presentations from each teacher, the lessons that has been videotaped will be played in the presence of the teachers, I will interview the teachers observed at their free time, look at lesson plans, learners' written work and I will share my experience with the teachers during our discussions.
All participants in my study will be treated with respect and dignity. Confidentiality and anonymity will be upheld. Where participant wants to withdraw, she/he will be free to do so.

Your co-operation in this regard will be highly appreciated.

Yours Sincerely

Hildred M. Denuga (Mrs.)

Appendix 5. Letter to my research participant 1.

P.O. Box XXX

Ngoweni

Namibia

24 March 2014

Mrs. Alta Lattey

Zebra Primary School

Private Bag YYY

Namibia

Dear Madam

Re: Requesting you as my research participant teacher

I am hereby requesting you to be my participant teacher in the research study to be conducted at your school as from 19th to 23th of May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi:** A case study**.**

The outcome from this study will be published in a thesis form and will be available to the decision makers in education, curriculum developers, teacher educators and Natural Science teachers in order to bring about improvement in the teaching of Natural Science.

Should you give me permission; I will observe and videotape three lessons presentations during your Natural Science class.

I will be most grateful if you will allow me to work with you.

Yours Sincerely

Hildred M. Denuga (Mrs

Appendix 6. Letter to my research participant 2.

P.O. Box XXX

Ngoweni

Namibia

24 March 2014

Mr. Rocky Wormmy

Zebra Primary School

Private Bag YYY

Namibia

Dear Sir,

Re: Requesting you as my research participant teacher

I am hereby requesting you to be my participant teacher in the research study to be conducted at your school as from 19th to 23th of May 2014.

I am currently studying with Rhodes University as from January 2013 -2014, the programme is a two years course. I am pursuing a Masters Degree in Science Education. My topic of study is: **An investigation into how the Grade 7 Natural Science teachers mediate learning through English/Silozi:** A case study**.**

The outcome from this study will be published in a thesis form and will be available to the decision makers in education, curriculum developers, teacher educators and Natural Science teachers in order to bring about improvement in the teaching of Natural Science.

Should you give me permission; I will observe and videotape three lessons presentations during your Natural Science class.

I will be most grateful if you will allow me to work with you.

Yours Sincerely

Hildred M. Denuga (Mrs)

\

Appendix 7. Acceptance letter from the Director.

Regional Council
Directorate of Education

Private Bag 50 Katima Mulilo, Namibia

Enquiries:
File No:

28th March 2014

Mrs Hildred M Denuga
P.O.Box 633
Ngweze
Namibia

RE: PERMISSION TO OBSERVE SOME SCIENCE LESSONS PRESENTATIONS AT NGWEZE PRIMARY SCHOOL

You letter dated 14th March 2014 requesting for permission to visit school as per above has reference.

Kindly be informed that approval is hereby granted to you to conduct your observations at Ngweze Primary School as per your request.

However, be advised that such granted permission should not disrupt the normal teaching and learning activities at the school you intend visiting. Principal of the school you intend visiting should be notified in advance, so as to propose a programme for such activity.

By a copy of this letter the Inspectors of Education will be notified accordingly.

Counting on your understanding and cooperation in this regards.

Thank you,

Appendix. 8 Acceptance latter from the Inspector.

REPUBLIC OF NAMIBIA
REGIONAL COUNCIL
DIRECTORATE: EDUCATION
KATIMA CIRCUIT

Enquiries: P/Bag 50 Ngweze,

12 May 2014

The Principal
Primary School
Private Bag 1
Ngweze

Dear Madam

RE: PERMISSION FOR MS DENUGA HILDRED MALILO TO DO OBSERVATIONS

Permision is hereby grated from the office of the Inspector for the above mentioned teacher to do her obersations for the period of two weeks, from the **19th** to the **30th** of May 2014.

Please accord her the opportunity.

Your faithfully

INSPECTOR OF EDUCATION

Appendix 9. Acceptance latter from the Principal: Zebra Primary School.

PRIMARY SCHOOL
Private Bag Katima Mulilo, Namibia

01 April 2014

P.O.Box 633
Ngweze
Namibia

Dear Madam **(Mrs. Denuga)**

RE: ACCEPTANCE LETTER: RESEARCH STUDY

With reference to your letter dated **14 March 2014** regarding the above mentioned title:

This letter serves to inform you that your request for conducting a research study at the above mentioned school from the 2nd week of the 2nd term is hereby acknowledged.

You are welcome to conduct your research study at our school for the period which is convenience to you.

We will give you all the necessary support which you will need from our school.

Wishing you a productive research study.

.....

SCHOOP PRINCIPAL

PRIMARY SCHOOL
Principal's Office
Private Bag Ngweze
2014 -04- 01

Appendix 10. Acceptance latter from research participant 2.

PRIMARY SCHOOL
Private Bag , Katima Mulilo, Namibia

09 April 2014

Mrs Denuga H M
P. O Box 633
NGWEZE
Namibia

Dear Mrs Denuga

RE: ACCEPTANCE LETTER

Your letter of requesting me to be a participant teacher in your research dated 24 March 2014 has been acknowledged and accepted.

You will be allowed to observe my lesson presentations.

Thank you

Yours faithfully

Mr. Normmy

09-04-2014
Date

Appendix 11. Acceptance latter from research participant 1.

PRIMARY SCHOOL
Private Bag Katima Mulilo, Namibia

Ministry of Education
2014 -04- 09
Republic of Namibia

09 April 2014

Mrs Denuga H M
P. O Box 633
NGWEZE
Namibia

Dear Mrs Denuga

RE: ACCEPTANCE LETTER

Your letter of requesting me to be a participant teacher in your research dated 24 March 2014 has been acknowledged and accepted.

You will be allowed to observe my lesson presentations.

Thank you

Yours faithfully

Kathey

09 - 04 - 2014
Date

Appendix 12. Acceptance latter from the Principal Yetu S.S.S.

YETU SENIOR SECONDARY SCHOOL

14TH May 2014

To whom it may concern

Dear sir /madam

Re: Permission for a Research (Mrs Denuga Hildred M)

The school is hereby granting permission to Mrs Denuga Hildred M a teacher at the above mentioned school to conduct her Research Study at Ngweze Primary School from 19-30 May 2014 as per her request letter dated 14 March 2014.

Since the School where she will be conducting her Research is nearby, the teacher is requested coming back and offer lessons to her classes in the afternoons.

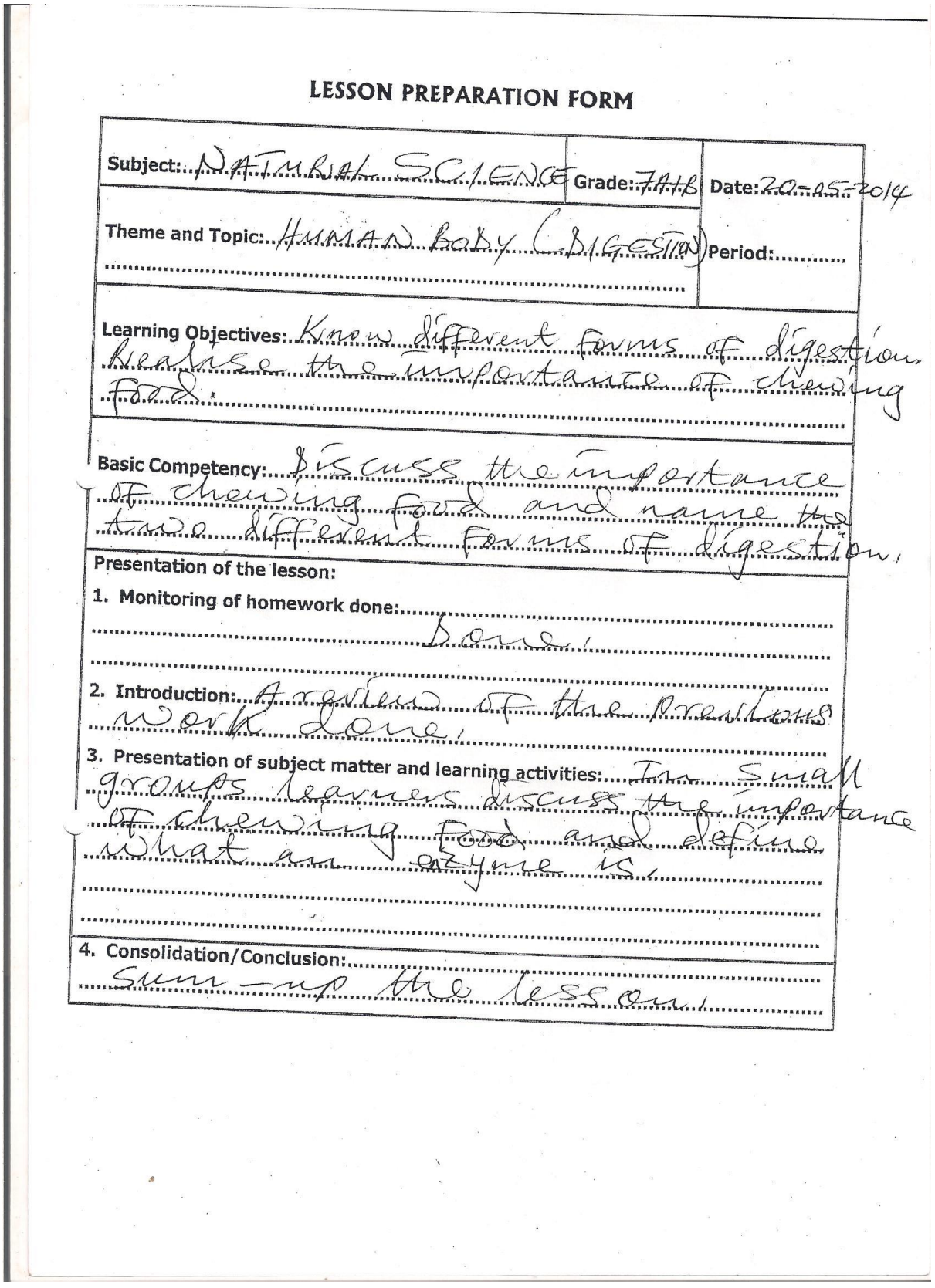
Your assistance will be highly appreciated.

Thanks

Principal

MINISTRY OF EDUCATION
Yetu Secondary School
Private Bag 1026
Kinfima Mutilo
2014 -05- 14
REPUBLIC OF NAMIBIA

Appendix 13. Example of the lesson preparation for teacher 2.



LESSON PREPARATION FORM

Subject: NATURAL SCIENCE Grade: 7A+B Date: 20-AS-2014

Theme and Topic: HUMAN BODY (DIGESTION) Period:

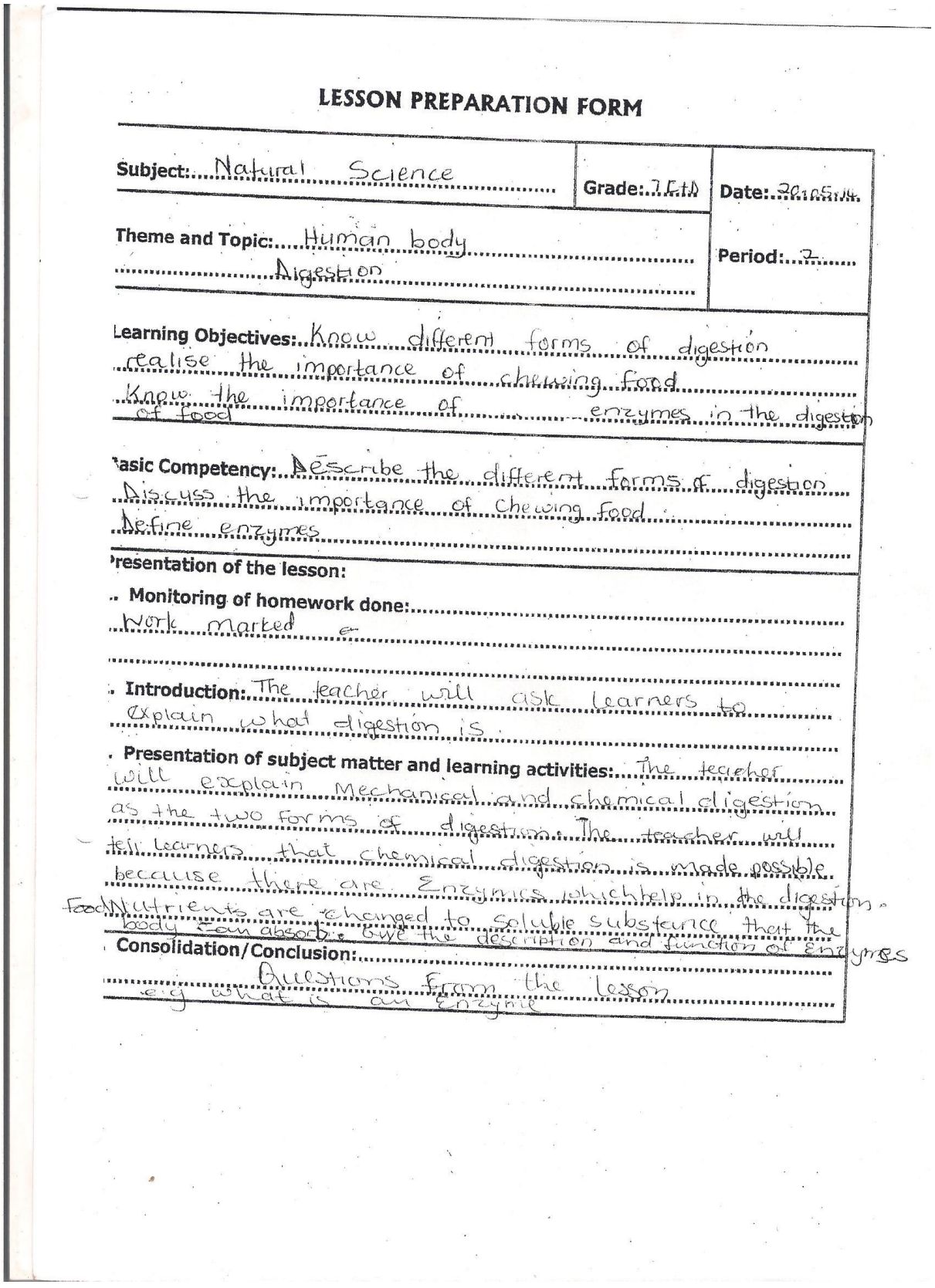
Learning Objectives: Know different forms of digestion. Realise the importance of chewing food.

Basic Competency: Discuss the importance of chewing food and name the two different forms of digestion.

Presentation of the lesson:

1. Monitoring of homework done: None.
2. Introduction: A review of the previous work done.
3. Presentation of subject matter and learning activities: In small groups learners discuss the importance of chewing food and define what an enzyme is.
4. Consolidation/Conclusion: Sum-up the lesson.

Appendix 14. Example of the lesson preparation for teacher 1.



LESSON PREPARATION FORM

Subject: Natural Science **Grade:** 7 Eth **Date:** 30/05/14

Theme and Topic: Human body
Digestion

Period: 7

Learning Objectives: Know different forms of digestion
realise the importance of chewing food
Know the importance of enzymes in the digestion of food

Basic Competency: Describe the different forms of digestion
Discuss the importance of chewing food
Define enzymes

Presentation of the lesson:

- **Monitoring of homework done:** Work marked
- **Introduction:** The teacher will ask learners to explain what digestion is.
- **Presentation of subject matter and learning activities:** The teacher will explain Mechanical and chemical digestion as the two forms of digestion. The teacher will tell learners that chemical digestion is made possible because there are Enzymes which help in the digestion. Food Nutrients are changed to soluble substance that the body can absorb. Give the description and function of Enzymes
- **Consolidation/Conclusion:** Questions from the lesson
e.g what is an Enzyme

Appendix 15: Learner's work

REPUBLIC OF NAMIBIA

MINISTRY OF EDUCATION

Natural Science Task Marks: 10

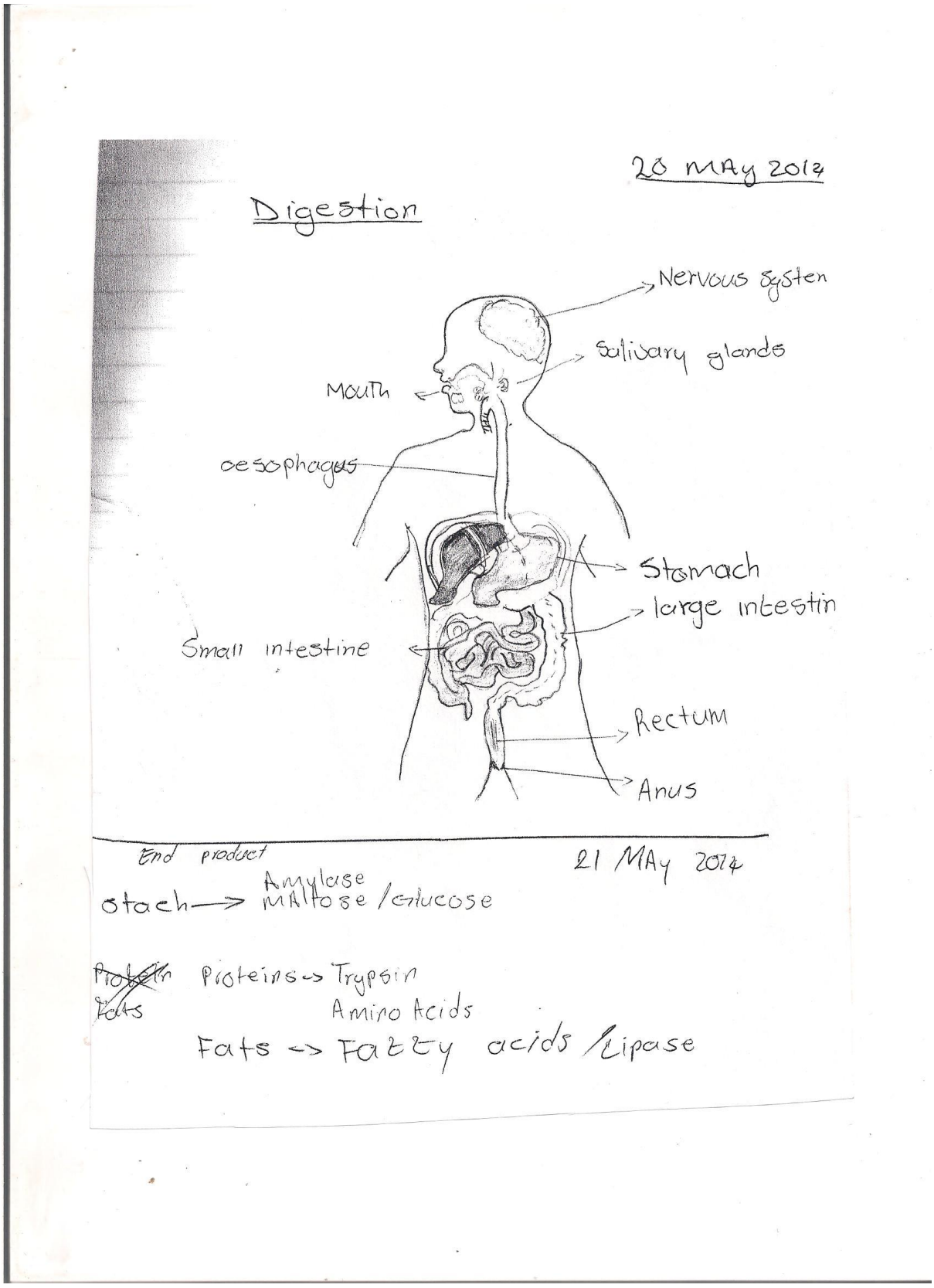
Grade: 7D 10/10 excellent 04/03/14

Name: Mushaulwa Viona Moola

Complete the following table by completing the missing information.

NAME OF SYSTEM	PARTS INVOLVED	FUNCTION
a) Degestive System	Stomach Intestines	b) To break down food in to smaller pieces./simpler su
Support System	Bones, Muscles	c) To give the body The shape/structure.
d) Nervous System	Brain, Nerves, Spinal Cord	Sends information to body parts
Respiratory System	Lung, trachea, nose	e) To breath in oxygen and breath out carbon dioxide.
f) Excretory System	Lung, Skin, Kidneys	To remove harmful waste products from the body
Circulatory System	g) Veins, Arteries heart bronchi	h) To pump blood to all parts of the body.
i) Reproductive System	Male and female sexual organs	j) To make babies

Appendix 16: Learner's work



Appendix 17: Teacher's questionnaire

Teachers' Questionnaire on Code-Switching

Code-switching is a teaching strategy in which a teacher uses two or more languages during his/her lessons, for example, English(which is a medium of instruction in Namibia) and another local language (for example, Silozi). So, the purpose of this questionnaire is to find out Natural Science teachers' perceptions and experiences regarding code-switching during teaching and learning. It is for my Master's study whose focus is on code-switching.

Instructions:

- ❖ Read each question carefully before answering.
- ❖ Put a (tick) in the box of your choice where appropriate.
- ❖ Write clear explanations where required.
- ❖ Complete the questionnaire survey as honestly as possible and to the best of your knowledge.

1. What is your home language? Tick in the correct box.

   ☐ English

   ☐ Silozi

   ☐ Other languages

2. What is your learners' home language? Tick in the correct box.

   ☐ English

   ☐ Silozi

   ☐ Other languages (specify).....

3. For how long have you been teaching Natural Science? Tick in the correct box.

   ☐ 1-5 years

   ☐ 6-10 years

   ☐ 11-15 years

   ☐ Over 16 years

4. Where is your school situated? Tick in the correct box.

   ☐ Urban

   ☐ Semi- Urban

   ☐ Rural

5. a). Do you think code-switching from English to a local language during Natural Science lessons will:

   ☐ Help learners understand the concepts

   ☐ Not help learners understand the concepts.

   Tick in the correct box.

   b).In what ways does code-switching from English to a local language **helps** or **not helps** learning? Explain

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

6. a) Do you code –switch to a local language in your teaching of Natural Science?
   Tick one of the boxes.

   ☐ **Yes** ☐ **No**

   If **yes** , Explain

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

   If **no**, explain

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

6. b) On average, indicate how much time do you spend using the learners' local language in your lessons.

Time	0-5	6-10	11-15	16-20	21-25
Minutes	min	Min	min	min	min
Tick in box					

7. a) Would you prefer Natural Science lessons to be taught in:

- ☐ English
- ☐ Silozi
- ☐ Both English and Silozi

b) Why do you prefer your Natural Science lessons to be taught in the language/languages you have chosen above?

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8. What challenges do you normally experience when code-switching from English to a local language?

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9. How do you deal with these challenges you have mentioned above?

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10. What are your general views about the use of code-switching in Natural Science lessons? Give your personal feelings and opinions.

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.....

End of questionnaire: **Thank you for your time and effort**

Appendix 18: Classroom Observational form.

Classroom Observation Tool

Teacher..... Date: _____
School..... Grade: _____
Observer..... Program: _____

Class period: ----------

Theme: ----------

Topic: ----------

Purpose of lesson
(objectives):----------

Intended

outcomes:----------

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1. **Use of prior knowledge**

- Introduction

- Throughout

- Conclusion

---

2. Use of language

- Clear instructions

- Code-switching

- Nature of questions asked

- Quality of teacher-learner interactions

- Clarity of explanations

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3. Teaching Strategies

Teaching style----------

- **Question and answer method**

- Group discussions

- Use of technology

- Activities- Practical's

  - Investigations

  - Worksheets

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4. Scaffolding

- Learner support materials

- Consolidation of content knowledge (Concepts)

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5. General lesson progression

- ❖ Flow of the lesson

- ❖ Gender sensitivity

Appendix 19: Questionnaire responses from teachers.

The Questionnaire

Perceptions (views) Q 10	**Experiences (Dealing with it) Q 5b**
▪ Code-switching should be effective. Learners easily understand throughout the learn. Serves time because if they don't understand in English, you just simply switch and explain then continue with the lesson.	▪ It helps in a sense that when you explain in the local language learners will understand better. They bring things explained in English and those in the local language and then draw only one conclusion of understanding.
▪ It has its' ups and downs. It helps learners if they did not understand clearly. But again learners will get used to be taught in both English and Silozi while it's just supposed to be in English.	▪ So that learners get used to be taught in English not both. Because now they might get used that you always have to explain in both English and Silozi, and that will always take long since you will be repeating the same thing twice.
▪ It could be wise to deal and present this lesson in English than in local languages.	▪ Because learners will need to find out some information in different recourses for them to understand the lesson. Natural Science also deals with natural resources that learners need to know and understand.
▪ Many aspects should strategies better ways of handling Natural Science.	▪ Give learners better understanding of the subject matter.
▪ It is good and applied in short seconds or minutes for understanding of learners.	▪ In the language I chose above, it will make learners to pass.
▪ It works because some learner who do	▪ English is the medium language; some terms do not have names in local

not understand proper English benefit from this code-switching but during examination, papers are set in English and teachers are not allowed to explain the question papers in vernacular language that is the problem.	language. ▪ For learners to understand the lesson topic based on learning objectives and basic competencies.
▪ I think code-switching in Natural science is necessary and important to the teaching and learning process.	▪ For learners to improve their learning in English not in their local languages.
▪ For rural areas where learners do not have access to laboratories, television, newspapers and magazines, I would prefer code-switching in my lessons, other languages have textbooks, e.g. English, Germany, French and Portuguese.	▪ It will make learners to understand the subject better since English might be a problem to some learners. ▪ Its' good because learners will improve in the language because I experience that some learners fail Natural science in various reasons, e.g. they cannot read and write English well.
▪ It is a good idea as it involve all learner and gives clear picture to the teacher whether the basic competencies was achieved or not, to deal with remedial teaching. ▪ Code-switching is necessary to improve teaching and learning.	▪ Because Natural Science is the science subject and us teachers we want to improve not only the science knowledge but also the speaking language. Namibia is a country with various languages and English is the only language we understand each other.
▪ It is a good idea as it involve all learner and gives clear picture to the teacher whether the basic competencies was achieved or not, to deal with remedial teaching.	▪ It helps them to understand the concepts well. ▪ It helps the learners to get the meaning of different concepts, they don't forget.
▪ .	▪ Learners will understand different concepts and be able to know their meanings.

▪ I prefer to use English when teaching Natural Science and if learners do not understand well the learning content, I use their local languages not more than 3-4 minutes.	▪ It will not help learners because learners will not write Natural science in the local language but in English. The concepts should be taught in English as the examination will be written in English.
▪ It helps the teacher and learners achieve the basic competencies set, and Grade 5 class need and use mostly cod-switching in Natural Science compared to Grade 7.	▪ Helps the learners to understand the concepts.
	▪ It helps make learners easily understand lesson content or concepts.
▪ It should be used only when necessary especially where learners find it difficult to understand given concepts.	▪ It helps learning by translating questions or concepts to a local language in order to understand and interpret concepts and questions well
▪ I think all teachers should use English in the lesson all the times because it can help learners to express themselves in English very well. This can help learners to use English even around the school premises.	▪ It helps learners to understand concepts which they find difficult to understand in English
▪ It is good because even those learners who are unable to comprehend in English will also benefit when code-switching is used.	▪ Not helping learners because the local language will not make learners understand the subject content, and during exams learners cannot write answers in English very well.
▪ It is good because learners understanding can be broadened in life science. Code mixing should be reviewed in a positive light.	▪ Code-switching helps learners to understand difficult words that are in English, when those words are translated, they will find it easy to understand what they have been taught.
▪ Not a good thing because learners won't master well the language of science and even terminologies.	▪ Code-switching from English to Silozi helps the learners to understand the concepts
▪ My opinion is that code-switching should not be implemented in Natural science and health education because most learners will not be able to express themselves in English; learners will be	▪ It helps learners in a way that they may understand some of the terminologies in science and this give a clear picture of what is being said

missing their answers in examinations.	
▪ My general view on this is the improvement of learners in science subjects, it must be taught in English, in local languages it bring the learning confusion of the learner and teacher bring the concept of reject real learning in Natural science.	▪ Does not help, some scientific words are very difficult to be translated to Silozi, e.g. enzymes, hydrochloric acid, protein, etc.
▪ It's really helping learners to understand real life situation integrated in the subject.	▪ It does not help because there are no biological concepts in our local languages; the concepts are hard to understand.
▪ It necessary to code-switch where necessary and not to where not necessary.	▪ It can help learners to know how to explain concepts in their local language and easily. However, there are concepts which are not so easily to be mentioned in their local language, e.g. chemicals.
▪ It must not be implemented in Namibia since communication will be a problem because we have lots of indigenous language	▪ It helps learners to understand concepts better than when just explain in English. It helps learners to recall not forget concepts
▪ Learners should be taught in English from Grade 1-7, all Natural science lessons should be in English to avoid poor understanding of English during lessons.	▪ It helps learning because when you code-switch during the lesson, learners will understand the concepts better.
▪ It is the best option, this way all learners in the classroom can understand the lesson, especially those that find it difficult in English.	▪ Through explanations, other words taught in English can be explained and well understood in their home language.
▪ Different concepts need to be interpreted in the language for learners to know and understand what is being taught, to achieve the intended goals of your teaching.	▪ It helps to explain some of the words with meaning. It also helps to give clarity as for natural science concept are confusing and terminology are will be easier to understand.
▪ Code-switching should be discouraged at all because it will	▪ There are some of the terms that learners may not understand in English where clarity can only be given in language they understand.

make learners be confused in the learning and teaching process. When learners get used to code-switching, it will be difficult for them to understand the teacher teaching without code-switching and they will not understand the content at all. I feel code-switching should be avoided as it has a negative impact to learners.	▪ Code-switching from English to a local language does not help learners because they will not know or understand the concept or terminologies of the subject, they write in English during examinations so they need to understand every explanation you do in English.
	▪ It helps learners to understand better in their native language.
▪ It is not helpful and will deprive learners of the opportunity to qualify for tertiary education, because their standard of English at that level must be high for them to cope and succeed.	▪ According to my own experience it helps, they are some terminologies which learners do not understand in English, so if a teacher mentions it in their home language they will know it, also some other animals and trees if they are mentioned in the local language they will know them.
▪ It is helpful as it enhance the understanding of the content by learners.	▪ It helps learners to fully understand, there are some things which they may only recall when you switch to the local language.
▪ It must not be implemented in Namibia because most teachers will be transferred to their regions. Some schools will remain with no teachers.	▪ It helps learners in the sense that learners clearly understand the instructions and answer according to their understanding which makes teaching and learning become better or improved.
▪ Teachers should use English where there are proper terms for science subject or lesson for easy explanations.	▪ Code-switching cannot be dependent or make it as a habitant methodology to tackle the natural science; however, those regards to be useful may be they find it to be useful.
▪ It is a good idea as this will help our learners to understand concepts in their local language.	▪ When explaining concepts, which they don't understand in English, I try to change the language; this helps them to understand better what exactly I am talking about.
▪ It is not good because learners do not benefit more by not getting the proper explanations of the basic competencies. There will be some mistakes in explaining basic competencies because people who drafted syllabi contacted	

more resources on different topics. ▪ I feel that code-switching should be allowed in school/lessons in order to meet learners' understanding in concepts that they do not understand well in the language taught because learners' understanding is one of the key to successful learning and teaching. ▪ It must be used to the minimum level because if used to the maximum level, learners might write the concepts in their local language which becomes a problem during examination. ▪ I view code-switching in Natural Science lessons to be good and very helpful as the result that I always obtain shows that really learners use to master the basic competencies stipulated in the syllabus. ▪ I feel it's good to use code-switching because it makes learners to understand better and I believe that learners will have gods to ask questions where they are not cleaver. ▪ I think it is very important. English is a second language so teachers must try to help learners to understand content by trying to use the local language when necessary. ▪ Sometimes it is helpful especial with average learners and confusion to learners who are intelligent. ▪ Is not necessary to use code-switching	▪ When learners do not understand during the lesson, they show facially and a teacher needs to explain the concept. If still learners seem not to follow, the teacher need to explain in the local language to help learners to catch up otherwise the rest of the lesson will be of no use. ▪ It helps learners to understand very well because they are fluent in their local language and it improves our learners and teaching development. **Question 6** ▪ Yes, in case I realise that my learners do not understand especially during compensatory lessons. ▪ No, to teach in local language is not good but the best way is to explain in the local language in order to make them understand. ▪ Yes, for learners to understand the learning content better and also to arouse learner's interest during teaching and learning situation. ▪ Yes, because it helps me understand this makes it easier to explain too. I use it because I have realised that it works and have improved the participation rate of my learners.

more often since Natural science provide the learners with broad subject knowledge therefore, they would be able to communicate with others and develop problem-solving skills up to the secondary level.	
▪ I think the medium of instruction must be used with the home language for the learners to achieve the basic competencies. There is no need of the teacher presetting without switching into the local language which learners understands. Lesson must be taught in English but if learners don't understand, a home language must be used and back to the medium of instruction.	▪ Yes, due to learners' poor background in English, it is hard for them to understand most English words, It is necessary to explain particularly in vernacular before switching to English.
	▪ Yes, sometimes, for learners to understand some of the difficult concepts.
▪ Code-switching cannot be overlooked in our teaching as both languages exist in our schools, but English have to be and used all the time to achieve perfect results.	▪ Yes, for learners to understand the concepts.
	▪ Yes, sometimes I do switch to a local language if they don't understand for better understanding and emphasize points.
▪ It promote failure rate, learners cannot express their views in English and they cannot master some of the concepts. It provide laziness.	▪ Yes, I switch because when I used to explain in English learners seems to not to understand when I switch to a local language you will see that learners seems to be understanding and get interested as you are explaining.
▪ Code-switching has a negative impact on the learners because they can do the same when writing the examination , that's why grade four learners in Namibia find it difficult in grade 5 when they are introduced to Natural science taught in English only because in grade 4 most teachers code-switch their lessons.	▪ No, in an independent world, people need to match with the level in which the world is focusing.
▪ I think code-switching helps because it's the only way in which explanations can be simplified and made easy for the learners to understand.	▪ No, because learners are suppose to be used to the language of science as this might also help in the examination when there is no teacher to explain the terminologies used

▪ Natural science teachers should motivate the use of English throughout the lessons, learners must get used to the concept and vocabulary of Natural science. The importance of mastering the subject. ▪ I may say code-switching can be helpful in teaching and learning but I may say teachers should not spend much time switching since learners will be assessed in English, use it on your scaffolding, thank you.	▪ Yes, when learners are involved in activities which require co-operation and discussions with their peers in order to give clarity to concepts. ▪ Yes, I do code-switch from English to Silozi if I realize that my learners are not perceiving what is suspected of them and English also is not our mother tongue even though is the official language. ▪ No, because during examination, it will be difficult for learners to write answer in English if they will be used to a local language during lessons ▪ Yes, I use to explain the concepts in local language when learners seem not to understand such English scientific concepts. ▪ Yes, for learners to understand well but not the whole period only where needed. ▪ No, it is not easy to translate science terms in local language. ▪ Yes, I do so in parts of the content that needs learners to comprehend and master the concepts. ▪ Yes, I always switch into local language just to enhance the understanding of learners. Although I know that it will not benefit my learners, I will always end up doing it because of the situation one find himself/herself in. ▪ Yes, to give local explanations and

	practical examples that meets the learning environment. ▪ Yes, for learners to be able to understand and get clarity. ▪ Yes, when I present my lesson, I always use English and I code-switch to a local language when I do further explanation in order for learners to understand the content very well. ▪ Yes, there are times where learners do not understand exactly what they are learning. Local language acts an eye-opener to the learners to grasp the content. Sometimes local language makes it easier for learners to translate to English. ▪ Yes, learners do talk and telling their friends in local language in the classroom during teacher and write class work or exercise and activity, otherwise they do ask in first language to the teacher. E.g. *Ha mu lu bulelele mwa Silozi.* Meaning, tell us in Silozi. ▪ Yes, teachers cannot be allowed to switch or use local language in teaching of any subject. Teachers are encourage to use teaching aids which can make learners to enhance learning in all subjects. ▪ Yes, sometimes but not often only when I see a need that learners do not understand in English. ▪ No, Very difficult to find the proper terms for science in Silozi, e.g. transpiration, xylem vessels, phloem

	vessels, translocation, etc. ▪ No, I have learners in my class who cannot understand our local language. ▪ No, I don't always code-switch, the reason is that there are no tests in the local language; moreover the vocabulary of the concepts in my language is limited. ▪ Yes. I use to code-switch to a local language if I see that my learners do not understand concepts when explained in English. I have proved that whenever I code-switch for explanations learners will understand the concepts and they will not forget it and also can explain it in English using their own words ▪ Yes, I do code-switch sometimes so that I can help my learners to understand what I am trying to emphasize during the lesson. ▪ Yes I use local language sometimes because our learners are not familiar with scientific terminologies. They only way is to code-switch and explain further, this enables my learners not to forget what they learnt. ▪ Yes, sometimes more especially to grade 8's if they do not understand a concept, I change to a local language just to clarify what learners seems not to understand. ▪ Yes, the concepts they don't understand, I translate to a local language which they understand better and I go back to English again.

	Sometimes I ask them to explain they understood in their local language. ▪ No, normally communicating with them through questioning, instruction explaining and giving feedback after that are given individual task or group task activities can make them understand. ▪ Yes, sometimes use local language in my teaching to help learners understand and get the meaning of the scientific terminologies used in the subject for the success of learning of the subject. ▪ Yes, I do code-switch because our learners in the rural areas do not have a full understanding of the English language which remains a challenge. ▪ Yes, for the learners 'sake, so that they can understand that word I am trying to explain as well as discipline purpose. ▪ Yes, it helps the learner to understand some of the concepts and can easily explain in their local language. ▪ No, because learners need to understand the subject in English, be able to pronounce, write correct spelling in English. Learners need skills in speaking and when giving feedback on tasks in English language. ▪ Yes, I always code-switch to a local language in order to help learners more especially with some terms, that they fail to understand during

	classroom situations. ▪ Yes, some of the explanations are difficult to understand by learners, code-switching therefore will help to simplify some vocabulary used in Natural science, and some learners fell comfortable with local language. ▪ Yes, I switch to a local language where learners seem to struggle on elaborating further to rectify where they do not understand.
	Question 7
	▪ English, ▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ Both English and Silozi ▪ Both English and Silozi ▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ English ▪ English ▪ English ▪ Both English and Silozi ▪ Both English and Silozi

	▪ English ▪ English ▪ Both English and Silozi ▪ English ▪ Both English and Silozi ▪ English ▪ English ▪ English ▪ English ▪ English ▪ English ▪ English ▪ Both English and Silozi ▪ Both English and Silozi ▪ English ▪ English ▪ English ▪ English ▪ English ▪ English ▪ English
	Question 8
	▪ Some scientific terms are tough to interpret in the local language. ▪ Some of the learners still find Silozi as a subject but not as a language. They do not understand Silozi; they use a lot of local languages such as, Sifwe and Mbukushu. ▪ Sometimes when switching languages, learners get too comfortable in vernacular and get to try and grasp the subject content in English.

	▪ I found it difficult to explain in Silozi because it is not my mother tongue. Our local languages make most of our learners fail, because during examination, they answer questions in English which they cannot even read and write. ▪ No challenges ▪ It is time consuming, we always waste time explaining twice and that makes us teach less topics. ▪ It is a challenge especially if you as a teacher doesn't know how to explain that specific thing in the local language and you only it in English. You think I am explaining or switching but you don't know how you will explain it, so here a teacher ends up being stuck if he/she does not react or think quickly. ▪ There are less or limited resources to be used than when learning in English. There are fewer books written in local languages compared to those in English. ▪ Most of the learners when they speak English they tend to shy and show negative attitudes towards learning. ▪ Communication between the teacher and learners is easy. Learners are able to answer the questions after the explanations and know and understand what is expected to them. ▪ Very difficult because there are no proper terms in Silozi, to explain the given scientific words, e.g. atoms

	being the smallest building blocks of matter. ▪ Some of my learners are disadvantaged because they do not understand the local language. ▪ Learners tend to become addicted to speaking in local languages leading them to have low courage to speak English. ▪ If teachers switch to a local language in teaching Natural science and Healthy education, most learners cannot express themselves in English; they want to write answers in the local language which is not good expressions. ▪ Experience in transfer English to a local language may cause a learner to know and not to understand a natural science subject. ▪ Learners do not understand English well if it is used for the whole period until the teacher changes to the other language ▪ I am not proficient in Silozi and have limited vocabulary in, therefore find it difficult to use correct or appropriate words ▪ Words that are in vernacular are not found in English and vice versa ▪ Learners will not be fluently in English because of code-switching and clear understanding of English will be a problem.

	▪ Sometimes words that are in English that learners do not understand well can be also difficult to explain in the local language. ▪ Code-switching is viewed as often as a negative phenomenon, you are viewed as inadequate command of language, and some people believe that it dilute the whole system of education. ▪ The only challenge will be that, learners also will be writing in the local language as well which is not right. ▪ One of them is explaining scientific terms, sometimes it is difficult because other words are better understood the way they appear. ▪ When I code-switch from English to a local language, learners wants to write their answer in their local languages instead of English ▪ When I give an example or explanation in a local language, learners also tend to write such an answer during the examination or test in a local language. ▪ The learners find it difficult to translate from local language to English when writing ▪ Some concepts are difficult to explain in mother tongue

	▪ Learners might write those local words during examination which is not allowed. ▪ They learners understand but cannot explain what they understood in English. ▪ The challenges could be, learners will always want to write in the local language that you were teaching them with, when they write a test, they will find it difficult to explain the concepts in English instead they will be mixing the language which will lead them to their confusion. ▪ Most of the learners become active and start to show positive attitude towards teaching and learning. They really share ideas in their local language when they are in groups instead of using English as a medium of instruction ▪ Its' time consuming, time will not be adequate to the lesson planned ▪ Right terms or terminology which suits the concepts that I am teaching. ▪ How learners respond in test exams, some prefer to write in their local language. ▪ My classes are compressed with multi-lingual learners; I have learners who speak different home languages, so if I speak in Subia other learners will not understand. We are lucky that all learners learn Silozi. So it's the only language all learners understand.

	▪ Learners intend to use the local language in the examinations or tests as the fail to translate it in English. ▪ In terms of assignments and projects, learners need to find out information from other sources such as internet and library books. ▪ Learners sometimes ending up responding and writing in their local language during examinations and writing of tests and other assessment. ▪ The only problem we experience is the full interpretation of some words in the local language putting some words from English to Silozi is a challenge we daily face. ▪ Some learners will get used to the home language even in the examination. When you explain in a home language will answer in a home language. ▪ Some other terminologies are difficult to explain in a local language. ▪ I do not code-switch. ▪ Sometimes learners may want to continue using the local language to explain some terms. ▪ For instance you may might switch to a certain language which other learners don't understand; it may favour others while others are deprived during the lesson.

	▪ Some of the concepts and vocabulary could not be found in the local language. It is also time consuming sometimes learners might be exempted to use first language.
	Question 9
	▪ I have tried to learn the local language and integrate it to my lessons to increase participation. ▪ By encouraging learners to try and learn as much English as possible ▪ Encouraging learners to use English as a medium of instruction. ▪ Sometimes I teach in the afternoon, and before teaching the lesson I ask the learners to read through the topic so it will be easier to explain once they have a background of what will be taught already. ▪ The only way is to continue teaching in English rather than to disappoint you as a teacher. After the lesson I ask my colleagues how I would have explained such a thing, when I have known then I have to come back to my learners and explain to them in the local language nicely. ▪ The other way is to make sure that the teacher has to gather more information and develop own teaching aids, which is also time

	consumption. ▪ Encourage learners to speak English on the school premises. ▪ To encourage learners to use English inside the classroom and outside the school premises for them to improve in English. ▪ I concentrate to teach in English where there are proper terms, explain in simple English clearly. ▪ I prefer to teach in English to avoid some inconveniences, learners will not get the proper explanations of basic competencies. Learners will be confused during the lessons. ▪ I always use teaching aids instead of switching to learners' local language. I also bring real teaching materials in the class when I am busy teaching learners in natural science and Health education. ▪ I stick to English at all times and encourage the learners to use English for better understanding of science terms and concepts. ▪ By giving much work to learners to do, e.g. homework's, testes, tasks and projects. Controlling and giving feedbacks. ▪ I do code-switch when a new concept which I did not come across in the previous lesson appears in a lesson. For learners to understand and be able to follow what is being taught

	▪ Sometimes teach in the afternoon and before teaching the lesson, ask learners to read through the topic so that it will be easier to explain since they have a background of what will be taught already ▪ To tell learners and discuss knowing for simple and fast understanding topic of chapter. Teaching fast and give activities or class work in homework and handouts in the same periods ▪ By consulting with other teachers especially language teachers for help before the lesson. Some learners are fluent in Silozi and they sometimes come in when stopped or looking for appropriate words ▪ Correct the misconceptions that may erupt. ▪ It is better to use one language which is English. ▪ Both I (teacher) and my learners will find the easiest meaning to the words. ▪ I do emphasize the value of co-operative learning, I do acknowledge what each learner contributes to the class, affension it and build on it in whatever language used. I have adopted a relaxed and tolerant attitude towards fascination in language abilities.

	▪ The only solution is to avoid local and English language in the class, and sticking to English by using the simplest English possible. This will also bring laziness in the comparing of the science terminology including wrong spelling. ▪ No other option, but just try by all means to make sure the words are explained in simpler terms. ▪ I only use English during my lessons so that all learners can express themselves in English at all times. ▪ I always warn them not to write any answer in vernacular, and I always mark wrong. ▪ I stick to English all times ▪ I justify in making my explanations and yet confuse my learners just to use it for better conception but still use the concept in the English language in their tests, homework and exams. ▪ To explain to learners and encourage them to use and write in the medium of instruction ▪ The best way is to do away with code switching to avoid misunderstanding. Teachers should concentrate much on the spoken language (English) in which this subject is taught, and this language is the only one which they will use to set the examinations of learners.

	▪ By consulting my fellow teachers teaching Silozi before presenting the lesson ▪ If I realize that the lesson have some difficult concepts that might require me to code-switch, I plain my lesson in such a way that it have five minutes for code-switching. Sometimes I use to conduct extra classes where I have enough time to code-switch. ▪ Have enough time to make learners understand the subject content. Seek help from other colleagues on how to handle the situation. I will ask those who really understand to explain to their peers in the language the understand using flash cards or different languages meaning the same thing or scenario. ▪ I totally discourage it at all. ▪ None ▪ I explain in English as it is , e.g. atom ▪ I use to discourage them to use the home language in exams as the medium of instruction is English. ▪ As a teacher teaching in the rural area where the use of English is not perfect by learners, we have to code-switch even when the words cannot be put perfect, the sentences can be put perfect making learners to understand. ▪ I always urge learners not to write or

	answer in their local language during assessment but use English to express their understanding in the subject. ▪ Giving them topic tasks, topic tests and practical activities based on the same topic so that the learners can recall what they have learnt. ▪ When teaching, you emphasize to learners not to use local language in written papers. ▪ I sometimes use Silozi which is a language all my learners understand. ▪ I explain to learners that we are not learning teaching local language and it is better to write a wrong spelling rather their language because in science we don't consider much on spelling.

Appendix 20: Video Transcription. Teacher 1.

Classroom observation.

Video Transcription. Teacher 1 (Mrs. Lattey)

List of abbreviations

T1- Teacher 1

T2- Teacher 2

TA-Teacher action

TT- Teacher talk

L- One learner

LL- Two or more learners

LLL- Whole class

Lesson 1. (35 minutes)

The human body

Introduction

T: What did we learn last Friday?

L: We learnt about systems

T: Systems of what? Systems of cooking?

L: Body systems

T: Do you still remember those systems?

LLL: Yes

T: What are there?

L: Support system

T: You are too fast

L: She repeats support system (now everybody heard what she mentioned)

T: Who else can give us the answer?

L: Respiratory system (with a low voice)

T: Your voice is too low, can you talk loud.

L: Respiratory system (learner repeats the word with a high voice)

T: Good, other systems?

LL: Other learners start to mention other remaining systems one by one. e.g. digestive system, nervous system, circulatory system, reproductive system and excretory system.

T: Les found out about the function of these systems. What is the function of the nervous system?

L: To send information to all parts of the body.

T: Very good.

T: What is the function of the digestive system?

L: To break down food into simpler substances.

T: Excellent, She repeats the answer again.

T: Today we are going to concentrate on the system which is **the digestive system**.

T: The What?

LLL: The digestive system

T: **The Digestive System**. (She writes it on the chalkboard)

T: What is digestion?

L: To break down food into simpler substance of molecules.

T: Good. This digestion learners, is a process in which food is broken down into simpler/soluble substances that can be absorbed by the body.

T: Why do we eat food?

L: To make our body strong

L: To get energy:

L: To get vitamin

L: To be health

L: To grow

T: To get minerals as well, that makes our bodies to repair itself.

T: Example is when you eat an apple; your body does not take an apple as it is. What happened?

L: It will be digested

T: There is digestion process in our bodies so that food is digested before absorbed by our bodies, this cannot happen in a minute but it takes a period of time.

T: When digestion is happening, it does not happened on the ground here but there are some body parts involved.

T: Can you name those body parts?

L: Stomach

L: Oesophagus

T: Some learners are not participating, are you with us here?

L:Stomach
T: Stomach has already been mentioned

LL: Some learners continue mentioning some part which is already been mentioned.

TA: She pastes the flash cards which are written all the parts of digestion randomly on the chalkboard. She told the learners to read them loud.

LLL: All the learners read the flash cards loudly.

TA: The teacher pastes the chart which she drew the structure of the digestive system on the chalkboard. She points on learners to pick a flash card and paste it on the correct part (the part that matches with the name) on the chart.

T: Calls on Sunny to paste the flash card on the part that matches.

L: Sunny pasted the word "anus" on the mouth.

T: I have realised that you were not participating that's why I called on you, I want you to participate. The teacher called other learners to paste the parts where possible.

T: Calls on another learner to paste another word where it is necessary,

L: Pasted the word anus on the oesophagus

T: Calls another learner again to come and paste the flash card on the correct part.

LL: Pasted the parts on the digestive system correctly.

T: All what you have pasted on the picture of the digestive system is called alimentary canal. The alimentary canal is the path way of food from the mouth to the anus in the digestive system.

T: It is time for questions now, any question from you learners?

LLL: No questions

T: What do we call that pathway in which food is moving from the mouth to the anus?

L: The alimentary canal

T: Good, what is digestion?

L: learners talk to themselves in their groups

T: Don't talk to yourself I need the answer

L: Few learners raised their hands.

T: Now language problem, if it could be our local language you could have said it, isn't?

LLL: Yes teacher.

T: Yes, Mbuli, give it a trial

L: Mbuli, digestion is the process of breaking down food into soluble substances.

T: Very good, he has got it, clap for him.

LLL: Clapped their hands

T: I will write some questions on the chalkboard, please answer them by writing in your workbook.

LLL: Takes their workbooks and answer the questions on the chalkboard.

T**: Writes the questions on the chalkboard:**

T: Name the body parts that form up the digestive system.

T: What do we call the path way of food in the digestive system?

T: What is digestion**?**

Lesson 2. Two forms of digestion.

Introduction.

T: The teacher greeted all the learners

T: Do you still remember what we learnt yesterday?

LLL: Yes

T: We learnt about what? Let me see those who revised at home.

L: We learnt about the digestive system.

T: What term did we look at?

L: Digestion

T: What is digestion?

T: Don't doubt, say what you know

T: Do you want to try?

L: Digestion is the process of breaking down food into soluble substances.

T: For what purpose?

L: For the body to absorb

T: Is it difficult for you to understand?

LLL: No

T: Les do something now, in your groups try to write this in your language. Write down this definition in Silozi: It is the process of breaking down food into soluble substance.

T: Hurry up; I will just give you 1 minute.

T: Are you done?

LLL: Yes

T: Now you should report

L1: *Ki mukwa wa kulubaluba lico kulibisa bunolo.*

L2*:* *Ki nzila ya kulobaka lico mwa tunto totunyinyani to tu kona kukena hande mwa mubili.*

L3: *Ki mukwa wa kuluba lico kuli lieze ze bunlo kwa kukena mwa mubili.*

L4*:* *Ki mukwa wa kutafuna lico kulibisa bunolo kuli likone kukena hande mwa mubili.*

T: Explain the definition to learners from English to Silozi.

T: Process- *Ki mukwa*

Breaking- *Kulobaka*

Simpler substances- *Kuli bisa bunolo.*

T: What do we get from food?

L: Nutrients

T: *Mubili cwale u kona kunga zani kuli sebelisa, Kwa utwahala.* The body can take those nutrients and use them. Is it clear?

LLL: Eni (Yes)

T: What do we get from food?

L: Energy

T: It is not only energy, what is it?

L: Nutrients'\

T: Yes, collectively they are said to be nutrients. Nutrients are very important to us we get them in apples, in porridge which is our stable food in fibers etc.

Main Lesson for the day

T: The teacher greeted the learners

T: She introduces the day's lesson to the learners, example: **Two forms of digestion.**

T: She writes on the chalkboard: Mechanical digestion and Chemical digestion.

T: What is the difference between Mechanical and Chemical Digestion?

LLL: All learners were quite

T: Mechanical is just break down of food into smaller pieces. Who can explain that one in Silozi?

L*: Ki kulobaka lico kuli eza bunyinyani/tubindibindi*. (Break down food into pieces)

T: Good, (*tubindibindi* is smaller pieces)

T: Mechanical digestion is happening in your mouth, it start breaking down food without mixing it with the saliva.

T: Chemical digestion is the breaking down of food into soluble/simpler substances not pieces like in mechanical digestion.

T: Who can explain what I said in Silozi?

L: *Ki kulobaka lico*. (breaking down food)

T: You can use *kulubaluba.(Crash)*

L: *Ki kulubaluba lico kuli libe ze bunolo.*To crash the food so that it become soft.

T: Ki kulubluba lico kuli libe ze bunolo hahulu ku eza kuli your body can absorb. (To crash food so that it should become very soft)

T: These food substances can be a liquid, solid, gas.

T: writes a table on the chalkboard as follows:

Food Nutrients and where they found

Proteins	Meat, eggs
Carbohydrates	Breads, porridge
Fats	Peanut butter, margarine
Vitamins	In all vegetables and fruits
Minerals	Calcium, e.g. milk, vegetables

T: What is helping us to digest food?

L: Enzymes

T: Yes enzymes help us to digest food.

T: What are enzymes? Yes, she points at one learner who was writing. *U sike wa ñola.* Stop writing.

L: The learner was quiet.

T: When you reach home today ask your parents or guardian about the meaning of enzymes in Silozi. Is it clear?

T: What are enzymes in English, tell us.

L: Enzyme is a biological catalyst that helps the digestive system to happen faster.

T: Yes, Good. Those enzymes whenever food is digested, enzymes will be produced and each enzyme knows what kind of nutrients is digesting.

T: *Mwa utwa banana*. Do you understand learners?

L: Yes

TT: Proteins are being digested by enzymes, proteins are not taken as they are in food but they are been digested (*Kulubwalubwa).*

TT: *Haunga mbonyi ye omile ku ibeya mwa chika ni ku kakala ku cokola, kana i ka cokoka hande?*

LLL: Batili

T: *Kiñi so ka bata ku beya mwateni kuli mbonyi i cokoke hande*?

LLL: Ki mezi.

T: She gave an example by saying:" When you take dry maize, put it in the mortar and pound it, is it going to be pounded well?

LLL: No

T: What will you need to add in order for your maize to be pounded well?

LLL: Water

T: Good, water will help you to pound your maize well.

TT: Enzyme is also acting like water, without enzymes to be released your food in your stomach will not be well digested.

T: She writes on the chalkboard.

Types of food nutrients and enzymes they contain.	
Proteins	Trypsin/pepsin
Carbohydrates	Amylase
Fats	Lipases

TT: Enzymes is not one kind but many. When you eat your food, the chemical digestive works on it. There is acid which helps in digestion which is called **hydrochloric acid**. This acid is very harmful. Ha *u isela fa sitino kapa lisila sa ca kapa kupunyeha* (when you pour it on your shirt or the cloth it will burn not burning in flames but make a hole.

TT: It is also harmful when it is in our stomach but what is helping us not to be damaged by this acid is the thick layer wall in the stomach; the stomach has mucus inside (wait wall inside) where hydrochloric acid is produced.

T: Are you with me? *Mwa ni utwa*

LLL: Eni, yes

T: *Mwa utwanga ku baba fa mumizo*? Do you normally feel itching on your throat?

LLL: Yes

T: It's because of hydrochloric acid. In the small intestine there are also enzymes produced.

T: *O muñwi mutala ki wa matumbulwa, mwa ziba matumbulwa*? Another example which I will give you is about fat cooks. T: Do you know fat cooks all of you?

LLL: Yes

T: *Ha u sina yeast kana u kaeza matumbulwa a mande*? If you don't have yeast are you going to make good fat cooks?

LLL: No

TT: That yeast is an example of enzymes. For you to have good fat cooks you need to have yeast in the flour, even bread will need such yeast in order to be very good bread. So enzyme is a biological catalyst that makes the process happen faster. Glands produces saliva, these enzymes together with your saliva will work on your food, start breaking it from smaller pieces to soluble substances. (*Hani zibi kapa mwa latelela*) I don't know whether you follow.

LLL: *Eni*. Yes

TT: Now when the saliva mixes with food we are starting with chemical digestion. Food is now changing from its form to another form, and then we talk of chemical digestion. This chemical digestion will now go from the mouth through the oesophagus. What you should have to know is, in this oesophagus there is no digestion which is happening there, the oesophagus is just a pathway through which food moves from the mouth to the stomach. It just contract and pushes the food into the stomach. When the food is in the stomach, there is some hydrochloric acid which works on the food there. Do you understand what enzymes are?

LLL: Yes

TT: There are still some enzymes here again which is still breaking down already soluble substances. When you eat your porridge and take 15 minutes then you vomits, do you always look at what you vomited?

LL: No

TT: You do, how can you vomit without seeing you're what so ever? Ha mu bonangi mataza a mina?

LLL: *Lwa a bonanga*. We usually see them.

T: *A swana ni buhobe bo mucile*? Do your vomits look like the porridge you ate?

LLL*:* *Batili*. No

T: The smell changes the colour can even change as well.

T: It means the chemical change has taken place; it changes from the form it was to a different form because of enzymes. Many things are mixing they break down into soluble substances.

T: I don't know whether you understand?

LLL: Yes we do

T: There are some enzymes again which breaks down into simpler substance when it is done then nutrients now start.

T: Do you know the nutrients in your body?

LLL: All quiet

T: Name the nutrients you know.

L: Energy

T: Energy is not a nutrient.

T: Explain how digestion is happening in your body in Silozi.

L: *Lico ha licilwe kukalela kwa mulomo za lubwalubwa ka ku sebelisa meno. Kona kukopanya ni mati kuli eza bunolo. (T: Mwa mati kuna niñI)? L: Ha ni zibi enzyme mwa Silozi. Enzyme yeo i luba hahulu lico kuli eza bunolokiona lika miziwa kuli isa mwamba, ni mwamba kuna ni ezyme yeñwi ye ka liluba hape ku liluba kona kuli beya mwalilale linyinyani, mwa lila le linyinyani kuna ni enzyme yeñwi ye ka liluba kuli beya mwalila le li tuna. Lila lelituna ni lona lishimba feela kwateni mezi, kusiala ze kolile, zale ze kolile cwale ki ona ze kayozwa*. When food is eaten starting from the mouth, they are chewed by the teeth to make them soft. The food that has been chewed will now mix with saliva to make it soft.

T: What is in the saliva)? L: I don't know what enzyme is in Silozi. That enzyme will break down into more soluble substance that can be taken by the small intestine. In the small intestine there is another enzyme that will break down those substances and take them to the large intestine where by those hard substances will be deposited outside the body through the anus.

T: Clap the hands for him, he was listening very well.

T: Any question?

T: Gives learners an activity to do. Draw the alimentary canal your summary books and label it. **End of the lesson**

Lesson 3

Introduction

T: Greeted the learners

T: Who asked the meaning of enzymes?

LL: They don't know it in Silozi; they just know it in English as enzymes.

T: What is an enzyme?

L: An enzyme is a biological catalyst that makes the digestion process happening faster.

T: Good, what is digestion?

L: Digestion is a process of breaking down food substances into simpler substance that the body can absorb.

T: *Kwa utwahala kaufela*. Is that clear everyone?

L: Yes.

T: Now we are going to look at into the food substance that is being broken down.

T: Remember we eat food for growth, energy and repair our bodies. That food should be digested (*Kulubwalubwa*) is when we are going to get substances we need by the bodies. To get substances we need by the bodies. Yesterday we got the names for these things we need for our bodies.

T: What is the collective name of them?

L: Nutrients

T: Good, we are going to look at nutrients today. What are those nutrients?

T: You should be ahead of your teacher; you know how to read isn't?

LLL: Yes

L: Proteins, Vitamins, Energy

T: Energy is not a nutrient

L: Carbohydrates

T: Yes carbohydrate is a nutrient

L: Fats

T: Yes, that is what our bodies need (*Ki minuno*) fats

T: What is *minuno*, explain

L: *Minuno ki lika ze nunisa mubili*. Things that makes our bodies fat.

T: *Nutients ki lika ze matafaza mubili*. Nutrients are those things that keep the body health.

T: Learners you should know these nutrients eee. These are: Protein-in meat. Carbohydrates-in breads. Fats-in peanut butter, then mineral and vitamins.

T: We have these in different kinds of food. What helps us to digest food? Have you forgotten?

T: It is enzymes. What are enzymes?

T: Ahaa, some learners are so quiet, yes pointing to another learner who was writing. Can you tell what an enzyme is?

L: Was quiet, could not give the answer.

T: You were busy writing, you did not concentrate. Stop writing and listen to me.

T: **End products**

T: In small intestine we have hydrochloric acid, then after final digestion then are ready to be absorbed. Those nutrients are no more proteins by that time in the small intestine; they have changed completely to amino acid after they have been digested.

T: Any question before I proceed?

LLL: All learners were quiet

T: Our food on the table have carbohydrates, the same process go through digestive system, digested enzymes through the stomach. Carbohydrates will not be carbohydrates but it will be maltose/simple sugars. Fats will be fat acids.

T: Now open on page 125 in Natural Science and Health in context. One learner should read for the class.

L: Reads aloud about carbohydrates

L: Another one reads about proteins

T: That is the end of our lesson

T: Now I will ask questions.

T: What acid helps in digestion of food?

LLL: Were quiet

T: It is hydrochloric acid

T: What is the end product of fats?

T: *Lico zahao hali felize kulubwalibwa selina ni mabizo a sili ki ona ma-end product mwa utwa?* When your food has gone under the digestion process, they have new names those are what we call end products, do you understand?

LL: *Eni*, yes

T: What is the end product of fat? She repeats the question.

L: Fatty acid

T: Good, What is the end product of protein?

L: Could not pronounce amino acid well

T: Calls upon anyone who can help her to pronounce it.

L: One learner pronounced it correctly as "Amino acid".

LLL: Pronounced the amino acid correctly in the class

T: Very good, what is the end product of carbohydrates?

L: Simple sugars.

T: Good, what is the scientific name for simple sugars?

L: Maltose

T: Good, who will come and write maltose on the chalkboard?

L: Wrote incorrect spelling as maltos

T: Who will come and correct him?

L: Corrected and wrote "Maltose"

T: Calls upon a learner to read a paragraph on page 125 in the Natural science textbook.

L: Could not pronounce glycerol

T: Calls another learner to pronounce it.

L: Learner could not pronounce it again

T: Pronounce the terminology correctly to the class.

T: Tell all learners to repeat the word "glycerol" by pronounce it correctly.

T: Asks some questions which learners answered in class.

T: **That is the end of our lesson for today.**

Appendix 21: Video transcription, Teacher 2

Classroom observation.

Video Transcription. Teacher 2. (Mr. Wormmy)

List of abbreviations

TA-Teacher action

TT-Teacher talk

T1- Teacher 1

T2- Teacher 2

L- One learner

LL- Two or more learners

LLL- Whole class

Lesson 1. (35 minutes)

The human body

Introduction

T 1: Good morning class.

LLL: Good morning sir and how are you.

T: I am fine class sit down.

T: I am going to ask questions on what we learnt on Friday since today is Monday. Now tell me, who still remember what we learnt on Friday?

L: We learnt about the human body

T: Good.

T: Tell me, what are the seven systems that make up the human body?

L1: Mentioned all the parts that form the human body. E.g. The support system, the reproductive system, the respiratory system, the excretory system, the circulatory system, the nervous system and the digestive system.

T: Today we are going to learn about one of these systems which are **the digestive system**. He writes it on the chalkboard

LLL: Yes

T: What is the function of the digestive system?

L: Is the process of breaking down food

L: Is the process of mixing food together

T: Is the process of break down food in soluble substance that can be absorbed by the body.

T: What organ makes up the digestive system?

T: *Wena, talima kwanu*: You look here

L: Nervous system

T: which word is that one? *Kele mu libala kakuli mu yozwa kwa week-end?* You have forgotten because you are coming from the week-end.

L: Alimentary canal.

T: Good: All learners repeat the word.

LLL: Repeated the word "Alimentary Canal".

TT: Yes, it is the alimentary canal: He displayed the poster of the alimentary canal on the chalkboard. He explains how the food moves from the mouth to the anus for them. E.g. the food starts from the mouth → *(mulomo*) oesophagus → (*ki mumizo*) → Stomach→. Mba→small intestine (lila le linyinyani) →large intestine (lila lelituna) →Anus (Munungu).

Enzymes will now act on the food, the food goes to the small intestine from there to the large intestine, and food which is not needed by the body comes out of the anus as waste food being pointing on the parts of the digestive system.

T**:** **The Alimentary canal** (the teacher writes the sub-topic on the chalkboard)

T: What are the main three categories of food you know?

L: Fruits

L: Fats

L: Proteins

L: Carbohydrates

T: You should know the importance of these food categories into our bodies, when we talk about fat, what do you get from fat?

L: Energy

T: Protein, What important nutrients do we get from proteins? (*Ki lika mañi za butokwa ze lu fumana mwa maproteins).*

L: Growth, (and repair of worn out tissues), the teacher added. If you have an injury, the wound will heal itself without you going to the hospital. That is food you eat that contains proteins. As you are growing, you need proteins to grow quickly, if you are not eating food that contains protein in your diet you eat only that contains carbohydrates and fats (*u ka fumana kuli banana ba lilimo ze nyinyani kuwena ba kahula kuto kufita).*

T: Carbohydrates

T: What do carbohydrates provide us with?

L: Growth

T: What food nutrients do we get from carbohydrates?

L: Energy

T: We still get energy, these food categories are not the only one that is digested by your body, you still need vitamins, minerals, fibre even water.

T: Who can define digestion for us? Sikute.

L: Digestion is the process in which food is broken down into soluble substances.

T: For example, if you eat an apple, that apple must be absorbed, it will not be absorbed in solid form but it will be absorbed into a liquid form then it will be absorbed by the blood

T: **Conclusion**

T: Any question learners?

LLL: No question

T: What organs make up the digestive system? Maswahu

L: It is the alimentary canal.

T: Ok, when you know of the alimentary canal, what does it includes?

L: It includes the oesophagus, mouth, stomach, small intestine, large intestine and anus.

T: Who can give me the stages how food is going through (passes through) into the digestive system?

LL: Mouth, oesophagus, stomach, small intestine, large intestine.

T: Any question that will come from you?

LLL: No question

T: Ok, open your book on p.126, there is a picture of the alimentary canal, draw and label it in your exercise books

LL: Which exercise book, the summary book?

T: Yes your summary book.

T: Tomorrow you are going to learn about **the importance of chewing food.**

Lesson 2 (35 minutes)

Introduction

T: What is digestion?

L: The process of breaking down food into soluble substances.

T: Good. What food groups did we look at yesterday?

LL: Fats, carbohydrates

T: **The importance of chewing food**

T: What do you think is the importance of chewing food? Why do we chew food?

L: To break food into smaller pieces.

T: When you take food and put it into your mouth then digestion starts, e.g. if you take an apple without breaking it into pieces, will you be able to swallow that apple?

LLL: No

T: The importance of chewing food is to break down food into smaller pieces so that it should be taken by your body.

T: What break the food in the mouth?

L: The teeth

TT: That's why we have got teeth in our mouth, that teeth is for us to break the food to make it easier for us to swallow. When food is broken into pieces that's when digestion starts.

T: What are the two forms of digestion?

L: Alimentary canal.

T: Alimentary canal is it a form of digestion?

LLL: No

T: Alimentary canal is the whole system of digestion start from the mouth to the anus.

T: Ok, I will give you the example of the forms of digestion. E.g. Mechanical digestion is when food is broken down into pieces. While chemical digestion is when foods is now mixed with enzymes and change into liquid and be taken by the body.

T: Mane luli mwa utwa? Do you really understand? (*Ha mu sika eza* digestion *mwa* Grade 6?) You didn't learn about digestion in Grade 6?

LLL: (*Lu i ezize*) we did

T: It is just a continous (ye ka fumana mane ku yo fita kwa university) which you will get up to the university.

T: What is an enzyme?

L: Was quiet.

L: Is a biological catalyst that helps the process of digestion to happen fast.

T: Ask a learner to read a paragraph on the process of digestion.

L: Reads a paragraph in the textbook.

T: *U sike wa bulela u teleze*. Tells a learner to pay attention and stop talking.

T: What is the importance of breaking chewing food?

L: The process of breaking food into smaller pieces

TT: Your syllabus requires you to know what digestion is, and you should know two forms of digestion, which is: Mechanical and Chemical. You have to know why it is important to chew food. The three categories of food which is fats, protein and carbohydrates.

T: Encouraged learners to read their books when they are at home.

Lesson 3 (35 minutes)

Introduction

T: What is the importance of chewing food?

L: Is the process of breaking down food into smaller pieces.

T: There are three categories of foods, what are there?

L: Fats, Protein and Carbohydrates

LLL: Repeat the three categories after the teacher.

T: **End product of foods**. He writes it on the chalkboard

TT: Today our lesson requiring us to know what is the end product, when you eat food which contains fat. What enzyme will change this food into what substance; these foods will change into another substance which must be soluble to your body. What enzymes are going to act on these types of this food? So we have to know the end product of starch. When we talk about starch, we talk of carbohydrates. We have to know the end product of protein and fats.

T: Les talk about starch. Which enzyme is going to act on starch?

L: Amylase

T: What will be the end product of starch?

LLL: No answer

T: The end product of starch is maltose or glucose.

T: When you eat food that contains carbohydrates, you are going to get what?

L: Energy

T: Protein, What is the end product of protein, and what enzyme is going to act on protein and change it to what?

L: Trypsin

T: Change to what? Converted to what?

L: Could not pronounce the word correctly.

T: Don't shy

L: I don't know the pronunciation

T: Spell it

L: A-m-i-n-o a-c-i-d

T: End product of protein is amino acid, everybody say amino acid

LLL: Amino acid

T: Fats, what is the end product of fat? Musunga

L: Fatty acid

T: Ehee, which enzyme is responsible to act on this food, Sikute?

T: You are shy but when it comes to writing you are very bright

L: I don't know the pronunciation

T: Spell it

L: L-i-p-a-s-e

T: Lipase, all class

LLL: Lipase

T**:** **Amylase**

T: Amylase is found in your saliva, where most of digestion is taking place that is where we get these enzymes.

T: *Cwale ni mifa sibaka sa kubuza lipuzo*. Let me give you a chance now to ask questions.

LLL: No questions

T: Let me give you a task so that you should come and present it tomorrow in your groups. Open on page 156 (Go for Natural Science), there are questions, work on those questions at home today come and present them to the class tomorrow.