Code-Switching in Mathematics Teaching in Early Childhood Education: Switching From English to the Home Language

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Abstract

In communication and linguistics, code-switching (CS) refers to the process of using two or more languages in speech. South Africa is a multi-lingual and multi-racial society. Schools form part of societies, therefore it is to be expected that this 'multi-ness' will also be evident in schools. In many South African schools, children are taught two languages namely their 1Home Language (HL) and a Second Language (SL). Education policy proposes that subjects in *primary schools* be taught in the school's *Language of Learning and Teaching* (LOLT), which is often English. However, teachers often code-switch between the LOLT and their 2mother tongue. This article examines the disadvantages and benefits of CS in the teaching of Mathematics in South African primary schools. Interviews were conducted with thirty-five teachers and seventy-eight learners from primary schools that have English as a LOLT, but where most teachers and learners have *Sesotho* as a HL. The findings revealed that teachers generally code-switch because they express themselves better in Sesotho, and they believe that learners will understand Mathematics better if some concepts are explained in Sesotho. The majority of the Sesotho-speaking learners reported that they appreciate it when the teachers explain Mathematics in English and Sesotho. However, learners who do not speak Sesotho claimed that they feel lost when teachers 'teach' Mathematics in Sesotho. The study concluded that CS is beneficial for teachers and for some learners, but teachers need to be cognisant of the fact that there are learners in their classes who do not speak and understand Sesotho.

Keywords: Code-Switching, Mathematics, Language of Learning and Teaching, Second Language, Home Language, Sesotho

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Introduction

South Africa, like many other countries, is a multi-lingual, multi-cultural and multi-racial country (Phatudi, 2015; Evans, 2015; Melysa, Sinambela & Pasaribu, 2022). South Africa has eleven official languages that are all recognised in the Constitution of South Africa of 1996. Despite this language diversity, English is a dominant language in many sectors of South Africa such as schools and businesses. English serves as a connecting thread among people of different linguistic backgrounds. The language diversity is not reflected in many schools and the language policy in schools is complex. Although the *Department of Basic Education* (DBE) is in favour of mother tongue instruction, especially in the *Foundation Phase* (Grades R-3), many primary schools have adopted English as the LOLT. In many of these schools, the learners' and teachers' mother tongue is not English. Rather, in most cases English is their SL. The focus on English as the LOLT poses many challenges for such schools. In the Foundation Phase learners are taught four compulsory subjects namely Mathematics, Life Skills, a HL (which can be English or any one of the official languages) and a SL. In schools where the LOLT is English, Mathematics and Life Skills have to be taught in English, whether or not English is the teachers' and learners' HL. This translates to the fact that many learners are being taught in a language that is not their mother tongue. In addition, many teachers have to teach in English, although they have English as a SL. The semantic, grammatical, morphological and syntactic structures for many languages are unique and learners and teachers whose HL is different from the LOLT are disadvantaged because they have to try and decipher subject content as well as English (Schoonen, 2015). This is because these learners' and teachers' English proficiency is lower than those who have English as a HL. The result is that many teachers use CS as one of the mechanisms to transfer content knowledge to learners. This study investigated the reasons why teachers code-switch, their attitudes towards CS and the advantages and disadvantages of using CS in the teaching of Mathematics.

Problem Statement

Globally many people are bilingual or multi-lingual. Schools are part of societies and therefore many schools are bilingual or multi-lingual. South Africa is a multi-lingual country but English is often used as the communal language in academia, business, schools, politics and social conversations (Van der Walt, Evans & Kilfoil, 2009). Many schools in South Africa have English as a LOLT, although the teachers and learners have a language other than English as a HL. In an English-limited context, many learners and teachers come from a background where they speak a language other than English at home. Although teachers can communicate and teach in English, many are not proficient in the language. The same applies to learners - many of them know English but are not proficient. The challenge is thus that teachers have to teach Mathematics in a language in which they are not proficient. In addition to this challenge is the fact that learners whose HL is not Sesotho, cannot understand Mathematics when the teachers code-switch from English to Sesotho.

Aim of the Study

Mathematics is regarded by many people as a difficult subject with complex terminology. Many learners struggle with inadequate mathematical skills which is often caused by challenges in grasping fundamental mathematical and numerical concepts. Learners who are taught Mathematics in a language that is not their mother tongue not only have to battle with difficult concepts but also have the added challenge of being taught in a language in which

they are not proficient. Unfortunately, teachers have to teach a complex subject in a language that is not their mother tongue. In order to address these challenges, many teachers opt to code-switch when they teach Mathematics. The study aimed to investigate:

   (i) the positive and negative factors of CS in the teaching of Mathematics;
   (ii) teachers' and learners' attitudes towards CS.

Motivation for the Study

Mathematics is a critical subject that forms the foundation of various disciplines. It is a basic skill that is used and needed in our everyday lives. It is long-standing knowledge that Foundation Phase learners in South Africa perform at a poorer level in Mathematics compared to their counterparts in other countries. One reason for this poor performance is the language barrier experienced by teachers and learners in many South African schools (Naude, 2017; Meier, 2019). The study was motivated by two factors: a) the manner (tell and listen) in which Mathematics is often taught in the Foundation Phase and b) the disadvantages of CS experienced by learners whose HL is not Sesotho. The researcher observed these factors when she visited the schools to evaluate students during teaching practice. Also, the researcher was a teacher for many years and observed the phenomenon of classroom CS.

Significance of the Study

Learners who are not proficient in the LOLT and in Sesotho, or those with a low proficiency, have a language deficit or barrier (Meier, 2019). They lack Cognitive Academic Language Proficiency (CALP), which is the proficiency needed to understand academic concepts and to perform the higher cognitive operations necessary to flourish in school. There are several reasons why the study is significant:

- The study hopes to assist teachers in adapting their classroom practices to meet the needs of learners who are learning through a SL.
- To provide possible solutions for the language challenges faced by minority group learners (those learners who speak languages other than Sesotho at home).
- To create awareness of the positive and negative implications of CS in the Mathematics classroom.

Theoretical Framework

The theoretical framework that underpins the study is Holmes's (1992) theory of CS, which occurs when speakers shift their speech from one language to another in verbal communication.

Literature Review

a) What is Code-Switching?

In bilingual and multi-lingual classrooms worldwide, CS is a frequent practice (Fachriyah, 2017; Abdulloh & Usman, 2021). Different definitions are suggested for CS by researchers. Generally, CS is regarded as the use of two language varieties in the same conversation. Mazur, Karolczak, Rzepka & Akari (2016: p. 55) define it as 'a phenomenon that exists in many multilingual societies where people use more than one language to communicate on a daily basis, such as Singapore, the Philippines, India, the USA, Spain and China". CS relates to switches between sentences in two different languages spoken by bilinguals or multi-

linguals. CS is when an individual who is bilingual alternates between two languages during his/her speech with another bilingual person. It is more than alternately using two languages because the communication that people hold is an interactional unit that embraces a two-way discourse. Often CS is used synonymously with code-mixing and code-changing. Such socio-linguistic phenomena can occur at two levels: a) the lexical level, when there is no instant equivalent for a word or sentence in the HL b) the semantic level, where an idea or a concept is better explained in the language currently spoken by a bilingual in a given language situation (Munoz & Fernanda, 2006; Hasan & Akhand, 2015; Almelhi, 2020).

b) Types of Code-Switching

There are mainly three types of CS namely inter-sentential CS, intra-sentential CS and tag CS.

(i) Inter-sentential CS: this type of CS takes place at the sentence level, where a speaker utters a sentence fully in one language or another (Almelhi, 2020).

> E.g.
> Teacher: Is Jacob not at school today? *Ke kopa lenkarabe hle.* (English and Sesotho)
> (Please answer me).
> In this scenario the teacher speaks English but also inserts a full sentence in Sesotho.

(ii) Intra-sentential CS: these switches take place when a speaker inserts a word or words from their HL (or SL) in a sentence because they do not know, or have forgotten a word:

> E.g.
> *Ke tlo tla le calculator hosane.* (Sesotho and English).
> The speaker speaks Sesotho but inserts an English word, calculator, in the sentence.
> I will bring the calculator tomorrow.

(iii) Tag CS: this type of CS typically includes the insertion of a tag or short expression in a sentence:

> E.g.
> *O na le teng*, you know. (Sesotho mixed with English)
> He was there, you know.

c) Functions of Code-Switching

CS has a variety of functions which vary according to the topic, people involved in the conversation, and the context of the conversation. Below are some of the reasons why people usually code-switch:

- To emphasise a point.
- To substitute a word for an unknown word (or a word the speaker does not remember).
- To express a concept that has no equivalent in the 'switch-from' language.
- To clarify a point.
- To ease tension and inject humour into the conversation.
- To relay meaning more accurately.
- Quoting what someone else has said.
- Habitual experiences.
- When bilingual speakers want to convey their attitudes or emotions to each other.

- In situational CS such as in the classroom teachers usually code-switch to narrow the language gap between them and their learners.
- When there is no appropriate translation for the language used (Hasan & Akhand, 2015; Almelhi, 2020).

d) Advantages and Disadvantages of Classroom Code-Switching

The use of CS in the classroom is an issue of great importance for educators and learners because it is a resource that teachers and learners may use in order to achieve a specific communication goal**.** However, the use of classroom CS is a debatable issue in current education practices because there are two views on the phenomenon. The first view is from researchers who consider CS as conflictive, especially for learners who do not understand the language the teachers switch to. The second view is from those researchers who see it as positive in the classroom (Munoz & Fernanda, 2006; Shinga & Pillay, 2021). CS has negative implications for some learners. A major disadvantage of CS is that learners who do not speak the *'switch-to' language* feel lost. CS may thus create problems in the classroom because students who do not speak the 'switch-to' language may feel neglected and marginalised. It is a positive for learners who speak the 'switch-to' language because it helps maximise learning opportunities in a bilingual/multi-lingual classroom. It is a linguistic advantage rather than an obstacle for these learners.

Method

a) Data Collection Instrument

A qualitative research approach in the form of interviews was used to collect data. Open-ended questions were mostly asked. The interviews were conducted by the researcher herself over a period of five months. Purposive convenience sampling was adopted because the participants were easily reachable and willing to take part in the study. The interviews with the teachers were conducted in English. The interviews with the learners were conducted in English, Sesotho, *Xhosa*, and *Afrikaans*, depending on the learners' HL.

b) Sample

Focus group interviews were conducted with thirty-five teachers and seventy- eight learners during a period of four months. The learners and teachers were selected from seven primary schools in *Bloemfontein.*

	35 Teachers	78 Learners (2 groups)
	Foundation Phase teachers	Learners from Grades R-3
	Have Sesotho as their HL	Group A - 62 learners - Have Sesotho as their HL Group B - 16 learners - Speak other Home Languages (Afrikaans, Xhosa, *Zulu, Venda*). - These learners have a very limited or no understanding of Sesotho.
	Have English as their SL	
	26 were female, 9 were male	

Table 1: Profile of the participants

Findings and Discussion

Interactional analysis was used to analyse the data. Interactional analysis is one of the methods of narrative research. Narrative analysis is a method that focuses on interpreting human experiences and motivations by looking closely at the narratives of the participants. It is a branch of interpretive research where 'words do the work'. Narrative research is an attempt to increase understanding of central issues related to teaching and learning through the telling and retelling of participants' stories (Van Wyk and Taole, 2015).

Below is an extract of the interviews that I conducted with teachers and learners.

Interviews with teachers	Interviews with learners
Are you aware that you code-switch during Mathematics teaching? P1: *"Yes I'm aware. I use English mostly, but sometimes I put in Sesotho words".* Why do you use Sesotho and English? P2: *"Most of the time is when I see the children do not understand. Or sometimes they ask me to explain in Sesotho because they do not understand the English explanation. Sometimes I have to explain the English words in Sesotho. Sometimes I explain in Sesotho because it's my Home Language. So I think it's beneficial for me and the learners to translate to Sesotho".* Are there children in your class that do not have Sesotho as a Home Language? P3: *"I'm not sure. But I think maybe one or two do not speak Sesotho, out of 38 learners".* Do you think that those one or two learners understand the content if you use Sesotho also? P4: *"I never really thought about it. Now that I think about it. yes, I think it's a barrier. Shame. I wish I could code-switch and explain in their languages. And some of them are not very good in English. So, it would help a lot if the content could be explained in their languages. But who is going to do it? Maybe the parents can. There is one teacher at my school who speaks isiXhosa, but she teaches the intermediate phase".*	What is your favourite subject? P5: *"I like Maths".* Which part of Maths do you like? P6: *"Addition/ volume/...But I don't like long division and long multiplication. Those are so hard".* Would it help if the teachers explained Maths in your Home Language? P7: *"Yes, I think so. Because the teachers explain to Sesotho learners. And when he speaks Sesotho, I don't understand. I only understand a little Sesotho".* What language do you speak at home? P8: *"Xhosa, but sometimes English".* Who helps you with homework? P9: *"My sister"* P10: *"My mom"* P11: *"No one. I do it myself. My parents work late".*

Table 2: Extract of interviews

The findings from the interviews reveal the language challenges experienced by learners and teachers in South African schools, especially in the teaching and learning of Mathematics. Teachers state that they code-switch mainly to clarify content and terminology. Teachers do not seem to be aware that there are learners in their classes who do not understand Sesotho. The teachers who are vaguely aware that there are non-Sesotho speakers still continue to code-switch to Sesotho. Teachers feel that these learners are in the minority and that the majority should be catered for. Many of the learners who are non-Sesotho speakers reported that it is hard for them to comprehend Mathematics - even more so when the teachers code-switch to Sesotho. Some said they are scared to tell the teachers that they do not speak

Sesotho. The learners who speak Sesotho reported that they appreciate it when teachers explain content in Sesotho and English.

Conclusion and Recommendations

The extent to which a learner is proficient and competent in the mother tongue will to a great extent determine his/her academic performance. Learning in a language that is not one's mother tongue is usually an overwhelming and frightening experience. The article aimed to highlight the benefits and disadvantages of CS. From the interviews it can be extrapolated that learners and teachers acknowledge the importance of CS. However, CS from English to Sesotho benefits the learners who can speak Sesotho, it serves no purpose for non-Sesotho speakers. Non-Sesotho learners' academic performance is thus hampered. CS is a normal, natural and useful response in a bilingual classroom and is recommended due to its numerous benefits for teachers and learners. But it is only useful and beneficial for learners who understand both languages (the 'switch-to' and *'switch-from' languages*). It leads to language loss for non-Sesotho speakers. The minority of learners who do not speak Sesotho also need to be taken into consideration. Teachers need to establish when the school year starts if there are non-Sesotho speaking learners in their classrooms. If possible, teachers can offer extra classes to these learners to explain Mathematics. Schoonen (2015) recommends that teachers can use gestures, pictures, demonstrations and bilingual software programmes for the non-Sesotho speaking learners. Non-Sesotho speaking learners can benefit from having bilingual dictionaries, e.g. English-Xhosa. Teachers can ask bilingual learners to explain or code-switch terms for learners who speak other mother tongue languages (provided the learners who speak Sesotho can also speak other languages, e.g. Zulu).

Future Directions

Current literature mostly focuses on CS in bilingual classrooms, with the assumption that all learners speak the HL and the SL. Limited literature is reported on the pedagogical implications of CS for learners who do not speak the mother tongue that is spoken by the teacher and the majority of learners. The phenomenon of CS needs to be further explored, especially the effect it has for minority learners in a classroom where they do not speak the 'switch-to' language.

Clarification of Terms

Primary Schools	Schools for children between the ages of about five and eleven.
Language of Learning and Teaching	The language that is used to teach subjects in a school and is used for communication purposes. In this article the Language of Learning and Teaching is English.
Sesotho	One of the official languages that is spoken in South Africa. It is one of the dominant languages spoken in the province where the research was conducted.
Department of Basic Education	It is the local authority that is concerned with education. It develops, maintains and supports the South African school education system.
Foundation Phase	It is the first phase of formal schooling and comprises Grades R-3. Children enrol for Grade R when they are about five years old.
Switch-to language	In this study the 'switch-to' language is Sesotho.
Xhosa	One of the official languages spoken in South Africa.
Afrikaans	One of the official languages spoken in South Africa.
Bloemfontein	The city where the sample schools are and where the research was conducted.
Zulu	One of the official languages spoken in South Africa.
Venda	One of the official languages spoken in South Africa.
Switch-from language	The language teachers switch from when they CS. In this article the 'switch-from' language is English.

List of Abbreviations

CALP	-	Cognitive Academic Language Proficiency
CS	-	Code-switching
DBE	-	Department of Basic Education
HL	-	Home Language
LOLT	-	Language of Learning and Teaching
SL	-	Second Language

Note

1 and 2: In this article Home Language and mother tongue are used interchangeably.

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