An Investigation Into The Prevalence of Code Switching in the Teaching of Natural Science And Health Education In Three Primary Schools At The Zambezi Region in Namibia.

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ABSTRACT: This study examines the functions of code-switching in primary schools by science teachers. In Namibia,English is the official language of instruction for science at primary school. At lower primary, Silozi is the language of instruction. Classroom interaction data was obtained from two science lessons. Analysis of the teachers' code-switching shows that code-switching in the two lessons was vastly different, with little code-switching in the teacher-facilitated lesson.Evident in other lessons, in which science was taught as a content subjectbut with abstract names that had no corresponding local names in Silozi, there was frequent use of code-switching for reiteration and message qualification. The direction of the language switch from Silozi to English as well as the proportion of teachersspeaking in English suggests that the official language for teaching is English at upper primary, grade 4 to 7. The science lesson and code-switching is a necessary tool for teachers to achieve teaching goals in content-based lessons involving students who lack proficiency in the instructional language.

The study was conducted in five government primary schools in Katima Mulilo, the capital of the Zambezi region in Namibia.The national language is English language, with no exception inscience, mathematics, and language subjects.All Schools are located in a Katima Mulilo-urban. The students are from mixed classes, lower, middle and upper class families with their parents typically working as unemployed single mothers, domestic workers, clerks, nurses, teachers, and accountants. Some of the students could understand English because of their parents' educational background or in instances where English is spoken at home.

Keywords: code-switching, science, teacher-facilitated lesson, content-based lessons

I. INTRODUCTION

Before Independence in 1990, the curriculum's official language in Namibia wasmixed Afrikaans and English, but Afrikaans dominated. Most subjects in most schools were taught in Afrikaans which was the official medium of instruction and this resulted in rote-learning. Longtime observations have shown that teachers code-switch to the language learners understand better in their classrooms. For the past few years of my teaching, I have observed that teachers code-switch during their teaching and learning.After Independence, however, the new government of the Republic of Namibia reformed its education system to provide equal education for all people in the country. The Ministry of Basic Education then developed the language policy to ensure that English became the medium of instruction from Grade 4 upwards (The language Policy for Schools in Namibia, 2003, p.1).

Even though the Namibian language policy states that learners should be taught through their mother tongue in their early years of schooling in order to acquire the basic skills of reading, writing and concept formation, it does not directly address code-switching despite the fact that the majority of the Namibians population are not first language speakers of English (Kamati, 2011, p.2). 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). However, Probyn (2009) refers to code-switching as 'smuggling the language' into the classroom since this is not official.

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

In another study conducted by Jegede (2011) in Nigeria, he found that Nigerian Mathematics Primary school teachers and learners used code-switching in the languages they understand better in order to enjoy the

educational benefits in multilingual and bilingual classrooms where learners hadlow English proficiency and limited material resources in their mother tongue. He further posit that although English is the official language of teaching and learning in Nigeria, in some five schools he did his research on code-switching, the findings indicated that they code-switched to their local language and language of learners for the following reasons: the lesson wouldbe 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-switch makes learners to understand the contents thoroughly and code-switch makes learners to have interest in Mathematics.

According to Shilamba (2012), there is a need that issues of language in general and code switching in particular is discussed and debated openly and widely. It was 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 learning policy at all levels.

Mastura, Azlan & Narasuman (2012) posit that although English is the dominant language used for communication in Malaysia, code-switching supports learning in such a way that students understand the concepts better. Teachers may code-switch because of lack of facility. 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."Analysis of the teachers' discourse involving code-switching using Gumperz's semantic model of conversational code-switching showed that the most prevalent function of code-switching was for repetition " (Chen-On & Su-Hie, 2011: 299). This showed that code-switching is mostly needed all over where English is their second language in the science classroom especially for better understanding of the science terminologies. From my own experience,if the teacher does not share the same language with learners, they will seek help from their colleagues or point out a learner who knows the same language with other learners and can understand English better to explain concepts in the language which others understand. Teachers who code-switch diverted from their lesson plans in order to help learners understand the concepts. Therefore, even if there is conflict between the language policy in terms of the use of English and home language in the classroom, code-switching may enhance learning for understanding, emphasize points, explain concepts, clarify statements, maintain discipline and improve learners' academic results.

According to the Namibian constitution article 3, 'the official language shall be English(p.3).' Despite what the constitution says about using English as the official language, the Namibian Ministry of Education, Youth, Culture and Sports (NMECYS) began to review the language policy for schools in order to develop a national language policy and it was agreed that the medium of instruction for the whole country in schools shall be English. The use of mother tongue/first language is allowed from the early years of schooling that is (Grade 1-4). After Grade 4, teachers are required to use English as the medium of instruction. Although, English is the medium of instruction, it is a second language to most teachers and learners in Namibia. This affects learners' understanding and performance in all subjects including the science subjects. Chen-On and Su-Hie (2011:299), 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".

In Zebra (pseudonym) Primary School, Katima Mulilo (Zambezi Region), teachers practiced different forms of code-switching in teaching Natural Science. The primary aim behind this practice may be to improve learning. Thus, this study seeks to investigate the reasons why Natural Science teachers in Zebra Primary School code-switch to their local languages during classroom activities and hence, determine whether code-switching enables or constrains learning. Lastly, the study will investigate what linguistic challenges teachers face when explaining certain concepts during science lessons.

II.   THEORETICAL FRAMEWORK

This study is anchored by the constructivist and socio-cultural theories. I will first discuss the constructivist theory and then discuss the socio-cultural theory.

2.1 Constructivism

This is a perspective based on the understanding that learners are not "account deposits" (Freire, 1993, p. 99). Learners in science can effectively construct science concepts if proper mechanism is put in place for them to construct the concepts. In this study I will focus on social constructivism and the socio-cultural perspective.

Social constructivism

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 experience as they interact socially.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 existing knowledge. Furthermore, that learning is personal and subjective and only exists in the minds of the knower (ibid). However, learners should be encouraged to put language to ideas, testing their understandings with peers and listening to and making 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. He emphasized the scaffolding principles (Vygotsky, 1978) of guiding the learners. Therefore, the role of the language in the classroom situation is very useful as the learners are socially interacting with one another. It is through using a language where a lot of mistakes are encountered in science lessons. Intermixing of learners from different groups and their cultural backgrounds also affects the learners to achieve the required language.

Language is not only crucial to learning but also the process of thinking because learners use language every day to communicate, that is, the process of code-switching (Probyn 2009) comes in now if the teacher and the learner share the same language. Most teachers will code –switch in the science classroom to provide learners with varieties of examples in the topic to enhance understanding so that they could be able to construct meaning form what they have learnt.

2.2 Socio-cultural perspective

In this study, the socio-cultural theory of learning will be used to explain why and how teachers code-switch to the local language*Silozi* in their science classrooms. 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 a case in which they use clay to mould earthen ware pots. After it has been molded, they use fire to enhance its mechanical properties. The earthen ware pot is used by certain community members to preserve seeds since when they close the opening no light comes in which will 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 practices is not available in English, teachers need to code-switch as suggested above. The classroom is the social unit 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.

3. Potential value of the study

This study is of potential value since it will be useful to those who are still willing to study in the field of science and language, particularly on the use of code-switching.Apparently, there is no training for teachers to equip them to deal with teaching through the medium of an additional language; therefore, this study will help provide some insights as far as this is concerned where code-switching could be used as a meditational tool in science classes.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 in science language regarding code-switching.

Research goal and research questions

The main goal of this study is to investigate the prevalence of code switching in the teaching of Natural Science and health Education in primary schools in the Zambezi Region.

To achieve this goal, I attempted to answer the following main question and sub-questions:
Main question:

Why do Natural Science teachers mediate learning through code switching in the classroom?

Sub-questions:
1) What are the Natural Science teachers' perceptions and experiences about code-switching from English into vernacular?
2) How do Natural Science teachers help learners to make sense of scientific concepts in science classes by code-switching?
3) In what ways does code-switching in the science class enable or constrain learning in Natural Science?

Research Design

This study was informed by an interpretive paradigm. According toCohen, Manion and Morrison (2011), the interpretive paradigm is a paradigm where "the central endeavor in the context of the interpretive paradigm is to understand the subjective world of human experience. To retain the integrity of the phenomena being investigated, efforts were made to get inside the person and to understand from within"(p.17). "Researchers begin with individuals and set out to understand their interpretations of the world around them" ibid (p.18).They 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 times and places. In the context of this study, this paradigm assisted me to understand how Grade 7 Natural Science teachers mediate learning through Silozi.Within this paradigm my study will adopt a qualitative case study. 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 why teachers code-switch from English to Silozi particularly in the Caprivi Region where I teach.

Participants: The participants were fiveNatural science teachers from five primary schools. All teachers and were proficient users of local language of different dialects, ranging from Silozi, Subia, Mbukushu andFwe making Katima Mulilo a multi-national dialect town, but Silozi is spoken by all other dialects. All teachers had a Bachelor's degree in teaching. The Science teacher was trained to teach science and mathematics but she teaches English and Science during study.

Data Collection

For the purpose of the study of code-switching in Natural science lessons, three lessons were selected and observed for each teacher. The first teacher's lesson at school A, wason digestion in animals, followed by HIV and AIDS and lastly structure of the leaf. The second teacher's lesson at school B was on Source of energy, followed by ecosystem and lastly electroscope.The third teacher's lesson at school C was on different systems of human body, followed by Excretion and lastly structure of plants. The classroom data for the science teachers were collected as part of a larger study.Prior to the data collection, verbal consent was sought from the teachers and the class was audio-recorded a single 35-minute per lesson. Until the recordings were done, they were only told that the study was on classroom interaction. On average, the amount of time allocated for science subjects was four lessons per week. The classroom interactions were transcribed with pauses indicated by the use of English language. The transcripts were analysed for code-switching.For the interaction at the classroom to be enhanced, ethical letters were shown and signed by the stakeholders.

Ethical considerations

Before conducting this study, written permission was obtained from the Regional Director of the Ministry of Education in Zambezi that outlines the purpose of my research at the chosen schools.
I asked permission from the gate keeper where I conducted my research study. I negotiated and sought permission from the Grade 7 Natural Science teachers as well from the parents of those learners involved even though the focus of my study is on teachers. I explained the purpose of the study to all participants. All participants were treated with respect and dignity. The data obtained during the classroom interaction were analyzed and the results are discussed below.

III. RESULTS AND DISCUSSION

This section presents the results on code-switching in the Natural science lessons. In the excerpts included in this section, use ofcode-switching (CS) were counted and recorded and presented in the tables.

Table 1. Frequency of Teacher 1, Code-switching in the vernacular and Science Lessons

School A

Lesson	Topic	Code-switching instances
Science	Digestion	23
	HIV and AIDS	13
	The structure of the leaf	12
Total		48

The results show that there were 48 instances of code-switching in the three lessons combined (Table 1), involving mainly Silozi. Science teacher code-switched (n=23) frequently during the lesson on digestion,but duringthe teaching of HIV and AIDS and structure of leaf very little code-switching. The frequency does not take account of the word "ya" as an example of code-switching as it cannot be considered as an English word because it is featuredin English as well as Silozi. In view of the frequent use of "ya" by the science teachers it over-represents the incidence of code-switching.

Table 2. Frequency of Teacher 2, Code-switching in the vernacular and Science Lessons

School B

Lesson	Topic	Code-switching instances
Science	Source of energy	20
	Ecosystem	25
	Electroscope	8
Total		53

The results show that there were 53 instances of code-switching in the three lessons combined (Table 2), involving mainly Silozi. Science teacher code-switched (n=20) frequently during the lesson on source of energy. During the teaching of Ecosystem (n=25) and Electroscope very little code-switching (n=8) was present.

Table 3. Frequency of Teacher 3, Code-switching in the vernacular and Science Lessons

School C

Lesson	Topic	Code-switching instances
Science	Different system of human body	10
	Excretion	13
	Plants	10
Total		33

The results show that there were 33 instances of code-switching in the three lessons combined (Table 3), involving mainly Silozi. Science teacher code-switched (n=33) during the lesson on different system of human being, Excretion and plants. The frequency of code-switching with teacher 3 was very little.

4. Findings
4.1. The frequency of Code-switching Observed.
Based on all observations, it was found that code-switching was used for classroom interaction. However, CS was the most frequent with concepts that have local language equivalent, as shown in the table with digestion, source of energy and ecosystem, totaling 68 frequenciesof CS. But code-switching reduced during the teaching of systems ofthe human body, electroscope and plants. The reasons that constrain and enact code-switching will be discussed below.

4.2. Reasons that Contribute to the Use of Code-switching
The result of the descriptive analysis on Section B of the questionnaire revealed students' ranking of 10 reasons for code-switching. In Table 1, the reasons are ranked ascending from the highest mean score to the lowest mean score. It was found that the reason "To Stress a Point" had the highest mean (m=7.35) which means that a majority of the respondents code-switched to either stress a particular statement or to make a statement clearer for others to understand. However, the reason "To Attract Attention", (m=1.79), had the lowest mean score which

shows that not many students code-switched to attract the attention of others to their speech. This highlights a lack of assertiveness among the respondents.

Table 1. Students' ranking of reasons for code-switching

Ranking Reasons	N	Mean
1 To Stress a Point	28	7.35
2 Semantic Significance	28	7.21
3 Lack of Register	28	6.57
4 Learning and teaching support materials (LTSMs)	28	6.17
5 Habitual behaviour	28	5.86
6 To motivate other children	28	5.79
7 Realistic Reasons	28	5.21
8 For understanding	28	5.21
9 To Show Identity in class	28	3.68
10 To Attract Attention	28	1.79

N=number of students

It was found that the class mostly code-switched in order to "Stress a Point", give semantic significance, and lack of Learning and teaching support materials. This result includes interaction with the teacher as well which means that because everyone in the classroom shared the same mother tongue and, the tendency to code-switch for the reason of solidarity was predictable. However within code switching emerged some valuable implications.

Code-switching implication.
The results of the present study suggest some implications for allowing students to use CS in the classroom. These implications can be applied as a generic framework in the classrooms as following:
1.The teachers should use authenticlearning and teaching supportmaterials (LTSMs) to set standards for CS in the classroom.
2.Instructing students about the situations that might motivate CS can help achieving uniformity in the positive perception of the concept been taught.
3.Results show general hesitant attitude for employing CS for difficult science concepts and students can be instructed with emphasis on the recent trends in this connection.
4.The proper use of CS can serve as a resource to diminish the hostility, thus reducing identity crises among students; also it can lessen the burden of cognitive processes for the concepts not present in scientific language.

6.4 Recommendations
The following recommendations emerged from the resultsbased on the findings of this study
▪ The Ministry of Education should admit that that code-switching exists in all primary schools particularly in the Zambezi Region and they should formulate a policy that will include 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 upper primary schools as well since the nation without culture is an unconscious nation. Therefore, the Ministry of Education should see to it that it is used if not in large quantities it should be in small quantities so that learners should not forget their culture.
▪ When formulating the language policy, the Ministry of Education should consider some of the teachers to be part of the planners because teachers are the ones attaining language challenges from learners.
▪ The University of Namibian and its satellite campuses all over Namibia are responsible for training teachers should as well include code-switching in their curriculum to achieve language barrier.
▪ Further studies on code-switching should be carried out in Zambezi Region or other regions in Namibia in order to strengthen the use of code-switching in the science classrooms.

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