CHAPTER ONE

Background to the study

1. Introduction

The issue of code-switching in the teaching of Mathematics has been controversial even during the apartheid period (Setati, 2002). Code-switching, however, cannot take place outside the context of Language in Education Policy. The following discussion will focus on the history of Language in Education Policy and then move to the present scenario regarding this policy and the application of code-switching.

1.1 Pre-1994 scenario

The historical background to the choice of medium of instruction has to some extent shown some tension within South Africa. The previous government had its own Education Policy which was demarcated according to racial groupings. People were forced to develop separately according to their languages as prescribed in the Education Policy.

The old Language-in-Education Policy was developed by the National Party which was in power. When the National government came into power in 1948, African schools were removed from provincial administration and placed under the National Department

of Bantu Education (Setati & Adler, 2002:1). The Eislen Commission was established, influenced by the Christian National Education (Ntshoe, 2002:63).The Christian National Education policy (CNE) was the design of a segregated educational system with separate schools for different cultural, ethnic, tribal, and linguistic groups. One of the aims of the Department of Bantu Education then was to ensure that African languages developed separately from each other. To enforce the above separation of African languages, the Nationalist government established the Eislen Commission (Setati & Adler, 2002:1).

The government did not want Black people to be united, hence the Eislen Commission. The Commission's terms of reference were to find out possibilities of developing African languages separate from each other, and also separate from English. The findings of the Commission were that black languages should be developed separately. In developing these languages separately, the government was aiming at entrenching its own apartheid policy.

The researcher would like to show the negative attitude of the National Party government towards Blacks by employing the rule of divide and rule agenda. The government did not want Black people to be united, hence the Eislen Commission. The Commission recommended that all education should be through the medium of the home language for the first four years (Grade R to Grade 3). The use of home language as the medium of instruction would be extended year by year till it reaches standard three (Grade 5) which

is the fifth year of schooling. From the sixth year of schooling, English and Afrikaans were to be used as the only two official languages.

In 1953, the government passed the Bantu Education Act which promoted the use of English and Afrikaans as the two official and compulsory languages. This Act prescribed that all African children at secondary schools should learn 50% of their content subjects in Afrikaans and the other 50% in English (Setati & Adler, 2002:2). The above decision led to the 1976 uprisings. These uprisings were a resistant and revolt by the Black youths against the use of Afrikaans as a language of learning and
teaching. They saw Afrikaans as a language of oppression and of the "master" (Afrikaners).

1.2 Post 1994 Scenario

The 1994-to-present era has brought along many changes in the country. One of them was the drafting of the new Constitution (1996). This constitution states that the following shall serve as official languages of the republic: Sepedi, Sesotho, Setwsana, Seswati, Tshivenda, Xitsonga, Afrikaans, English, Isindebele, Isixhosa and Isizulu (The Constitution of the Republic of South Africa: Chapter1, section 6.1)

The new Constitution also makes provision for the establishment of the new Language-in-Education Policy (LiEP, 1997). The LiEP was

developed to replace the old Language Policy (apartheid era) which was fraught with tensions, contradictions and sensitivities, and was underpinned by racial and linguistic discrimination (LiEP, 1997:1). The old Language Policy did not promote multilingualism and served as a barrier to learning and teaching, hence the development of the new LiEP.

1.2.1 Aims of Language- in-Education Policy

The following discussion will focus on the aims of LiEP as stated in the Language-in-Education Policy (1997). The aims are stated as follows:

- to pursue the language policy most supportive of general conceptual growth amongst learners, and hence to establish additive multilingualism as an approach to language in education.
- to promote and develop all the official languages.
- to support the teaching and learning of all other languages required by learners or used by communities in South Africa, including languages used for religious purposes, languages which are important for international trade and communication, and South African Sign language, as well as Alternative and Augmentative Communication;
- to develop programmes for the redress of previously disadvantaged languages.
- to counter disadvantages resulting from different kinds of

mismatches between home languages and languages of learning and teaching.

- to promote full participation in society and the economy through equitable and meaningful access to education.

The above aims are all related to the learning of languages and developing the previously marginalized languages. The Language-in-Education Policy (1997) also aims at promoting multilingualism. By using the learners' home languages in instances where the language of learning and teaching (English) fails, learners and teachers are elevating the previously disadvantaged languages to their rightful status. This means that all languages are equal. The aims of LiEP (1997) address the general conceptual growth amongst learners, which is needed in the teaching and learning of various school subjects.

The above aims also imply that learners should be taught in their home language or any language which will make them understand the content. By being taught in their different home languages and also through English, learners will be developing multilingualism. Additive multilingualism is also one of the corner stone of the new Constitution. Additive multilingualism means that learners must learn additional languages while maintaining and developing their home language at a high level. The adoption of additive multilingualism makes it possible for learners to transfer skills, such as reading, writing and speaking, from the language in which they not most proficient to their additional languages (Learning Programme Guidelines: Languages-April 2005).

The LiEP (1997) envisages that learning more than one language should be a general practice and principle in our society (LiEP 1997:1). This policy is conceived to be an integral and necessary aspect of the new government's strategy of building a non-racial nation in South Africa. It aims to facilitate communication across the barriers of colour, language and region, while at the same time creating an environment in which respect for languages other than one's own would be encouraged (LiEP, 1997:1).

This policy states that teaching in the classroom should focus on the locally viable approaches towards multilingual education. This means that all the official languages in the community may be used as languages of learning and teaching. The use of all the official languages will help the learners to complement their English language skills which may be lacking when English is used as a language of learning and teaching. The Department of Education adopted an additive multilingualism as an orientation to Language-in-Education Policy (LiEP, 1997:2). This means one official language will be used as a language of learning and teaching and the other will be taught as a subject; e.g. English may be used as the language of learning and teaching and Sepedi taught as a subject. The above position does not limit communities to choose their preferred language of learning and teaching.

The status of languages of teaching and learning is also explained in the Learning of Languages in C2005.The following discussion will

focus on the introduction of the Curriculum 2005 (National Curriculum Statement).

1.3 The introduction of the National Curriculum Statement and the Revised National Curriculum Statement

The National Curriculum Statement was developed in 1998 by the Department of Education. It was developed with the aim of addressing and bringing equality in the education system. Before the NCS, the education system was divided according to racial groupings. Education for blacks was also divided according to the homeland system. That is the Pedis had their own education system which was different from the Tsongas and the Vendas. The democratic government wanted to address this by developing a new education system. The National Curriculum Statement (1998) was developed with the aim of addressing the above inequality. The problem with the NCS was that it had so many specific outcomes which were not easily achievable. The reason for them (outcomes) not to be achievable is that they were many (sixty-six in total). The Department subsequently revised the policy, which resulted in the Revised National Curriculum Statement (RNCS 2002) and the National Curriculum Statement (2003).

The Revised National Curriculum Statement (RNCS) states that any official language can be used as language of learning and teaching. These languages are arranged according to their roles in different communities. For example: Home Languages, First Additional

Languages and Second Additional Languages (Revised National Curriculum Statement 2002:5). The home language is studied as the mother tongue, the First Additional Language is the language used as the language of learning and teaching where that language is not the home language. The second Additional Language is any language not spoken as a first additional language or home language, but used in the speech community.

The policy (RNCS) has the following as its position regarding the choice of languages in teaching and learning:

- the additional language should be introduced as a subject in Grade 1
- the home language should be used alongside the additional languages as much as possible, which are: English and Afrikaans.
- When a learner enters a school where the language of learning and teaching is an additional language for the learner, language teachers and other subject educators should make provision for special assistance and supplementary learning of additional language until such time as the learner is able to learn effectively in the language of learning and teaching. This means that educators must provide the learner with the necessary support so that he/she acquires the necessary skills which will enable him/her to study through the additional language.
- all learners [must] learn their home language and at least one additional official language. This means that learners must

learn their home language and English or Afrikaans.

- learners[must] become competent in their additional language, while their home language is maintained and develop (RNCS, 2002:4)

The above reference to the RNCS is important because it has some impact on the proposed study. The learners in the proposed study use Sepedi as a home language. However, they make use of English when learning in different learning areas like Mathematics. In this way, they are expected to become competent in their additional language (English), while their home language is maintained and developed. In their use of the additional languages, learners may experience some difficulties in understanding difficult concepts. The educator may help the learners by using their (learners) home language to explain those difficult concepts.
The use of the learners' home language as a resource towards better understanding of content is known as code-switching.

The following discussion will focus on the background to code-switching and the problems related to the LiEP (1997).

1.4 The emergence of code-switching

Code-switching occurs when an educator teaches through English as the language of learning and teaching, and then switches over to the learners' home language to explain concepts which are difficult to explain in English. Code-switching, therefore serves as an attempt

by educators to improve their (educators) chances of success in the facilitation of subjects and to assist learners to comprehend concepts in their subjects better. It may help learners so that they can freely express themselves in their home language when their English competency fails.

For the purpose of this study, the researcher has chosen to focus on code-switching in the process of teaching and learning Mathematics in the Senior Phase. The reason for choosing Mathematics as a learning area is that Mathematics educators often code-switch. These educators often code-switch because their linguistic competence is sometimes not enough for them to explain the difficult concepts in Mathematics.

1.5 Problem statement

Learners in the Senior Phase of schooling are taught Mathematics through the medium of English, which is not their home language. They encounter mathematical concepts which are needed to be explained in English. As second language speakers of English, they often struggle to understand these concepts with the result that the educator resorts to using their home language to explain such concepts. Just like their educators, they resort to using their home language in trying to put forth their thinking. This is referred to as code-switching. There have, however, been arguments against the unlimited use of code-switching. It was observed that while some learners may benefit from code-switching, others may never learn to

apply concepts that were explained in the mother tongue in the second or additional language. This study therefore sought to investigate the effects of code-switching in remote rural schools where both the learners and teachers have limited proficiency in the language of learning and teaching.

1.6 Aim of the study

The aim of the study is to explore the role of code-switching in the teaching and learning of concepts in Mathematics and its effect on the learning of Mathematics in the Senior Phase, at schools around the Sekgosese East Circuit.

1.7 Research Questions

In order to realize the aim as outlined, the research will address the following questions:

- What is the role of code-switching in the teaching and learning of concepts in Mathematics in Sekgosese schools?
- To what extent does it or does it not assist in the teaching of learning concepts in Mathematics?

1.8 Delimitation of the study

The proposed study will be conducted in the Sekgosese East Circuit in the Mopani District of the Limpopo Province. This district is

situated 150 kilometers east of the city of Polokwane.

The learners in the proposed area of study are from villages which consist of Xitsonga, Tshivenda, and Sepedi communities. All the above-mentioned languages are used interchangeably outside the school premises. The above scenario appeals to the teachers to have knowledge of all these languages so that communication is not hampered.

The learners' linguistic background contributes towards little proficiency in English. This is because they are L2 speakers of English. They are from a model of education which promoted the use of the home language as the language of learning and teaching for the first three years of schooling. From the fourth year of schooling, the model transfers to the use of first additional language (English) as the language of learning and teaching. Their level of proficiency in the first additional language is so low that it may disadvantage them in the learning of Mathematics.

The majority of the educators in the proposed area of study are Sepedi- speaking. There are, however, some educators who are from the neighbouring areas who either speak Xitsonga or Tshivenda. Their level of proficiency in English as a second language helps them in teaching concepts in Mathematics. Some concepts may become difficult for these educators where they lack adequate vocabulary to explain them. They may therefore be forced to use their home language (which is common to both educators and

learners) to explain those concepts which they are not able to explain in English.

1.9 Significance of the study

Various functions of code-switching have been discussed; namely, code-switching as a mark of solidarity, code-switching as strategy for isolating participants, code-switching as an indicator of topic change and next speaker selection, and code-switching as a strategy to signal multiple identity (Gumperz 1982 in Nwoye 1993:386).

The above functions of code-switching are relevant to the study. They will help the researcher in identifying the instances of code-switching in the teaching and learning of Mathematics and also their functions in such instances. The function of code-switching as will be identified in the study will help the researcher in gauging the success of code-switching in the teaching of Mathematics.

In conducting this study, the researcher will bring in another dimension of code-switching which may have been neglected for some time. The study will raise awareness on the effects of code-switching in Mathematics classes and address the problem of language barrier which make learners to be afraid of studying Mathematics. The study may also assist educators realize the dynamics of presenting a subject matter which is otherwise difficult to express in English.

1.10 Definitions of concepts

Code-switching and code-mixing are well-known traits in the speech patterns of the average bilingual person in any society.

1.10.1 Code switching

The researcher is aware that there are various definitions of code switching (Nwoye 1993) and that the availability of such definitions may confuse the reader. The researcher has therefore chosen Nwoye's (1993), Peires (1994) and Wardhaugh's (1998) definitions as the ones to be used in this study. The researcher defines code-switching in the same way as Nwoye (1993:365) who defines it as "the use of more than one language or variety of languages in the course of a single discourse" Peires (1994:14) refers to code-switching as "the alternate use of two or more languages in a single piece of discourse"; and Wardhaugh (1998:100) who explains it as " a conversational strategy used to establish, cross or destroy group boundaries, to create, evoke or change interpersonal relations with their rights and obligations".

Code-switching in short, is a term used in linguistics which refers to alternation between one or more languages, dialects, or language registers in the course of discourse between people who have more than one language in common. Sometimes the switch lasts for a few sentences or even a single phrase.

1.10.2 Code-mixing

Quite often people are unable to differentiate between code-mixing and code-switching. Whereas code-switching refers to the use of two or more languages in the course of single discourse, code-mixing occurs when conversants use the language of learning and teaching and the Home Language together to the extent that they change from one language to the other in the course of a single utterance (Wardhaugh 1998:103). Mesthrie (1993) cited in McCabe (1996:40) explains code-mixing as a 'a general term for the use of words and phrases from two different language systems by the same speaker in the same speech event; for example I would like to tell you "*ke a go rata*" (I love you)

1.10.3 Multilingualism

Multilingualism is defined as the ability to speak, at some level, more than two languages. For a person to be multilingual, one should have a bilingual competence.

1.10.4 Bilingualism

According to Bloomfield in Romaine (1995:11), bilingualism resulted from the addition of a perfectly learned foreign language to one's own, undiminished native language. The relationship between code-switching and bilingualism is explained by Crystal (1987) in Skiba (*at melbourne.starway.net.au:*p1). He explains code-switching

as occurring when an individual who is bilingual alternates between two languages during his/ her speech with another bilingual person. A bilingual person is described as one who is said to be able to communicate, to a varying extent, in a second language (Skiba *at melbourne*. *starway.net.au*:p.2). People who are engaged in the act of code-switching should know at least two languages.

1.11 Structure of the dissertation

The study will be sub-divided into the following chapters:

Chapter 1-Background to the study

In this chapter the researcher gives a brief orientation towards the problem regarding the teaching and learning of Mathematics in English which becomes difficult to second language learners. A brief history of code-switching as used in the teaching and learning will be given.

Chapter 2- Literature Review

In this chapter the researcher will give a review of the literature and a brief theoretical background towards the proposed study. The literature review will help in positioning the proposed study and the contribution the study will have in the academic context.

Chapter 3-Research Design

This chapter will explain the methodology used in data-collection. The researcher will explain the qualitative methodology. More information will be given on how sampling, interviews and observation were used in collecting data.

Chapter 4-Data Presentation and Analysis

In this chapter, the researcher analyzes and presents the results from the data collected in report form.

Chapter 5- Findings, Recommendations and Conclusion

In this chapter the researcher will give recommendations regarding the study and the future research

Conclusion

As it was the aim of this chapter, the researcher was able to give the historical background to the development of Language-in-Education policy. The chapter was also able to give a structural layout of the dissertation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to provide theoretical background for the study on code-mixing and code-switching through a review of relevant studies carried out both in South Africa and elsewhere.

2.2 Literature review on code-switching

Many studies have been conducted regarding the use of code-switching in teaching difficult concepts in Mathematics. The following discussion focuses on some of those studies, looking in particular at their findings, which will influence the proposed study.

Chantler (1997) conducted a study with the aim of observing how pupils construct their own conceptually-based algorithms using problem solving activities. The pupils were placed in an environment that is favourable for them to explore and share their ideas, as well as their differences of opinion, with each other.

The findings of the study were that when pupils are left on their own to solve mathematical problems, their solutions have greater meaning for them. The important thing in the study is that learners

share their knowledge and experience. The sharing of knowledge and the discussions (in groups or peer-to-peer) is done through the language of learning and teaching.

The problem, however exists when learners are supposed to learn and be taught successfully in English. Their linguistic competence of English is not enough for them to effectively learn and comprehend concepts in Mathematics. Code-switching therefore serves as a solution to the above problem by allowing educators and learners to use their home language when their English knowledge fails.

The other finding is that the understanding of concepts is enhanced through the use of the learner's home language which is common amongst the learners in the study. The learners confront concepts which are easily understood when using their home language than when they are confronted with a rule which is put through the medium of instruction which is not theirs. The intermittent use of the learners' home language in the explanation of difficult concepts is known as code-switching.

Setati conducted a number of studies with the aim of determining the role played by language (English) in the teaching and learning of Mathematics. The following discussion will focus on some of those studies conducted.

In (1997), she conducted a study on a standard three class of Mathematics. The class consisted of 33 pupils who were first language speakers of Setswana. The purpose of the study was to find

out instances of code-switching and whether they create opportunities for Mathematical meaning-making. The findings of the above study were as follows:

- Code-switching enables the teacher to engage in a variety of mathematical processes, such as explaining the various ways in which they solve problems, modifying their ideas during argument and transferring knowledge to new situations.
- Code-switching enabled the pupils to use language as a tool for thinking.

The implication of the above study is that if applied in our classrooms, code-switching may enable the educators to teach and also help the learners in understanding the Mathematical concepts.

In 2000, she again conducted a study of ten rural and urban schools. The study was the product of the University of Witwatersrand in the programme of Further Diploma in Education. The research was aimed at observing the teachers' classroom practice and also to encourage the use of code-switching as a means for enabling learners to talk more freely in class, and so to use their main language as a learning resource, for talking to learn (Setati 2000:25).

Setati (2000:246), furthermore cites Arthur (1994) who conducted a study in Botswana schools which revealed that the absence of appropriate use of learners' main language, and a delivery of

instruction through English only, subtracted out opportunities for exploratory talk, and thus for meaning-making. The findings of the above study show that the learners' home language is very important in the teaching and learning of Mathematics.

The most important aspect about the above-mentioned studies is the recommendation made. She recommends that there is a need for further research. Research that will investigate code-switching in diverse contexts on the one hand, and in relation to the range of Mathematical discourses in school on the other. This particular study is a response to this recommendation.

Another study was conducted by Inglis (1993). Inglis conducted a study at the University of Natal where she focused on students in the Science Foundation Programmme. The students were taking a course in language development. They were tested on a writing assignment in Biology. The assignment was marked by both the language teacher and the subject (Biology) teacher. The results of the assignment were that students performed poorly because of the language problem (Inglis 1993:131). Their language proficiency had deteriorated and thus led to their failure in what seemed to be a relatively easy assignment (Inglis, 1993:131).

What the researcher deduces from the above results is that learners had a problem with the language of learning and teaching. It is not because of their lack of knowledge of the subject matter that they are not able to answer the task. But it is a problem of language that

impedes their learning. What the researcher hopes to achieve is guided by the problem as indicated above.

Canagarajah (1995:177) conducted a study of classroom observation of 24 teachers who were from rural and urban areas in the Jaffna Peninsula. The teachers were doing a diploma in English Language Teaching. Students were also from the rural area of the Jaffra Peninsula in India, which was dominated by war. The purpose of the study was to explore the role of code-switching in the classroom. The findings of this study showed that code-switching was successfully used in the classroom for negotiating directions, requesting help, managing discipline, teacher's commands, definition, explanation, negotiating cultural relevance. The above study is important to the proposed study because it shows how code-switching can be used in the classroom?

In yet another instance, Meyer (1995) conducted a study on practicing educators and students in the then Northern Province (now Limpopo), North West, and Mpumalanga. The aim of the study was to identify the language of learning practice in formerly black schools, and to identify tension between official policy and classroom practice. The aim of the study was to find out:

- Which language or languages are used by teachers when speaking to their students, and if more than one language is used then in what proportion are these languages used?

- Which language or languages are used by students when speaking to their teachers, and if more than one language is used then in what proportion are these languages used?
- Which language or languages are used by students when speaking to other students, and if more than one language is used then in what proportion are these languages used?

The findings of the survey were as follows:

- With regard to the first question on which language or languages are by educators when speaking to their students, the majority of educators (59%) employed a combination of English and a vernacular language, while 41% employed only the official medium, which is English.
- With regard to the second question about the language used by students when speaking to their educators, the majority of the students employed a combination of English coupled with a vernacular language when speaking to their educators (66%).
- Regarding to the third question about the language used by students when talking to

> other students, the majority of students use a combination of mainly English and their vernacular when talking amongst themselves.

In all the above findings, it shows that vernacular plays an important role in assisting both the educators and students to teach and understand each other. The majority of the learners (66%) indicated that they use their home language when talking to their teachers, instead of the official language of learning. It is through their home language that learners were able to understand the content better.

Dalvit and De Klerk (2005:3) conducted a study in which 1500 questionnaires were distributed on the Alice Campus of the University of Fort Hare. The aim of the study was to find out the attitudes of the students towards the use of IsiXhosa on campus. The students responded that they are all in favour of IsiXhosa. An integrative orientation towards IsiXhosa was expressed. The integrative approach means that IsiXhosa should be used at the same time with English. However, IsiXhosa could not be used throughout the university studies. Students recommended that it be used only in the first year of study. The reason for using IsiXhosa only for the first year is that it serves as the basis of learning through the second language. The skills which are learnt in the first language will be transferred to the second language. It is also because of the status of English as a political and business language that make the students to decide on an integrative approach toward using English and

IsiXhosa.

The above study again helps to show the importance of the learners' home language in the teaching and learning, even at tertiary level. The study implies that if code-switching can be used in the teaching and learning of Mathematics, it can lead to a more understanding of concepts. The researcher arrives at this conclusion basing his argument on the findings of the above study. The findings are that students performed better when using Isi-Xhosa alongside English in their teaching and learning.

Another study was conducted by Montis (1997). He conducted an in-depth case study on a 12 year old learner who had problems in learning mathematics. This learner was said to be suffering from 'Dyscalculia". Montis (1997:1) explains 'Dyscalculia" as a psychological and mental term that refers to extreme difficulty in learning Mathematics and deficits in the production of accurate, efficient arithmetic calculations.

The purpose of the study was to find out whether there is a relationship between mental development and language. Some of the findings were that the learner had "language deficit". This means that the learner demonstrated extreme paucity in describing or making distinctions among objects. The paucity was in the language of learning and teaching in their classroom, which was English. The learner also had a problem of "concept inflexibility" (Montis, 1997:3). The learner had problems with multiple representations of

ideas.

What Montis presents in his findings is that the learner has problems relating to language. What the learner has is a problem relating to the phonemic representation and phonological representation. He explains the phonemic difficulties as "difficulties in recognizing or differentiating among speech sounds as they are used in language and phonological processing as the brain's processing of speech sounds." The phonemic and phonological processes are mental activities which relate to language development. This means that either the learners did not go through the stages of development in Piaget or laterilization stage. Code-switching can therefore be a good resource in such cases in trying to help the learner to understand better. This is confirmed by Montis in his conclusion when he says "the students' learning difficulties in Mathematics may be related to phonological-processing deficits similar to those now being suspected in many reading abilities. Inability to clearly hear or process the phonemic components of a language has obvious implications for the development of language and reading skills (Montis, 1997:12).

The act of code-switching implies that one is going to use his home language for the purpose of learning and understanding a concept. The learners' home language is mentioned because it is the language through which the teacher may code-switch when his knowledge of the language of learning fails.

In the following section, a brief outline of the role of the learners' home language in the teaching and learning of Mathematics is provided.

2.2.2 The role of the learners' home language in code-switching

The discussion above has tried to show the studies conducted in relation to the use of code switching. As code switching relates to the knowledge of two or more languages, it is important for one to be fully multilingual for him to be able to code- switch easily.

The role language plays in the teaching and learning of Mathematics is therefore very important. Ralenala (2004:107) cites (Corson 1990) who describes the role of language in learning as follows:

> *Language plays a central role in learning. No matter what the subject area, students assimilate new concepts largely through language, that is, when they listen to and talk, read and write about what they are learning and relate this to what they already know. Through speaking and expressing personal interpretations of new learning in the various subject fields, students clarify and increase both their knowledge of the concepts in those fields and their understanding of the ways in which language is used in each*.

The learners' home languages are therefore not excluded from the role performed by the language above and help the learners in understanding concepts in various fields of their studies.

The other reason why the learners' home language is important is indicated by Heugh (2001) also cited in Ralenala (2004:147). Heugh says that in a multilingual society where a language such as English is highly valued, there is only one viable option, and this is bilingual education where adequate linguistic development is fore grounded in the mother tongue while the second language is systematically added. If the mother tongue is replaced, the second language will not be adequately learned and the linguistic proficiency in both languages will be compromised. This serves to show that the learners' home language may serve as a background for the learning of the second language and also learning the subject matter. The skills learnt during the home language acquisition may be used in the classroom where English as language of learning and teaching fails to do so.

Canagarajah (1995:174) states that the learners' home language is very important in the cognitive-academic field. He explains this importance by stating that learners may be assisted in their learning of content if they make use of the native language as well as the second language. This is what Cummins (1984) calls "linguistic interdependence principle." Cummins further explains that proficiency in L1 can enable better proficiency in L2 by activating a common underlying proficiency that enables cognitive/academic and literacy-related skills to transfer across language.

What Canagarajah and Cummins claims is important in the teaching and learning of Mathematics because it will be through the use of code-switching from mother tongue to L2 and vice versa that

understanding can be achieved.

This proposed study may bring a solution toward the problem of language in the teaching and learning of mathematics. The learners' home language may be used in instances where their linguistic competences in English enable them not to understand certain concepts. Code-switching may serve as a solution to the problem, because students will be able to understand concepts in their mother-tongue (home language).The use of the home-language in teaching Mathematics may have some negative results. Ralenala (2005:88) calls this problem of misunderstanding being related to the learners' linguistic deficiency. The learners' home language may not be adequate to complement for difficult concepts which are there in Mathematics. The negative results may be in the form of arguments put forth by Moji and Grayson (1993) that the use of the home language may sometimes create problems. Problems may be that the home language may not be good enough to explain some of the scientific concepts. (Refer to 2.4).

Another problem may be that the explanation of concepts in the home language may lead to a situation where learners never learn to use the concepts in the designated medium of instruction. The use of the home language in the teaching of different concepts is being argued as an alternative towards solving the problem of the medium of instruction. Canagarajah (1995:174) explains this importance by showing the interrelatedness between L1 and L2. He says that L1 can actively promote the more effective acquisition of L2.

The following discussion will focus on the various reasons for code switching.

2.3 Reasons for code-switching

McCabe (1996:44) cites Arnberg (1987) and Baker (1993) who give the following as reasons for code switching. They argue that people code-switch

- Learners have inadequate vocabulary in one of the languages;
- certain activities can only be described in the one language since they have only been experienced in that language;
- certain concepts are easier to express in the one language than in the other;
- to clarify a misunderstanding;
- to create a certain communication effect (e.g. anger, impatience);
- as a continuation of the last language used(i.e. 'triggering effect');
- to emphasize a point;
- to express group solidarity;
- to cross social or ethnic boundaries;
- to quote someone;

- to exclude someone from the conversation; and
- to interject in a conversation.

Ralenala (2004:149) adds the following reasons of code switching in an English medium environment:

- to report what someone has said
- to use markers from one language to highlight something in another
- to express certain ideas and feelings that can only be successfully done in English and not any other language.

The studies conducted on the use of code-switching as a teaching and learning strategy, and the reasons for code-switching are, however, not without criticism. It is on these criticisms that the researcher bases his proposed study. The following discussion will focus on the criticism of code-switching.

2.4 Criticism against the use of code-switching

Code-switching may impede learning. Moji and Grayson (1993:216) say that code-switching may impede learning especially in languages which lack the necessary vocabulary to express such code-switching.

They conducted a study where some scientific concepts were to be translated into SeTswana and Isi-Zulu. The problem they encountered with code-switching was that Tswana and Zulu lack the vocabulary to explain exactly what is said in English (more on this under literature study is review).The aim of the proposed study is therefore to determine whether code-switching aids or impede learning.

The other criticism is on the use of the learners' home language when teaching concepts in Physical Science (taught through the medium of English). They maintain that it becomes difficult for learners who are not mother-tongue speakers of English. Translating or using the learners' home language also creates a further problem. The problem arises because some of the scientific concepts e.g. energy, power, force or momentum, when translated to Sotho or Nguni language groups , mean only one thing; i.e., "matla" or "amandla" (Moji & Grayson, 1993: 216). According to Moji and Grayson, the lack of adequate words in the home language creates a problem because it does not adequately give the appropriate meaning or description of the concept. The same problem may be there in Mathematics were certain concepts are easily explained in the learners' home language and others are not.e.g you may find that there is no adequate word in the home language to explain concepts such as "parallelogram," "acute angle". The use of the Home Language in such instances may end up giving a wrong meaning.

Another criticism against code-switching is by Grosjean (1982) in Adler and Setati (2002:9). Grosjean criticizes the act of code-switching by arguing that many people regard it as a grammarless mixture of languages. This means that code-switching results in learners not knowing either grammar of the two languages. Grosjean as such, sees it not as a good strategy which can be used in the classroom. The criticism does not provide (educators and learners) with any alternative for the problem of not understanding concepts in English. It rather instills fears within the speakers of the home language that they would not be fluent in the language of teaching and learning.

Code switching is seen by monolinguals as an insult to their own-rule governed language. These are people who are conservatives, who do not want their language to be mixed or diluted by other languages. They see their language as grammatical, governed by rules. He furthermore argues that these people who are monolinguals want to protect their language. That is why they regard this as an insult to their own – rule governed language.

The criticism leveled against the use of code-switching by Mawasha (1993) as cited in Ralenala (2004:140) should not be given an oversight. Mawasha states that the use of mother tongue is perceived as lowering the status of education and that of African languages. These languages are not developed enough to be used in the teaching of subjects like Mathematics and Physical Science.

What he (Mawasha) is ignoring is that the learners' home language is not used entirely throughout the lesson. It is used only in cases where the educator's linguistic ability in English as a language of learning and teaching fails. Despite the fact that the home language is not technically developed to be used as a language of learning and teaching in Mathematics and Science, it still serves as a good resource in explaining difficult concepts.

The weakness in Grosjean (1982)'s criticism is that he does not provide with any alternative. The RNCS (2002) is trying to address the problem of inferior status of African languages by promoting and elevating all languages (African) to official ones. The proposed study will therefore try to show the importance of code-switching in the teaching and learning of mathematics. It, however, depends on the findings of the proposed study, whether code-switching plays a role in the teaching and learning of concepts in Mathematics. The use of code-switching will also promote multilingualism as it is the government's policy that all languages can be used as languages of learning and teaching.

Most of the studies conducted, especially by Setati (1997, 2000) and Setati and Adler (2002) are based at the Intermediate Phase. The age factor is the one which brings the difference in the previous studies and the proposed one. The proposed study will be addressing code-switching at Grade 9 (Senior Phase) where learners have reached the laterilization stage in their level of language development (Brown 1994). It is at this level that learners are able to conceptualize what

they are learning about. The researcher agrees with the findings that a talking class will involve a lot of code-switching. The study will add to the research conducted by Canale and Swain (1980), Gumperz (1982), Wardhaugh (1988) and Setati (1997) and Setati (2000).

Educators must therefore be able to make use of the learners' home language in teaching concepts which may be difficult to the learners. For the educators to be able to perform the above role, they must know their roles as learning mediators. The Government Gazette (2000: 4) explains the educator's roles as the following:

- Using the language of instruction appropriately to explain, describe and discuss key concepts in the particular learning area
- Using a second official language to explain, describe and discuss key concepts in a conversational style
- Using key teaching strategies such as higher level questioning, problem-base tasks and projects; and appropriate use of group-work, whole class teaching and individual self-study.
- Understanding different explanations of how language mediates learning: the principle of language in learning; language across the curriculum;
- Language and power; and a strong emphasis on language in multi-lingual classrooms.

- Making judgments on the effect that language has on learning in various situations and how to make necessary adaptations.
- Reflecting on how race, class, gender, language, geographical and other differences impact on learning, and making appropriate adaptations to teaching strategies.

Knowledge of the above roles will enable the educator to expediently perform his duties. This knowledge will also help him to realize the importance of language in mediating knowledge.

The implication of the roles of the educator to the proposed study is that he should know his home language, so that when his knowledge of English as a language of learning and teaching fails, he may be able to communicate. The educator must therefore have reflexive competence. The reflexive competence includes the following:

- Defending the choice of learning mediation undertaken and arguing why other learning mediation possibilities were rejected.
- Reflecting on how race, class, gender, language, geographical and other differences impact on learning, and making appropriate adaptations to teaching strategies.
- Making judgments on the effect that language has on learning in various situations and how to make necessary adaptations.

It is because of the educators having the above reflexive competence that they will be able to analyze their teaching methods and also assess the role language plays in the presentation of their lessons and the understanding thereof.

2.5 Conclusion

Despite the above criticisms on code-switching, the studies conducted still put code switching as an alternative resource in teaching and learning difficult concepts. The researcher hopes that code-switching may be a tool which will leads to a better understanding of concepts in Mathematics, and it will help in allaying the fears that Mathematics is a difficult subject to learn.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Conducting of research may be a daunting task, especially to a novice researcher. The success of such a study depends on the methodology used, the research design and data collection instruments. The aim of this chapter is to describe the research design, data collection methods and analysis procedures followed in order to answer the research questions for the study.

3.2 Qualitative Research Methodology

The methodology which will be used in the study is the qualitative one. The qualitative methodology will be used because it is through this methodology that the researcher will be able to conduct an in-depth extradition of data. The researcher will follow an ethnographic approach. By being involved in the study as an observer, the researcher will be able to observe and record data. Macmillan and Schumacher (1993:37) state that in an ethnographic study, the researcher relies on observation, interviewing, and document analysis, to provide an in-depth understanding of what is studied.

3.3 Research Design

3.3.1 Case Study

A case study design was used. MacMillan and Schumacher (1993:375) describe a case-study as important in qualitative research because it focuses on the one phenomenon, which the researcher selects to understand in depth regardless of the number of sites, participants or documents for a study. It is through a case study that the researcher can have an in-depth study and an understanding of the problem situation and extradite relevant data from the participants themselves.

3.3.2 Request for permission

The researcher negotiated for permission to conduct research with the principals of both schools. The principal of each school was given a letter requesting permission to collect data. The subject educator was also requested to sign a letter of request (see annexure 3). The researcher followed the above procedure as a way of abiding by the ethical rules.

3.3.3 Sampling

The researcher employed purposive sampling as a tool for capturing data. Purposive sampling is defined as selecting information-rich

cases for study in-depth when one wants to understand something about the cases without needing or desiring to generalize to all such cases (McMillan & Schumacher 1993:378). The researcher' sampling is described as information-rich because that it is through the learners' various linguistic background (Sepedi, Tshivenda, and Xitsonga) that the researcher aims at finding out whether code-switching aids or impedes teaching and learning.

Two high/secondary schools were sampled for the purpose of this study. The high schools were from Sekgosese East Circuit in the Mopani District, which is mostly rural. There are about sixteen high schools in the circuit. The high schools sampled were close to each other and he (the researcher) thought that it will be convenient for him to visit them. Each school had about seven hundred learners who were from neighbouring rural villages.

The two high schools served as the right environment for conducting the study because of their learner population which consisted of Vhavenda, Bapedi, and Vatsonga. One class of grade 9 from each school was selected for the study. At school A, the class had 45 learners, whereas at school B there were only 40 learners. The researcher chose to focus on Grade 9. Grade 9 serves as a transition point from the RNCS to the NCS which brings many challenges to the learners. The implementation of the RNCS also takes place at the senior phase, which is the focal point of the proposed study.

The researcher wanted to find out whether learners could successfully deal with concepts in Mathematics using English as a medium of learning and teaching. The researcher chose only one grade 9 class per school because a bigger sample would not be manageable and might not yield satisfactory results to the researcher.

The sampling of learners was done as follows:

3.3.3.1 Learners

There were 45 learners in grade 9 class at school A and 40 in grade 9 at school B. The learners' ages ranged from 15-18 in all the classes. They were mixed because of their different genders and abilities. Their differing abilities and heterogeneity did not hinder the researcher in conducting the study, because the issue of the medium of learning and teaching applied to all of them. Learners were taught through English, even though most of them were Sepedi speaking.

3.3.3.2 Educators

Two educators, one from each school, were selected for the study. One educator is a Male and the other a female. These educators were teaching Mathematics in grade 9. Both are well experienced in the teaching field and in teaching Mathematics. They have ten years experience of teaching Mathematics. The female educator has a science degree and a teachers' diploma, and the male educator has a three year teaching diploma. The researcher hoped that the

educators' experience and knowledge of Mathematics will be a good resource to this study.

3.4 Data collection instruments

3.4.1 Questionnaire

A questionnaire is regarded as the most widely used technique for obtaining information from subjects. This is because it is relatively economical, has standardized questions, can ensure anonymity and questions can be written for a specific purpose (McMillan & Schumacher 1993:238). It was because of the above justification that the researcher has used a questionnaire.

The researcher, as a student of language at the University of Limpopo, has in the course of his studies interviewed (orally) educators on code-switching. He has managed to acquire information about educators and learners' perceptions regarding the use of code-switching in the teaching and learning of mathematics.

The following discussion gives an outline of how the questionnaires were administered.

3.4.1.1 Learners' questionnaires

Questionnaires were sent out to learners for completion at the two sampled schools. The researcher requested two educators (not

Mathematics educators), from each school, to help in the distribution of the questionnaires. The learners were requested to fill in the questionnaires immediately after the lesson in their classrooms. This was done so that the learners could remember what they had just been taught. The researcher thought that the learners' classrooms could be conducive for administering the questionnaires because of the unavailability of classrooms. The learners spent fifteen minutes in completing the questionnaires. It had seven items which required learners to supply information regarding their home language, the language used in teaching and learning, their preference regarding the language of learning and teaching, the language used in group discussions, and language which makes them understand better when being taught Mathematics. The purpose of the questionnaire was to find out which languages learners were comfortable with and what their preferences and attitudes were regarding code-switching.

Open-ended questionnaires were used. They were used to give the learners the opportunity to explain as far as possible their views regarding the language of learning and teaching. It was through the use of the questionnaires that the researcher was able to gather information about the subjects' linguistic background.

3.4.1.2 Educators' questionnaires

The researcher was able to administer the questionnaires to the educators with the help of the principals from both schools. The educators were not in any way influenced by the researcher in

completing the questionnaires. The questionnaire had two sections: that is the personal section and questions section. The questions section had nine items which required the educators to supply information regarding

- the official language used in the teaching and learning
- the language spoken in the school community the learners' home language;
- when it is used in the classroom.
- whether it good to use the learners' home language or not

They where given about fifteen minutes to complete the questionnaires. This was done immediately after the lesson presentation. The purpose of administering this after the lesson was that the researcher did not want the educators to be influenced by the contents of the questionnaires when teaching. He wanted them to be as naturalistic as possible. Their responses were to inform the researcher about their (educators) choices of the language of learning and teaching, and whether those choices make the learners to understand concepts in Mathematics or not.

3.4.2 Observation

The researcher used observation as another tool for gathering data. Observation is described as a specific method of collecting information that is very different from the interviews or questionnaires. The observational method is described by Macmillan

and Schumacher (1993:256) as relying on a researcher to see and hear things and record them. It gives the researcher an opportunity to have first hand information from the participants. The researcher is able to observe the physical reaction of learners and educators as it happens in the classroom, which could not be captured in the questionnaire.

One Mathematics lesson in each grade 9 class (of 45 learners at school A and 40 learners at school B) was observed. The researcher prepared an observation schedule (see Annexure 4), which was used in the observation of these lessons. The topic under discussion was about angles. The duration of the lesson was 35 minutes. The aim of the lesson observation was to determine whether code-switching takes place, how and when, in the presentation of the lesson.

The researcher's role in the classroom was limited to observing only. The information obtained during lesson observation was used to validate the instances of code-switching and to determine whether code-switching aids or impede learning.

To triangulate, audio-recording was used to gather data. The recording served as a backup to the lesson observations. This was done because not every information could be captured during lesson observations. The advantage of using audio-recording is that every interaction can be recorded and analyzed later (Johnson, 1992:86).The researcher tape-recorded the lessons and later on transcribed them.

3.4.3 Tests

After the lesson presentation, the researcher administered a test for each class at each school. The duration of each test was 30 minutes. It was administered immediately after the lesson, so that learners could not to forget what the educator had just taught them. The test on lesson A was on “angles” and the test on lesson B was on “substitutes”. The researcher does not consider the differing topics as a problem. Because the emphasis was on the language of learning and teaching used in the presentation of the subject matter.

The purpose of the test was to find out whether learners have understood the concepts taught or not. Immediately after the tests, the researcher requested the Mathematics educators to manually mark them. The results of the tests were analysed and compared to determine whether code-switching played or did not play a role in successful learning of Mathematics lessons.

3.5. Conclusion

In conclusion, the researcher hopes that with the methodology used, he will be able to determine whether code-switching played a role in the successful teaching of Mathematics.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

Every data collected should be analyzed and interpreted to inform the researcher about the findings**.** Data analysis was done manually based on the observed lessons and the information from the questionnaires. The analysis focused on the instances of code-switching and whether it helped the learners in understanding Mathematics contact.

The following data collection instruments were used to inform the researcher on the role of code-switching in teaching Mathematics.

4.2 The Educators' questionnaires

The following serves to report on the results of the questionnaire given out to the educators.

Two educators from two different schools were sampled for this study. They were requested to complete the questionnaire which needed information on the language they used when teaching in their respective classes. For the purpose of this study, the schools were labeled as school A and school B. The analysis will be separated

according to schools' educators respectively. The educator from schools a will be: Educator A and from school B: Educator B

4.2.1 EDUCATOR: SCHOOL A

4.2.1.1 The educator's teaching experience

- *The educator's teaching experience is 12 years*

The above experience of the educator shows that he knows the new Language -in- Education Policy very well to implement. His problem is that he still clings to the old policy of English being used as the official language of teaching and learning.

4.2.1.2 The official language of learning and teaching

As indicated under sampling, the official language of learning and teaching at both schools is English. The reason for using only English as the language of learning and teaching is that

- English is the official language of learning and teaching
- all content subjects are studied through English
- all examination papers are stet through English

The educator stated that learners may find it difficult to understand and answer questions in the examination if they are taught in their home language.

4.2.1.3 Languages spoken in the school community

The educator mentioned Xitsonga, Sepedi and Tshivenda as languages spoken within the school community. This means that he must know all of the above languages for him to be able to code-switch when the need arises.

4.2.1.4 The use of the learners' home language.

The educator stated that he makes use of the learners' home language and English. The reason for using Sepedi as the learners' home language is that it makes them understand concepts better than when taught through English. It should be borne in mind that code-switching takes place through two languages. The use of the learners' home language is mentioned because it is through that language that code-switching takes place (English and Sepedi).

4.2.1.5 Whether it is good to make use of the learners' home language

The educator stated that it is good to make use of the learners' home language. The reasons for the use of the home language are given as follows:

- *The home language makes the learners understand better*

The educator only states the need to use home language but he does

not implement it in class. Considering the educator's experience in teaching, it shows that he is used to the old Language-in-Education Policy which advocated for the use of only English and Afrikaans as the official languages. The opposite of what the educator states is that even though he acknowledges the importance of the learners' home language, he does not implement it.

- *Learners are not able to express themselves freely during learning and teaching when using English*

The above response shows that there is a need for the use of Sepedi when the learners' English vocabulary does not allow them to understand what is being taught.

- *English affects the learners' performance negatively because learners sometimes fail to understand the language used (English)*

The fact that learners fail because of being taught in English helps to show the need for the use of the learners' home language as stated above.

4.2.2 EDUCATOR: SCHOOL B

4.2.2.1 The educator's teaching experience

The educator at school "B" indicated that she has 8 to 12 years teaching experience. Her experience makes her to be a good

resource to the researcher.

4.2.2.2 The language of learning and teaching

The educator indicated that the official language of teaching and learning is English. The reason for using English as the official language of teaching and learning is that the teacher wants to prepare her learners for the examination. This is done for the learners to be able to answer questions and understand them.

4.2.2.3. Languages spoken in the school community

The educator stated that learners use both Sepedi and English. The use of Sepedi as a language of learning and teaching helps the educator to explain different concepts which he is not able to explain in English. This shows that the educator recognizes the importance of the learners' home language in teaching Mathematics.

4.2.2.4. The use of the learners' home language

The educator stated that he never uses the learners' home language, because if he can use it, the learners will experience problems when writing tests or examinations. The above explanation shows that the educator is stereotyped, following the old language policy rigidly. He only wants to conform to the old policy which promoted English as the language of learning and teaching.

4.2.2.5. Whether it is good to make use of the learners' home language or not

One educator responded that it is good to use the learners' home language, though she does not use it herself. The reason she advances is that she wanted to abide by the old Language- in - Education Policy. The policy states that English is the best.

Of note here is the fact that the educator from school B agrees that using the learners' home Language is important even though she claimed never to use it. The fact that the learners' home language may be used shows that the educator acknowledges its role when code- switching. From the educator's response, the researcher deduces that the educator only says this because she wants to conform to the old Language- in- Education Policy. The previous policy did not allow for the use of the learners' home language as a teaching resource.

The old education Policy did not allow for the use of the learners' home language as a teaching resource. The researcher therefore hopes that code-switching can be a resource for helping educators and learners in dealing with the problem of concept understanding. The researcher thinks that the use of the learners' home language in the teaching and learning of Mathematics will help educators to teach better and learners to understand better.

4.3. Response to Learner Questionnaires

The questionnaire was given to learners who are doing Grade 9 from both sampled schools for completion. The following analysis is based on the responses given by learners from both schools respectively.

4.3.1 SCHOOL A: LEARNERS' RESPONSES

A Grade 9 class at school **A** was purposively sampled for this study. There were 45 learners in this class. The learners' age ranged from 15 to 18.The reason for having the 18 years old in the Grade 9 class may be that they have repeated many grades. Some of them may have experienced problems regarding the Language of Learning and Teaching, which is English. Learners were forced to use English from grade 5 without any foundation being layed in this language. They found it difficult to learn in this language. The following questions were asked and the responses are as follows.

4.3.1.1 The learners' home language

- ***Ninety four percent*** *of the learners indicated that they speak Sepedi, while only* ***6****% was Xi-Tsonga speaking. Those who are Venda speaking have shun away from Venda because of the influence of Sepedi in the community. They ended up regarding themselves as Bapedi, but they are originally from Venda.*

1 Table 1: The learners' home language

Sepedi	Xitsonga
94%	6%

4.3.1.2 The language of learning and teaching

- *The language of learning and teaching used at school A is English*

The above response is only abiding by the general policy (which is the old Language policy), but the reality is teachers do code-switch.

4.3.1.3 On whether the learners' home language is used in the Mathematics classroom

Ninety five percent of the learners responded positively citing the following reasons:

- *they want to understand what the teacher says in the class;*
- *the home language is simple to understand;*
- *Mathematics is the important subject in the classroom and they understand it when taught through their home language;*
  1. *they do not know English well; and*
  2. *they always speak Sepedi*

Only 5% indicated that they use English in their studies.

From the above reasons, it emerged that all the learners stated the same reasons: that their home language is used in their mathematics class. The reason advanced show that it is through the use of their home language that they understand difficult concepts in Mathematics.

Table 2: The use of the learners' home language

Sepedi	**English**
95%	5%

4.3.1.4 The language they prefer

Eighty five percent responded by indicating that they prefer English to their home language. The reasons given are:

- *It is because the teacher reads and teaches in English.*
- *Because they want to understand Mathematics*
- *English is spoken all over the world.*
- *English is good and simple*
- *English is important*
- *They love English*

Only 15 **% of** the learners responded that they would like to be taught Mathematics in their home language. Their reasons for choosing their home language are as follows:

- *it is because it is their home language.*
- *they want to speak it.*
- *because Mathematics is very important.*
- *they don't know English well.*
- *it makes them understand better.*

Table 3: Language of preference

English	Sepedi
85%	*15%*

4.3.1.5 On **the question of the language used in group discussions**, the **61%** indicated that "English" was used as the medium of group discussion. Their reasons were:

- *They want to know the language (English.)*
- *They want to understand the language (English).*
- *It is part of the school policy.*
- *English can be used even outside the classroom world.*
- *Other learners do not understand other languages (because of their differing Home Languages)*
- *It is an important language for the classroom.*

The common understanding is that English is used as the language of learning and teaching. What should be noted is that learners may have been influenced by the educator's standpoint regarding the language of learning and teaching. Their standpoint originates from their background and experience during the apartheid era where English was used as the only alternative language of learning and teaching Afrikaans. The educator at school B believes that learners should be proficient in English, for them to be able to succeed in the examination. Such fears and believes may have influenced the learners when filling in the questionnaires.

Only **39 %** chose Sepedi as the language used in group discussions. They gave the following reasons:

- *Sepedi is their Home Language.*
- *They understand when being taught in Sepedi.*
- *The language is very simple and good for them.*
- *It makes them to freely engage in classroom discussions.*
- *They do not know English.*

Table 4: Language used in group discussion

English	Sepedi
61%	39%

From the reasons given above, the researcher would like to conclude that code-switching makes discussions to be easier amongst learners and so they end up comprehending their reading. It is through their home language that learners are able to discuss difficult concepts in Mathematics. This does not mean that English is not used. Learners code-switch to their home language only when their linguistic knowledge of English fails them to comprehend the given concepts. Code-switching therefore serves the purpose.

4.4 SCHOOL B: LEARNERS' RESPONSES

There were 40 at this school in grade 9.They were given a questionnaire which contains different questions which they were requested to respond to. The following discussion will focus on the responses to those questionnaires.

4.4.1 The learners' home language

Ninety five percent of the learners indicated that their home language is Sepedi, whereas only 5% indicated that they speak Xitsonga.

Table 5: The learners' home language

Sepedi	**XiTsonga**
95%	5%

4.4.2 The Language of learning and teaching

Out of the 40 learners, 80% indicated that they use Sepedi whereas only 20% indicated that they use English.

Table 6: language of learning and teaching

Sepedi	**English**
80%	20%

4.4.3 Whether the teacher make use of the learners' home language

Fifty percent of the participants responded by saying YES and 50% responded by saying NO. The ones who responded by No gave the following reasons:

- They like to know English
- Mathematics is not taught in Sepedi

The learners who responded by Yes gave the following reasons:

- Sepedi makes them to understand quickly
- English is difficult for them

Table 7: The use of the learners' home language

YES	**NO**
50%	50%

4.4.4. Preferred language

On the question on whether learners preferred to be taught in their home language or Sepedi, 60% indicated that they prefer Sepedi, whereas 35% indicated that they preferred English. The other 5% did not complete the questionnaire correctly and therefore were regarded as spoilt. The fact that 60% indicated that they prefer Sepedi shows that Sepedi medium can serve as an alternative to the problems which they come across when they are taught Mathematics in English.

The reasons given for the choice of sepedi are as follows:

- They love their Home Language
- They do not know English
- Sepedi is the Language they speak at home

- It makes them to understand the content

The reasons for the choice of English are as follows:

- They want to know the language
- It is because English is the official language

Table 6: The language preferred by learners

Sepedi	**English**	**Other (Spoilt)**
60 %	35%	5%

4.4.5 The language used in group discussions

Out of 40 learners who responded to the question, 67,5% indicated that they use English in their group discussions. Twenty five percent indicated that they used Sepedi whereas 10% indicated that they use Xitsonga.

The following reasons were given for the choice of English being used in their group discussions:

- They want to know the language;
- It is the language of learning and teaching; and
- Other learners do not understand Sepedi.

The reasons for the choice of sepedi are as follows:

- They do not understand English; and
- Sepedi is their home language

The reasons for the choice of Xitsonga were not given. The researcher would therefore like to conclude that their choice of Xitsonga is influenced by the difficulty of the English language.

Table 8: Language in group discussions

Sepedi	**English**	**Xitsonga**
67,5%	25%	10%

The fact that 67,5% of the learners indicated that they use English in their group discussion does not mean that it makes them to understand the subject matter (See Annexure 3). They only use the language because their educator wants them to conform to the policy of English as the language of learning and teaching.

What the researcher gets as the general idea is that the learners' home language makes them to understand the subject content. Therefore code-switching can be introduced as a strategy towards making learners to understand. The response that English is the preferred language is questionable based on the learners' performance in school B. The question remains whether English aids them to understand Mathematics. Analysis of the observation

schedule (annexure 3), results of the test, do however indicate that at the school where English only was used as the medium of teaching and leaving (School B), the learners performed poorly. On contrary the school where the learners' home language was used showed good performance. This to indicate that code-switching can be used to help learners understand difficult concepts in Mathematics.

4.5 Observation schedules

The observation schedules also included an item on assessment during the lesson presentation. The observation schedules also helped in confirming the notion that code-switching does take place. The information from the lesson assessment helped in determining whether the application of code-switching has helped in understanding different concepts.

4.6 Audio recording

The audio recordings acted as a back-up to lessons observed. Analysis of the audio-recordings confirmed what the researcher has noticed through the use of the observation schedule. It confirmed the notion that educators do code-switch. One of the analysis from the transcription is that code-switching does help learners in understanding difficult concepts in Mathematics.

The following discuss will focus on the analysis of lessons observed.

4.7 Analysis of lesson A

GRADE : 9

SUBJECT **: MATHEMATICS**

TOPIC **: ANGLES**

DURATION **: 35 MINUTES**

TEXTBOOK REFERENCE: MAPHUMULO ET AL, 2003. ***MATHEMATICS IN OUR WORLD*- LEARNER BOOK. NASOU. CAPE TOWN**.

The following analysis will be based on the lesson by educator A at school A as outlined in the delimitation of the study and the sampling procedure.

The purpose of this analysis is to find out instances of code-switching and their reason in the presentation of a Mathematics lesson. It is worth noting that the educator started his lesson by introducing the researcher to the learners. This was intended to make them feel at ease and be active during the lesson.

The pattern which emerged may either be because of the learners did not understand what the educator said, or because of the language (English) which may be a barrier. This is contrary to the learners' responses in the questionnaires that they prefer to be taught in English because it is "simple". It seems that the learners only stated

that it is simple because they wanted to satisfy their teacher.

The educator switched to the learners' home language when he asked a question "*Le ditseba bjang?*" (How do you identify them?). The function of this code-switching was to make the lesson to continue and also to link the learner's understanding of the topic being taught. The educator made sure that learners participated by repeating the question in their home language "*Le di tseba bjang gore ke di corresponding angles*?" (How do you know that they are corresponding angles?)

In turn 44, the teacher again code-switches to the learners' home language by asking the question "*ke efe*?"(What is it?). The purpose of this code-switching is to encourage learners to think. It is to make them respond to questions asked. The learner responded by saying 16. This shows that the learner understood what the educator was saying because of the common language between them. At turn 51, the educator again makes use of code-switching. He code-switched to the learners' home language. This is because the learners failed to respond to the question asked. He said "*a re yeng, ke rile di corresponding angles di diya bjang?"(*What kinds of angles are corresponding angles?). The purpose of this code-switch was to try to remind learners about the nature of corresponding angles, that they are identified by means of "f".

At turn 55, the educator again code-switched to Sepedi by indicating what the learners should do to identify the corresponding angles. He

said "*O di yo lebelela nto yeuwe, wa re e tshwana le Z* "(you just look at it and say it is like Z). "*Wena wa bona gore ke "s" go ba ke 'f'* (you just see whether it is's' or 'f').The purpose of this code-switching was to guide the learners in identifying corresponding angles. The educator seems to have realized that learners were struggling in identifying the corresponding angles. The educator succeeded in the use of code-switching because learners were able to compare the shapes of angles with given objects (Annexure 1).

In turn 59, a learner used code-switching to liken the shape of alternating angles with the shape of a Scissor. He said *"e eme bjalo ka sekero? Eh! Le a se tseba sekero?*"(Is it like a pair of scissors? Do you know a pair of scissors?).The educator repeated the question in turn 61 and asked*"Le a se tseba?" (Do you know it?).*By comparing the shapes of corresponding angles and alternating angles of a scissor, the educator wanted the learners to have a better understanding of alternating and corresponding angles. The response was, however, not satisfactory, hence the educator repeated the question "*Le a se tseba?"(*Do you know it?) in turn 63.The comparison was further indicated by the statement*: "meno a sekero a ema ka mokgwa wona wouwe."*(That is how the shape of a pair of scissors is.)

The insistence on the use of code-switching in the utterance "*Le a se tseba*?" (How do you know them?) is because the educator wanted to make sure that learners have understood him. The insistence also confirm the reason for code-switching which is to clarify

misunderstanding and because certain concepts are easier to express in the one language than in the other.

The above occurrence shows that the learners' home language (Sepedi) can be used in the explanation of difficult concepts in Mathematics. It can help them understand the concepts.

In turn 84-90 the educator realized that learners have not understood his explanation of the shape of an alternating angle and code-switched to Sepedi. The switch came in the form of comparison, where the age of the learner (Portia), was compared with the age of another learner (Euphodia).The teacher asked Portia's age and he translated it into Sepedi and said" *Portia, o na le mengwaga e mekae?"*

The analogy of Portia's age being the same as Euphoria's and Paul's was transferred to Mathematics. The educator wanted the learners to understand that the value of X, Y, Z, is the same, because they are all corresponding angles.

The responses given by learners (turn 91-98) do not show whether they have understood or not. This makes the teacher amazed, hence the statement: "*Mpotsene class, dinomoro tse le di tseere kae?"* (Tell me class, where did you get these numbers from?).The learners responded by stating that they were just guessing (*Ke dio kesa) (I am just guessing)*

The researcher's general observation about code-switching in the class is that:

- The educator applied code-switching in instances where he felt that learners did not understand.
- The learners at first appeared to be confused about the explanation of concepts.
- The educator later on succeeded in the use of code-switching in the explanation of variable angles.

The researcher would like to conclude by stating that code-switching helps learners to understand concepts as they are being taught in Mathematics content. It serves as a good resource for educators to use when their knowledge of English fails them to explain difficult concepts.

4.8 ANALYSIS OF LESSON B

SUBJECT: Mathematics
GRADE : 9
TOPIC : SUBSTITUTION
DURATION; 35 MINUTES
TEXTBOOK REFERENCE: MAPHUMULO, SMALLBONES AND CRANSTON.2003 *MATHEMATICS IN OUR WORLD.* LEARNER'S BOOK.NASOU .CAPE TOWN

One grade 9 Mathematics lesson at school B was observed. The purpose of observing this lesson was to find out whether code-switching is being applied when teaching concepts in Mathematics. Again it is to find out whether it assists both the learners and

educators in the teaching and understanding of difficult concepts.

Unlike lesson A, which had instances of code-switching, lesson B was presented purely in English. The educator stated in her responses to the questionnaire that she believed that if she used the learners' home language, they would experience problems in answering questions during the examination.

There are many factors which make the subject matter presented to be difficult for learners to understand. The language of learning and teaching is one of them. This may be contrary to what some of the learners have stated in their responses to questionnaires that they prefer to be taught in English. The results of the test show that they did not understand the subject matter. The language problem was experienced because the educator did not explain difficult concepts to learners. For instance she did not explain what substitutes and expansion mean. This created a problem to the learners, who out of fear of seeing the researcher and not wanting to disappoint their educator, responded by saying "Yes" to whatever question. The educator again mentions difficult concepts like poly-nominal. This concept was not explained to the learners and as such they ended up not understanding what the educator was talking about.

The educator became frustrated because instead of explaining what poly-nominal are, he then asked another question: what is a variable? Learners were confused and frustrated. This is shown by only one learner attempting to answer by saying "X". The educator

creates more confusion by bringing in another concept: exponent. This concept was not understood by learners, hence their failure to respond to questions.

Using English only did not help either the educator to present the subject matter well or the learners to understand the subject matter. The frustration in the educator is revealed by the phrase "Shoo you learn to forget". Learners were also frustrated, but are afraid to show this frustration to their educator. They only respond to all her questions by saying "Yes". The educator also wanted to make sure that learners did understand what she said by asking the question: "Are we together?" repeatedly.

The researchers' observation from the analysis of the above lesson is that the use of English as a language of learning and teaching (without the explanation of concepts in the learners' home language) in the presentation of Mathematics will not make learners to understand.

4.9 Results from the Test

Success of whether teaching only in the language of teaching and learning (English) made learners to understand concepts in Mathematics or not was seen through the assessment applied.

The presentation or explanation of concepts was done through the learners' home language, but assessment was carried out through the use of the language of learning and teaching which English First

Additional Language is. The researcher would like to put forth the above statement because it is a part of the contextual factors which may have affected the performance of the learners.

A test was administered to the learners of both schools at the end of each lesson. The test at school A contained items on different types of angles (e.g., corresponding angles and alternating angles) whereas learners at school B were given a test on variables. The aim of both tests was to assess whether the use of code-switching helped the learners in understanding difficult concepts or not. The analysis of the results is as follows:

4.9.1 Results of the test of school A

Table 8: School A

SPREAD OF SCORES IN TERMS OF PERCENTAGES					
Number of learners	0-9%	10-19%	20-29%	30-39%	40%+
45	1	8	3	10	23

The results of the test of school A shows a higher performance than in school B, where learners performed dismally. Twenty three of the learners obtained 40% upwards with only 1obtaining below 10 and 3 obtaining average (20-29%). It should be borne in mind that the educator applied code-switching at school A, unlike at school B where learners were taught only through the medium of English. The

above results served to answer the researcher's question of whether code-switching aids or impedes learning. It shows that learners perform better when concepts are explained in their home language, than when they are explained in English as in school B.It therefore implies that code-switching does not impede, but aids learners and educators in the teaching and learning of difficult concepts in Mathematics.

4.9.2 Results of the test of school B

Table 9: School B

SPREAD OF SCORES IN TERMS OF PERCENTAGES					
Number of learners	0-9%	10-19%	20-29%	30-39%	40%+
35	11	13	5	3	3

The table above represents the results of the test in terms of percentages. I show that the class consisted of 40 learners. Out of 40 learners, 5 did not write the test. The majority of the learners obtained below 30%, with only 3 obtaining above 40%.The results above show that learners did not perform well in the test. One of the reasons which may have led them to perform so poorly may be the issue of the language of learning and teaching. The learners were taught only through the medium of English, without code-switching to the learners' home language. From the educator's responses, the educator mentioned that she teaches her learners through the

medium of English because she does not want them to experience problems when coming to the examinations. The results of the test, however, proved her position to be wrong. Learners did not perform well.

The researcher would like to state that has the teacher used the learners' home language in the presenting of her subject matter, learners would have performed differently. The researcher does not say that the home language should be used, but that rather code-switching is a teaching strategy towards solving the problem of misunderstanding and poor comprehension

CHAPTER FIVE

FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The purpose of this chapter is to summarise the findings that emerged from the study. The findings will be presented and conclusions and recommendations be made in relation to the problem in question and directions proposed for future studies.

5.2 Summary of procedure

A total of 90 learners and two educators from two respective schools were interviewed. Two questionnaires were sent out to educators to be filled in. The questionnaires requested the educators to supply the researcher with information regarding their experience in teaching Mathematics, and which language of learning and teaching do they use in teaching concepts in Mathematics.

Learners were also given questionnaires to complete. The learners' questionnaires requested them to supply information concerning the language of learning used in their classrooms and their preferences in terms of the language of learning and teaching. The researcher also used the observation schedule to record instances of code-switching: (i) whether it does take place in the classroom and for

what purpose. The observation schedules were backed up by lesson recordings. Each lesson was recorded, transcribed and analysed. The lesson analysis was also used to determine the patterns which may have emerged in the lesson regarding the use of code-switching, if it did take place.

5.3 Findings of the study

In this section the researcher focuses on the findings of the study according to the data collection instruments used. The following are findings which emerged from the learners' questionnaires when analyzing data:

5.3.1 Questionnaires

5.3.1.1 Learners

- The learners' home language was stated as being used in the classroom. The researcher would like to conclude that even if they use the learners' home language in teaching, for the fear of being reprimanded, the learners state in number three (below) that the language of learning and teaching is English. This is only conforming to the practice which is being inherited from the previous (old) Language in Education Policy.
- The most preferred language is English

- The language used as the language of learning and teaching is English.

Learners only stated that the language used as the language of learning and teaching is English be cause they only want to conform to the act. They pretend not to acknowledge that code-switching do exist.

5.3.1.2 Educators' questionnaire

The educator at school A indicated that he uses code-switching in his class. According to him, it makes learners to understand better when code-switching to their home language. This is in contrary to the educator at school A, where she stated that she does not use code-switching in her class; because it will confuse the learners .The educator states that learners will not be able to answer questions when writing tests or examinations.

5.3.2 Tests

The results of the tests are, however, different from the learners and educators responses. The tests showed that:

- Learners at school A where the educator applied code-switching, performed better than at school B where code-switching was not applied.

The above results will help in informing the educator about the recommendations to be made regarding the use of code-switching.

5.3.3 Oral Interview

Oral interview conducted by the researcher also revealed that educators do code-switch. Some of the instances of code-switching take place when educators were not aware of. The fact that educators do code-switch at some point or another indicates the importance of code-switching in these classrooms.

5.4 Interpretation of the findings

The results of the tests should not be confused with the responses from the learners and educators' questionnaires. The purpose of the questionnaires was to inform the researcher on what was going on in the classroom regarding the language of learning and teaching from the perspective of the learners and educators.

The lesson observation and the assessment applied during and after the lesson was what informed the researcher about the success or failure of code-switching. The following interpretations were based on the results of the assessment (tests).

- From the summary of the findings and data analysis, it was evident that the learners' home language was preferred and

- used in the classroom. Learners have stated that they prefer English as language of learning and teaching. This may be because English was being used as a language of learning and teaching during the Apartheid régime. It was sort of abiding by the law.

- The results of the tests indicated that the use of code-switching in the teaching or explaining of difficult concepts could be useful towards improving the learners' understanding,

From these results the researcher would like to conclude that code-switching can be a good resource towards addressing the problem of understanding concepts in Mathematics.

5.5. Recommendations

Based on the findings and the interpretation of data, the researcher would like to recommend that the code-switching be used by educators as a strategy towards solving language problem. Educators should start implementing the Revised National Curriculum Statement policy which states that:

- Educators should lead the learners in communicating effectively using visual, symbolic and /or language skills in various modes. To achieve this, educators may use the

learners' home language in instances where they find it difficult to use English to explain certain concepts.

- Learners should also be encouraged to use their home language in instances where they feel that English fails them to express themselves freely.
- Textbooks should also be written in such a way that they will be user friendly. A glossary should be included in books which will help learners in explaining difficult concepts.

The use of code-switching can extend to other learning areas at school, which are said to be difficult for learners, like Physical Science. In making use of code-switching, educators will be fulfilling their roles as mediators of knowledge. The researcher would also like to recommend that more studies be conducted which will add knowledge to the existing ones so that they can inform policy formulation regarding the Language of Learning and Teaching.

5.6. Conclusion

In conclusion, the researcher would like to provide the answer for the question "does code-switching aid or impede the learning of difficult concepts in Mathematics? From the study conducted and the analysis and interpretation of the data collected, it became evident that the application of code-switching does aid in the learning of difficult concepts in Mathematics.