Investigating factors contributing to poor mathematics performance of Grade 7 students in the Berea District of Lesotho

by

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DECLARATION

I, ‘Masekhohola Mary Nyamela declare that the project “*Investigating factors contributing to poor mathematics performance of Grade 7 students in the Berea district of Lesotho*” is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

______________________________ 26 May 2015

SIGNATURE **DATE**

‘Masekhohola Mary Nyamela

DEDICATIONS

To

My husband Tsotang Benedict

My two daughters Rorisang and Maleshoane

and

My son Rethabile

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ABSTRACT

The aim of this study was to identify factors that negatively influence students' performance in Grade 7 mathematics in the district of Berea of Lesotho. A Bronfenbrenner's model of child development and the constructivist theory were used to frame the study. The sample was drawn from the population of 98 primary schools in the Berea district of Lesotho. Of the 98 primary schools in the Berea district 15 were purposively sampled for participation in the study. This sample represented more than 10% of the study population. Participating schools were selected on the criterion that they persistently registered poor performance in Grade 7 mathematics. The poor performance of n=15 schools was determined through an evaluation of their performance trends. For instance, the n=15 schools had registered an average pass in Grade 7 mathematics that ranged from 17.0% to 39.4% in the year that preceded the study, which was considered to be less than the national benchmark of at least 50% and above (see, Table 1.2).

Participants consisted of n=15 primary school principals, n=15 deputy principals and n=30 Grade 7 teachers for mathematics. An explanatory mixed-methods design was employed in which both quantitative and qualitative methods were used to collect data. Five point Likert scale questionnaires and semi-structured interviews were used to collect data. The descriptive statistics and thematic content analysis were used to analyse data. On the whole, the study found that the teaching methods, overcrowded classes, teaching observations, teachers' workshop attendance, students' progress monitoring, teaching resources, collaboration between Grade 7 mathematics teachers, support given to Grade 7 mathematics teachers, teachers' attendance at school, syllabus completion, mathematics assessment policy, students' socioeconomic background, teachers individual meetings, students' prior knowledge, remedial classes, teachers' files and lesson plans and students' negative attitude, all contributed to the factors that promoted students' poor performance in mathematics in Grade 7. In addition, the study established that Grade 7 mathematics instruction in participating schools did not subscribe to constructivist approach. The study recommends that teacher development programmes should be strengthened in the Berea district to enhance pedagogy and students' mathematical performance at primary level.

KEY TERMS

Primary education in Lesotho

Free primary education

Mathematics performance

Bronfenbrenner’s model of development

Constructivist learning theory

Students’ progress monitoring

Teaching methods

ABBREVIATIONS

CAP	Curriculum and Assessment Policy
COSC	Cambridge Overseas School Certificate
DES	Diploma in Education Secondary
DPQ	Deputy Principals' Questionnaire
DTEP	Distance Teachers' Education Programme
ECOL	Examination Council of Lesotho
HTQ	Head Teachers' Questionnaire
JC	Junior Certificate
LCE	Lesotho College of Education
MGD	Millennium Development Goals
MOET	Ministry of Education and Training
MTQ	Mathematics Teachers' Questionnaire
PCK	Pedagogical Content Knowledge
PPMCC	Pearson Product Moment Correlation Coefficient
PSLE	Primary School Leaving Examination
SACMAQ	Southern African Consortium for Monitoring Education Quality
SEO	Senior Education Officer
SPSS	Statistical Package for Social Sciences
STC	Secondary Teachers Certificate
TSD	Teaching Service Department

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CHAPTER ONE

ORIENTATION OF THE STUDY

1.1 INTRODUCTION

The mathematics performance of students in Lesotho schools continues to become a source of national concern (Matsoso & Polaki, 2006; Nenty, 2010). Recent Southern African Consortium for Monitoring Educational Quality [SACMAQ] (2011) showed that Lesotho's mean score for mathematics was below the collective SACMAQ average of 500. The Education Strategic Plan for 2005-2015 in Lesotho has highlighted a continuing decline in the quality of mathematics performance, particularly at the primary school level. The following factors are identified to influence mathematics performance: the teaching practices, the language, teachers' pedagogical content knowledge, parental involvement, availability of qualified teachers, teachers' experience, teacher's subject specialization, teacher's qualification, syllabus coverage, teachers' professional development and the teaching resources (Jackson, 2009; Nenty, 2010; Ogbonnaya, 2007 & Orton, 1997).

The purpose of this study was to investigate factors contributing to poor mathematics performance of Grade 7 students in selected primary schools in the Berea district of Lesotho. The study was important to highlight the influence of these factors in the context of Lesotho mathematics education in order to design strategies to curb poor mathematics in lower classrooms. Participants consisted of school principals (n=15), deputy principals (n=15) and Grade 7 mathematics teachers (n=30) from 15 primary schools in the Berea district of Lesotho. The study followed a mixed methods approach that largely incorporated elements of descriptive survey design. All participants completed a questionnaire that mainly probed them on factors that influence students' performance in Grade 7 mathematics. Subsequent to the questionnaire were semi-structured interviews conducted with a purposive sample in each group of participants. The Beria district was sampled due to its history of poor performance in primary level mathematics, and the fact that the researcher worked as a mathematics teacher in the same district during the time of this research.

1.2 AIM AND OBJECTIVES OF THE STUDY

The aim of this study was to identify factors that negatively influence students' performance in primary school mathematics in the district of Berea of Lesotho. To achieve this aim the researcher identified the following objectives:

1.2.1 To determine, in each school, possible causes of poor mathematics performance in Grade 7; and,

1.2.2 To determine how mathematical teaching and learning activities are facilitated in selected schools.

1.3 CONTEXTUAL BACKGROUND OF THE STUDY

Lesotho is a mountainous country with an average altitude of more than 1600 meters above the sea level. It covers about 30 355 square kilometers (CopyWrite, 2005). It is entirely landlocked within the territory of the Republic of South Africa. Lesotho's society is predominantly monolingual with English and Sesotho as the two official languages. Lesotho has 10 districts and Maseru is the capital city. Lesotho attained its full independence in 1966. Since then vigorous efforts have been made to reform national education and to address the country's developmental needs (Curriculum and Assessment Policy [CAP], 2008, p. 2). To improve education people's opinions were solicited through a series of *lipitso*[1] that were held throughout the country to influence education policy reforms. The purpose was to design a democratic curriculum that would be responsive to local needs. Berea (site of this study) is one of the 10 districts and is located in the northern part of Lesotho. Currently there are 98 registered primary schools in the Berea district. There are three types of primary schools namely, the mission, government and community schools. Of 98 primary schools in the Berea district; 45(45.9%) are owned by the missionaries, 36(36.7%) by the government and 17(17.3%) by the community.

The education system of Lesotho consists of three levels: the primary, secondary and tertiary education. The primary education takes seven years and is divided into two cycles: lower primary (Grade 1-4) and upper primary (Grade 5-7). At the end of Grade 7 students sit for the Primary School Leaving Examination (PSLE) administered by the Examination Council of Lesotho

1. *Lipitso* is a Sesotho name to describe an act of gathering in which people in a village discuss issues of local and common interest.

(ECOL), which is a department in the Ministry of Education and Training (MOET) responsible for the setting and administration of external examinations in the country. The language of instruction at primary level is English. Students may progress to the secondary education if they pass the primary level education with one of the following options: first class pass, second class pass or third class pass. A first class pass at the primary level refers to obtaining 60% in Sesotho, English, mathematics and the aggregate; a second class pass refers to obtaining 50% in Sesotho, English and the aggregate; and, a third class pass refers to obtaining 40% in any three subjects and the aggregate and 30% in the remaining two subjects.

The subjects' grades are first grade if they are scored at 60%, second grade at 50% and third grade at 40% (Examination Council of Lesotho [ECOL] Report, 2009). The secondary education takes five years. Within three years of secondary education students sit for Junior Certificate (JC) examination, then Cambridge Overseas School Certificate (COSC) examination after two years. Secondary education serves as the preparation phase for tertiary education. Five subjects are offered at primary level, namely, Sesotho, English Language, mathematics, science and social sciences. Sesotho, English and mathematics are the core subjects. At the end of seven years of primary education pupils should have acquired communication skills for listening, speaking, reading and writing Sesotho and English, and most importantly, numeracy skills for counting, adding, subtracting, multiplying and dividing (CAP, 2008).

As a signatory to the Millennium Development Goals (MDG) the government of Lesotho has pledged to achieve 100% primary completion and secondary education by 2015. The government has set its own goals to improve the quality of education at all levels. Despite these well-intended educational initiatives the mathematics performance of Basotho[2] primary and secondary school students is a source of national concern. Examination reports by the Examination Council of Lesotho (ECOL) (2005) have highlighted deficiencies in mathematics achievement in Lesotho students. According to ECOL's (2005) statistics, students' performance in mathematics in Cambridge Overseas School Certificate (COSC) for 2000-2005 is below 12% credit. This means that only less than 12% of the candidates are able to score up to 50% in the subject in the examinations. This was also the case for Junior Certificate (JC) examinations. ECOL's statistics

2. Basotho is a Sesotho name to describe the nation of the people who live in Lesotho and who speak Sesotho.

JC (2004) examination showed that there was 10% credit pass in mathematics and the average students' performance in the subject was symbol F+ (20-29%) (ECOL, 2005). The recent Southern African Consortium for Monitoring Education Quality (SACMAQ) survey of Grade 6 primary school performance in reading and mathematics showed that Lesotho performed below the SACMAQ average of 500 both in 2000 and again in 2007 (SACMAQ, 2011).

The Education Sector Strategic Plan (2005-2015) indicated a decline in the quality of mathematics teaching at all levels. The Tabular Report from ECOL (2012) analyzed the mathematics performance from 2007 to 2012 in the Primary School Leaving Examination (PLSE) report (Table 1.1). According to ECOL (2012), there has been a drop in percentages of students obtaining first and second class passes although there has been an increase in third class passes and the total pass rate has generally remained the same as that of the preceding years.

Table 1.1: Patterns of mathematics performance in Lesotho primary schools over the period 2007-2012

School year	Number and pass percentage (%) of Grade 1	Number and pass percentage (%) of Grade 2	Number and pass percentage (%) of Grade 3	Total number and corresponding fail percentage (%)
2007	8935 (21.2%)	10881 (25.8%)	8659 (20.5%)	13734 (32.5%)
2008	10292 (24.6%)	10104 (24.2%)	10368 (24.8%)	11044 (26.4%)
2009	9802 (23.7%)	10514 (25.4%)	11119 (26.8%)	9982 (24.1%)
2010	9142 (21.8%)	10300 (24.6%)	12290 (29.3%)	10606 (24.3%)
2011	9543 (23.4%)	11838 (29.1%)	9499 (23.3%)	9859 (24.2%)
2012	9406 (23.7%)	9204 (23.4%)	10497 (26.5%)	10447 (26.4%)

Source: *ECOL (2012)*

Given this background, there is a need for research to find ways of reversing poor performance in mathematics in Lesotho schools. The current study aimed to investigate factors contributing to students' poor performance in Grade 7 mathematics in the district of Berea in Lesotho.

1.4 RESEARCH ON FACTORS INFLUENCING MATHICS PERFORMANCE

Research shows that variables that influence students' achievement include teaching practices (Stigler & Hiebert, 1997; Stols, Kriek & Ogbonnaya, 2008 & Wenglinsky, 2002), teachers' pedagogical content knowledge (Makgato & Mji, 2006; Tsong & Rowland, 2005), unqualified teachers in schools (Lewin, 2000; Taylor & Vinjevold, 1999), language of teaching and learning (Barwell, 2008; Orton, 1997), parental involvement in schools (Deventer & Kruger, 2008; Polaki & Khoeli, 2005) and educational resources (Machobane, 2000 & Bolila, 2007). In this section a brief discussion is provided on some of these variables in relation to mathematics instruction.

Research has found that teaching practices are a significant factor in promoting students' performance in mathematics (Stols, Kriek & Ogbonnaya, 2008). Decisions teachers take about classroom practices can either greatly facilitate student learning or serve as an obstacle to this process (Wenglinsky, 2002). Stigler and Hiebert (1997) reported that classroom instructional practice is an important aspect of students' learning. Studies have emphasized that teacher attempts to improve students' learning should occur inside the classroom (Khoeli & Polaki, 2005; Wenglinsky, 2002). Mathematics education reforms have noted the need to shift from didactic teaching approaches (traditional methods), in which teaching is associated with transmission of knowledge by the teacher and learning associated with passive receiving of knowledge (Dhlamini & Mogari, 2013), to student-centered learning (Artzt, 1999; National Council of Teachers of Mathematics, 2000, cited in Polaki & Khoeli, 2005).

The teachers' personality, the knowledge and the teaching practices are considerable factors in shaping students' academic performance (Wenglisky, 2002). Tsang and Rowland (2005, cited in Stols *et al*., 2009) noted that effective teachers have good mastery of the substantive syntactic structures of the subject. Teachers need to be able to unpack the subject's content in a way that would be understood and retained by the students. In other words, teachers need the ability to understand subject content enough to teach the students effectively. A qualitative study asserted that pedagogical content knowledge (PCK) is identified as an important aspect in improving students' poor performance in mathematics (Makgato & Mji, 2006). This study recommended the school-based, clustered, provincial and national workshops targeting mathematics teachers if the usefulness of PCK is to be enhanced (Makgato & Mji, 2006).

Lack of qualified teachers has been identified to influence mathematics performance (Konyongo, Schreiber & Brown, 2007; Lewin, 2000; Taylor & Vinjevold, 1999). Researchers have noted a positive connection between teachers' subject majors and students' achievement in mathematics

(Darling-Hammond, 2000; Goldhaber & Brewer, 1996; Wenglinsky, 2002; Wilson & Floden, 2003, cited in Stols *et al*., 2008). Teachers' highest qualifications have been identified to correspond positively with students' achievement (Goldhaber & Brewer, 1996; Greenwald, Hedges & Laine, 1996; Rice, 2003). Barwell (2008) noted that home language plays a pivotal role in students' learning of mathematics. Barwell (2008) adds that students need a high degree of proficiency in at least one language in order to make satisfactory progress in schools. Orton (1997) argues that the language used for thinking is always likely to be the first language. Research shows that low proficiency in all languages and mathematics underachievement are clearly linked (Lefoka, 2003; Mckay, 1995; Seotsanyane, 2004; Setoi, 1999).

Time spent by a student with the parent is crucial to the understanding of the mathematical concepts (Polaki & Khoeli, 2005; Lytton & Pyryt, 1998). Students perform better in schools that have a strong positive parental involvement (Goldring & Shapira, 1996; Ho & Willms, 1996). Deventer and Kruger (2008, cited in Jackson, 2009) indicate that parental involvement improves students' learning performance, school attendance; it eliminates behavior problems and restores trust between the home and the school. Educational resources such as textbooks, teacher availability and teaching aids are essential in teaching and learning. Machobane (2000) argues that the unavailability of resources in schools negatively impacts on students' performance. Machobane (2000) adds that educational resources arouse students' interest, sustain students' attention and eliminate blind memorization of words without any association with the real objects. Bolila (2007) states that teaching mathematics without textbooks and enough teachers are not the best ways to assist a school to achieve its envisaged performance objectives.

Given the background on the factors that influence students' performance in mathematics classrooms, and the observations of students' poor performance in Lesotho mathematics classrooms, it is reasonable to conduct an investigation to address the following question: *Which of these factors influence students' performance in the context of Lesotho mathematics classrooms?*

1.5 PROBLEM STATEMENT

At the time of this research most primary schools in the district of Berea were recording low performance in mathematics. The Senior Education Officer (SEO) at Berea confirmed that the Grade 7 (PSLE) Grade 7 students' performance in mathematics were low and stagnant in comparison to other districts of Lesotho. Table 1.2 shows the 2012 average passes of Grade 7 students in mathematics of the 15 selected primary schools.

Table 1.2: Average mathematics passes (%) of the 15 sampled primary schools[3] in Berea for 2012

Berea primary schools (n=15)	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**
Average pass % in 2012	25.1	17.0	38.7	27.4	22.0	38.0	18.1	23.0	29.3	38.2	33.0	35.4	36.3	38.7	39.4

Source: *Berea Education Office (2012)*

Table 1.2 shows that in 2012 the mathematics pass rate of 15 primary schools in the Berea district ranged between 17.0% and 38.7%. The implication of this is that students who fail mathematics at the primary level will not be admitted at the secondary education because mathematics is a core subject in Lesotho (see, Section 1.3). There is a need for research to investigate factors perceived to be contributing to poor performance in primary school mathematics in the Berea district in Lesotho. The results of this research may help to address the problem of many students who are forced to abandon secondary education because of poor performance in primary school mathematics.

1.6 RESEARCH QUESTIONS

The study sought to answer the following specific questions:

1.6.1 What factors contribute to the poor performance of Grade 7 students in Berea district?

3. In Table 1.2, symbols are used to represent schools. The actual names are withheld for ethical reasons.

1.6.2 What characterizes teaching and learning of mathematics in Grade 7 classrooms of participating schools?

1.7 RATIONALE FOR THE STUDY

There is a gap in the research that documents factors influencing poor performance in Lesotho schools. Few studies that have been conducted in this area have specifically focused on secondary school mathematics (for examples, see, Jackson, 2009; Litheko, 2012; Mogari, Kriek, Stols & Ogbonnaya, 2007; Nenty, 2010; Ogbonnaya, 2007). For instance, Ogbonnaya (2007) collected data from a convenient sample of Grade 10 teachers from 54 secondary schools in the Maseru district. The study found a significance positive relationship between student academic achievement in mathematics and teachers' background, and that quality qualifications and deep subject content knowledge tend to make teachers more effective. It is clear that there is a paucity of research to investigate poor performance in mathematics at the primary level of education.

1.8 SIGNIFICANCE OF THE STUDY

An investigation of factors that contribute to poor performance at primary level is imperative for early intervention. Findings from this study can contribute in the design of strategies to improve performance in mathematics by Grade 7 students in the Berea district of Lesotho.

1.9 DEFINITION OF KEY TERMS

In the following subsections the key terms are defined and explained.

1.9.1 Primary education in Lesotho

The CAP (2008) primary education is a basic education, which is a minimum provision of knowledge, skills, values and attitudes (The Daker Framework of Action, 2000). It forms the basic foundation for secondary, technical and vocational education and life-long learning. The Preliminary Education Statistics Report [PESR] (2005) states that primary education is the level one and the basic education in reading, writing and arithmetic, as well as other subjects such as, history, geography, religious and social studies. Officially primary education in Lesotho starts at Grade 1 when a child is at least six years old and it lasts for seven years. Successful candidates usually complete primary education when they are 12 or 13 years old.

1.9.2 Free primary education

While there has been much debate about the precise definition of *free primary education* due to its multi-disciplinary lineage, in terms of this study free primary education will be conceptualized as free teaching and learning in primary schools in Lesotho (SACMAQII, 2011). According to FPE (2000, cited in Lerotholi, 2001), free primary education in Lesotho means that “the government of Lesotho will provide basic education to all Basotho children of school going age” (p. 43). In terms of the FPE policy, as described in 2001-2006 FPE strategic plans, the government strictly prohibited the schools from charging fees or any other levies to compensate for schooling. Instead, the government has agreed to provide all schools with money for operational purposes and other expenses such as book rental fee, stationery for students, teaching materials, feeding, world food program and maintenance. According to CAP (2008), MOET provides food to all primary school students under the FPE policy.

1.9.3 Mathematics performance

According to the Office of Superintendent of Public Instruction (OSPI, no dated) state testing, mathematics performance refers to the reported information of students on typical skills and knowledge that the student has demonstrated on state assessment in each performance level at school. According to SACMAQ II (2011, p. 6), there are eight levels of competence in mathematics. Level (1) is pre-numeracy which is about applying single step addition and subtraction. Level (2) is emergent numeracy, applying a two-step addition and subtraction involving carrying. Level (3) is basic numeracy which translates verbal information into arithmetic operations. Level (4) is beginning numeracy which translates verbal or graphic information into simple arithmetic problems. Level (5) is competent numeracy which translates verbal, graphic, or tabular information into an arithmetic form in order to solve a given problem. Level (6) is mathematically skilled which solves multiple- operation problems involving fractions, ratios and decimals. Level (7) is concrete problem solving which extracts and converts information from tables, charts and other symbolic presentations in order to identify and solve multi-step problems. Level (8) is abstract problem solving which identifies the nature of an unstated mathematical problem embedded within verbal or graphic information and then translate this into symbolic, algebraic or equation form in order to solve a problem. A student is designated as poor performing in mathematics when demonstrating incompetence in the above levels and a fail of the subject in the public examination [PSLE] (ECOL, 2009).

1.10 ORGANISATION OF CHAPTERS

Chapter one: This chapter provides an overview orientation and the context of the study describing the background of the study, the statement of the problem, the aim, objectives and the research questions, the significance of the study and definitions of key terms.

Chapter two: In this chapter the review of related studies is conducted. The conceptual framework of the study is developed. The literature focuses on teaching practices in mathematics classrooms and exploring factors that influence students' performance in mathematics.

Chapter three: Chapter three presents the methodology of the study including the research design, sample selection, methods of data collection, instrumentation, data analysis techniques and a description of how the ethical issues were addressed in the study.

Chapter four: This chapter presents the analysis of data and the results of the study.

Chapter five: A discussion of the findings of the study is done in chapter five. The implication of the study results to the current classroom practice in Lesotho is considered. Recommendations for improving students' performance in Grade 7 at primary school level are presented.

1.11 CONCLUSION

The presentation of the problem that initiated the study and the formation of the aims, objectives and research questions of this study were all presented in chapter one. The significance and the rationale of the study were also articulated in this chapter. The chapter concluded by the presentation of the key definitions of the study and the organization of chapters in this report. Chapter two will provide a review of existing literature relating to the current study. The discussions in this Chapter lead to the development of concepts that framed the current study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Almost all nations of the world are currently facing the challenge of investigating and improving the teaching and learning of mathematics. Literature points out that in view of the universal nature of mathematical content and the ongoing global research in the classroom the practice in mathematics education is almost similar in all countries (Shava, 2005). Mathematics has been one of the major foci of educational research studies (Ogbonnaya, 2007). The focus in mathematics is possibly motivated by consistent evidence of students' poor performance in mathematics that limit the growth in the number of students taking mathematics at tertiary education (Durrant, Evans, Thomas, 1989; Reynolds & Farrell, 1996; Stols, Kriek & Ogbonnaya, 2008). This is also motivated by an inevitable technological advancement, globalisation and job demands that are imposing workplace pressures (Brandford, Brown & Cocking, 1999).

Students' poor performance in mathematics has become an area of focus globally. Teachers and researchers have debated about school factors that influence students' performance (Amadalo, Shikuku & Wasike, 2012; Makgato& Mji, 2006; Ogbonnaya, 2007; Stols, Kriek & Ogbonnaya, 2008). Studies have focused on the following factors: syllabus coverage (Amadalo, Shikuku & Wasike, 2012; Makgato & Mji, 2006), teaching practices (Ogbonnaya, 2007; Stols *et al*., 2008), teachers' qualifications (Betts, Zau & Rice, 2003; Rice, 2003; Stols *et al*., 2008; Wenglisky, 2000), teachers' subject specializations (Ogbonnaya,2007; Stols *et al*., 2008; Thomas & Raechelle, 2000), educational resources (Amadalo *et al*., 2012; Bolila, 2007; Southern African Consortium for Momitoring Education Quality [SACMAQ] II, 2011), language of instruction (Matsoso & Polaki, 2006; Nenty, 1999, 2010; Orton, 1999), teachers' pedagogical content knowledge (Matsoso & Polaki, 2006; Oluka & Opolot-okurut; 2008; Shava, 2005), and parental involvement (Makgato & Mji, 2006; Mbokoli & Msila, 2004; Singh & Lemmer, 2003).

The need to improve students' performance in mathematics in Lesotho is very compelling. According to Shava (2005), over the past two decades mathematics has been one of the most poorly performed subjects in Lesotho. Factors that actually affect students' performance in mathematics in Lesotho have not been adequately identified by empirical studies and are thus not well documented. An emerging body of research shows that students' performance is associated with teachers and their teaching practices (Ogbonnaya, 2007; Stols *et al*., 2008). According to Ogbonnaya (2007), the influence of the teacher is the core factor in determining students' performance and could offer an explanation for the students' poor performance in mathematics in Lesotho. Therefore this chapter provides the theories, related framework and a systematic review of the present knowledge relating to the factors contributing to poor mathematics performance of Grade 7 students in Lesotho.

2.2 TEACHING PRACTICES IN LESOTHO MATHEMATICS CLASSROOMS

According to Ogbonnaya (2007), teaching practices may be defined as "instructional methods or techniques that teachers use to accomplish their classroom learning objectives" (p. 22). In terms of this definition teaching practices consist of techniques or strategies that the teacher uses to present instructional materials. Teaching practice specifies ways of presenting instructional materials or guiding and conducting instructional activities. Teaching practices may shape the classroom environment. For instance, a teaching practice or technique that is largely teacher-dominated is likely to promote a classroom environment that limits student contribution and participation because a teacher is viewed as the main source of knowledge.

A huge body of research shows that teaching practices play a critical role in influencing students' achievement in mathematics (Peterson, 1998; Stigler & Hiebert, 1999; Wenglinsky, 2002). Wenglisky (2002) studied the relationship between teaching practices and students' academic achievement and found that teaching practices are important causes of students' learning and achievement. Wenglisky (2002) found that the influence of classroom practices is comparable in size to students' background. It can be observed that the various aspects of teacher quality are related to students' achievement. In particular, the following five variables have been observed to be positively associated with students' achievement: the teacher subject major, teachers' professional development in high-order thinking skills, professional development in diversity, hand-on learning and higher-order thinking skills (Wenglinsky, 2002, p. 26). It seems the type of a teaching may have influence on students' performance in mathematics. Given the observed poor performance in mathematics in Lesotho schools, it is essential to investigate the type of teaching practices that primary school teachers use to teach mathematics in their classrooms. Research shows that the following teaching practices characterize mathematics instruction in Lesotho classrooms: (1) a teacher-centered approach (Polaki, 1996); and, (2) a "teach-example-exercise" approach (Matsoso & Polaki, 2006, p. 59). In the next sections a discussion of the two teaching approaches and some of their underlying practices as well as their influence on students' performance in mathematics in Lesotho is provided.

2.2.1 Teaching mathematics using a teacher-centered approach

Teacher-centered approaches are traditional teaching approaches that include direct instruction and deductive teaching (Killen, 2007). The teacher is the main provider of information. The teacher has a direct and stronger control over what is taught and how information should be presented to students for learning purposes. In traditional classroom the focus is on memorization of information. Teacher-centered approaches are textbook driven, meaning that the teacher uses the text books extensively and encourages students to do so as well. The drill problems and sometimes the accompanying answers are drawn from textbooks (Howson, 1974; Shava, 2005). In teacher-centered learning environments students passively absorb the content and focus only on the teacher's presentation (Killen, 2007). The relationship among students and teachers often remains distant because teachers have apparent power in the classrooms. In these classrooms student's diversity is ignored and students work in isolation and students may simply take the notes during the lessons without thorough understanding of what is taught as there is little or no students' freedom. Teacher centered approach assumes that students can succeed if they study on their own (Killen, 2007). Two types of teacher-centered approaches that have been identified in Lesotho classrooms: (1) whole class teaching approach; and, (2) lecture method.

2.2.1.1 Whole-class teaching approach

A whole-class teaching approach is a teacher-centered approach that involves teacher presentation and demonstration (Ogbonnaya, 2007). Teacher leads the whole class discussions and individual work that are linked to classroom activities. The teacher takes an active role, conveying information to the students rather than just ‘facilitating’ learning. The information is conveyed to students in brief presentation followed by opportunities for recitation (memorize information and say it aloud from memory) and application. The teacher carries the content personally to the students rather than relying on curriculum materials or textbooks (Reynolds & Muijs, 1999). This type of teaching enables the teacher to focus instruction on meaningful development of important mathematical ideas and also helps the students to learn mathematics content in order to improve students’ achievement in mathematics (Grouws & Cebulla, 2000).

A study by Reynolds and Muijs (1999, cited in, Ogbonnaya, 2007) found that student’s increased knowledge; understanding and skills have been recorded in settings where the teachers use higher proportion of whole class teaching. Croll (1996) showed that teachers who invested more time in whole class interactive teaching generated the more gains in mathematics. Teachers who spend more time using whole class interactive teaching have registered high students’ task engagement (Croll, 1996). According to Reynolds and Muijs (1999), research on American teacher effectiveness found that students show more achievement gains in classes where they spend more time being taught and supervised by the teacher than working on their own. This is mainly because teachers in these classrooms provide more thoughtful and thorough presentations (Borich, 1996; Mason & Good, 1993). Achievement is maximized when the teacher not only presents the material but does it in a structured way by beginning with an overview and/or review of the learning objectives.

Research shows that teaching and learning in Lesotho mathematics lessons follow a whole-class teaching approach, which comprises of recitation, whole class responses and individual seatwork (Sebatane, Chabane & Lefoka, 1992; Shava, 2005). Shava (2005) reported that a pattern in which teacher-directed explanations and questions to the whole class is followed by students’ seatwork on pencil-and-paper assignments is prominent in mathematics classrooms. The whole-class teaching approach in Lesotho mathematics classrooms consists of an overwhelming predominance of teacher-direct-question-answer with the majority of the questions calling for a whole-class single response. The emphasis is to encourage whole-class involvement and participation in the lesson. This approach allows for a strong emphasis on factual or propositional knowledge, and little on procedural knowledge and adaptive reasoning. The whole-class involvement lessons are less interactive because students are denied an opportunity for adaptive reasoning as well as procedures in connections that excite students to such critical thinking that necessitates their asking of questions (Shava, 2005).

2.2.1.2 Lecture method

According to Kriek, Ogbonnaya and Stols (2008), a majority of mathematics teachers in Lesotho use formal presentation also known as lecture method. Lecture method (telling, narrative, story or talk) is a form of classroom activity where a teacher is the supplier of information. In this method students are expected to sit down and be quite while the lesson is presented. Students follow the teacher, use their imaginations and judge for themselves (Killen, 2007). Teachers direct learning activities and plan how the lesson should proceed. Teachers know every stage and regulate every activity in the learning of students at all times and assess their progress in a subject and set tests accordingly. Sebatane *et al*. (1994) found that teachers in primary school classrooms use lecture method to teach mathematics. The findings indicated that "teachers have apparent power to write and draw on the chalkboard, mark queuing students, reprimands and expel students, ask questions, refutes students' answers and calls for attention" (p. 144).

2.2.2 Teaching mathematics using a "teach-example-exercise" approach

According to Matsoso and Polaki (2006), the *teach-example-exercise approach* means that the teacher starts by explaining how a certain mathematical procedure works (teach); this stage is followed by a teacher demonstrating how a mathematical principle may be applied (example); and finally students are given a related exercise or task from a textbook to do (exercise). Example 2.1 illustrates how the teach-example-exercise approach is enacted during a mathematics lesson in the Lesotho context.

Several studies show that mathematics teachers in Lesotho follow the "teach-explain-exercise" approach (Khoeli & Polaki, 2005; Matsoso & Polaki, 2006; Polaki, 1996). For example, the findings of Matsoso and Polaki (2006) study on training needs analysis for improvement of teaching English, Sesotho, mathematics and science in Lesotho secondary schools found that teachers employ only the teach-example-exercise. The observations made in the mathematics classrooms at the six case study schools revealed that all the lessons follow the teach-example-exercise approach (Matsoso & Polaki, 2006).

Example 2.1: A sample of a textbook format of a teach-example-exercise approach

Step 1: The teacher presents the strategy to the students (teach) and suggests the following steps:

Read the problem carefully

Ask yourself

What is the question?

What are the facts?

In what kind of quantity should my answer be?

What must I do: add, subtract, multiply, divide or more than one of them?

Estimate the answer.

Answer the question.

Ask yourself

Does the answer seem correct?

Step 2: The teacher provides an example to the students.

A farmer use trucks to send 197 goats and 219 sheep to a sale. Each truck could transport 40 animals. How many trucks were needed?

1. Ask yourself
   - What is the question?

How many trucks are needed?

- What are the facts?

197 goats, 219 sheep and 40 animals per truck.

- In what kind of quantity should my answer be?

Trucks.

- What must I do: add, subtract, multiply, divide or more than one of them?

Add then divide.

2. Estimate the answer.
   - (200+200)÷40: more than 10
3. Answer the question.
   - (197+219)=416÷40=10 r 16. The 16 remaining animals will need 1 more truck. 11 trucks are needed.
4. Ask yourself.

   Does the answer seem correct? *Yes. It is 1 more than the estimation*.

Step 3: The teacher gives the students an exercise from a textbook.

Estimate the answer, then use step by step approach to solve the below problem.

A farmer packs 8 baskets of peaches. There were 36 peaches in each basket. He packed them in trays of 24. How many full trays did he pack?

Source: *Top Mathematics for Lesotho Pupil's Book Standard 7 (2004)*

In the teach-example-exercise approach in Lesotho mathematics lessons teachers spend more time on using mathematics routines or procedures. Teachers explain the concept where necessary, asks questions, stresses the important points and dictates the few notes where applicable with memorizing and recitation procedures. Teachers pump-in knowledge and the need for students' self-activity and problem solving approach is ignored. Later, the teacher demonstrates the concept by way of an example and then gives students a task to do from a textbook. As the students work on written tasks the teacher goes around checking whether the students obtain the correct answers instead of developing students' thinking by asking probing questions. Teachers do not require students to read from the textbook instead are required to open the textbooks when they do a task. It seems the teach-example-exercise discourages students to read extensively; to think for themselves; to formulate their own thoughts well; and, to express these thoughts properly in an oral format. However, teachers in Lesotho have argued that they prefer this teaching approach because it enables them to finish mathematics syllabus on time and ahead of terminal examination (Khoeli & Polaki, 2005).

2.2.3 The influence of teacher-centered and teach-example-exercise approaches

Even though the teacher-centered approach and the teach-example-exercise approach are largely favoured in Lesotho schools students' performance in mathematics is not improving (Mokhele, 2011). On the 17th of January 2011 the Lesotho Ministry of Education and Training convened a meeting at the United Nations Educational, Scientific and Cultural Organisation (UNESCO) hall with the responsible teachers. The purpose of the meeting was to discuss the challenges faced by teachers and students in mathematics as well as to suggest possible solutions to the problem. After the meeting UNESCO announced that they had initiated 10 different projects to improve performance in mathematics. One of the projects is termed "*Improving the performance of secondary students in the area of geometry, through the use of graph boards and geometers sketchpad"* (Mokhele, 2011). The objective of this project is to provide the relevant teaching aids and the resource tools to schools to facilitate effective teaching and learning of geometry in order to improve the overall performance of students in mathematics. The Grade Distribution Tabular Report (GDTR) from ECOL analyzed the mathematics performance from 2008 to 2012 in the COSC report (see, Table 2.1). According to ECOL (2012) statistics, students' performance in mathematics in COSC was below 22% credit which means that only less than 22% of the candidates were able to score up to 50% in the subject in the examination in 2008-2012.

Table 2.1 Patterns of students' performance in mathematics in COSC over the period 2008-2012

Year	% of candidates that scored above 50%
2008	21
2009	21
2010	23
2011	20
2012	24

Source: *ECOL (2012)*

Similarly, ECOL (2012) has provided the mathematics performance from 2008 to 2012 in the JC report. Students' performance in mathematics in JC has been below 10% credit over the past five years. This means that less than 10% of the candidates were able to score 50% in mathematics in examinations during a five year period (see, Table 2.2). According to ECOL, there has been no improvement in the percentage of students' passes in mathematics.

Table 2.2 Patterns of students' performance in mathematics in JC over the period 2008-2012

Year	% of candidates that scored above 50%
2008	10
2009	9
2010	9
2011	10
2012	12

Source: *ECOL (2012)*

Despite the increase from 12% credit to 22% credit in COSC (Table 2.2) students' performance in mathematics remains poor. In comparison with the 2000-2005 JC analysis, the JC credit was also 10%. This comparison shows that there is no improvement in mathematics performance. Based on Table 2.1 and Table 2.2 it is reasonable to infer that students' performance in mathematics remains poor in Lesotho. Hence the teaching approaches such as the teacher-centered approach and the teach-example-exercise approach are not effective in improving students' performance. The

Lesotho JC curriculum has stipulated a student-centered teaching approach that emphasises understanding and application of mathematical concepts as against rote memorisation that is currently employed in most Lesotho mathematics classroom (Ministry of Education, 2002). The curriculum also suggests that there should be more hands-on-activities for the students (Ministry of Education, 2002). Given these observations it is the researcher's thought that the JC curriculum suggests a shift from teacher-centered to student-centered approach as a result of the poor students' performance in mathematics in Lesotho.

2.3 OTHER INSTRUCTIONAL FORMS OF TEACHING MATHEMATICS

This study focuses on teaching practices that influence mathematics performance in the district of Berea in Lesotho. However, background literature that is explored in this study pertains to global views and universal teaching practices of mathematics. Khati's (1995) noted that an overview education in Lesotho should be both comparable and compatible with standards in the Southern Africa region (of which Lesotho is part) and with the rest of the world. Grouws and Cebulla (2000) noted that certain teaching practices like whole class teacher-guided discussion, cooperative group work are worth careful consideration when teachers strive to improve their mathematics teaching. Kriek *et al*., (2008) noted that homework may improve students' achievement in mathematics.

2.3.1 Whole class teacher-guided discussion

Several studies have acknowledged that *whole class teacher-guided discussion* is a teaching method that improves students' achievement in mathematics (for example, see, Brandford *et al*., 1999; Kriek *et al*., 2008; Ogbonnaya, 2007, Shava, 2005 & Szalontain, 2001). According to Ogbonnaya (2007), in the whole teacher-guided discussion the teacher presents the subject matter in an active way by involving students in the class discussion through asking a series of questions. This approach has been described as:

- having the potential to engage students actively in the classroom and to make them active members of the learning community (Ogbonnaya (2007);
- a teaching method that enhances students' achievement in mathematics (Branford *et al*., 1999); and,

- being very effective in improving students' achievement in mathematics (Grouws & Cebulla, 2000).

The whole class teacher-guided discussion is built on the idea that the students should be able to talk their ideas out. Stein (2001) pointed that "it is now commonly accepted that a productive classroom is one where there is a great deal of talk" (p. 127). In my view Stein (2001) refers to the type of classroom that allows students to grapple with ideas, and to make up positions and defend them in terms of the topic that is under discussion in the classroom. This is not prominent in Lesotho mathematics classrooms. According to Wood (1999), the benefit of whole class teacher-guided discussion is best realized in a classroom environment that encourages students to be active listeners who participate in the discussions

2.3.2 Group work

Research suggests that group work may improve students' performance in mathematics (Brandford *et al.*, 1999; Grouws & Cebulla; 2000; Reynolds & Muijs, 1999). In this teaching approach teachers allow students to work together providing opportunities to share solution methods to achieve a common goal (Dhlamini & Mogari 2013). According to Dossey, McCrone, Giordano and Weir (2002, cited in Ogbonnaya, 2007), working in groups provide students with a less threatening environment to work because students do not feel the pressure to perform individually. An analysis of the results of 122 research studies that focused on the effects of using peer group work on students' achievement showed that the use of group work leads to improved students' achievement (Ogbonnaya (2007). Similar findings were reported by many other studies (Brahier, 2000; Dhlamini & Mogari, 2013; Grouws & Cebulla, 2000). The effectiveness of using group work learning approach to improve students' achievement in mathematics has been highlighted in many other studies (for examples, see, Abu & Flowers, 1997; Dori, 1995; Johnson & Johnson, 2002; Reynolds, 1999; Slavin, 1983; Soresen, 2003).

The use of group work as an approach to teach mathematics has not been without challenges. We may note some of the following challenges: (1) students' shared misconceptions in a certain topic can be reinforced by working in group environments (Good, McCaslin & Reys; 1992); (2) students might be tempted to engage in off-task social interactions (Good & Galbraith, 1996); and, (3) some students may feel that they have little or nothing to contribute to the group or that their contributions are not valued and as a result may opt to become passive (Reynolds & Muijs, 1999). Nevertheless, the use of group learning approach is generally perceived as an instructional tool to help students to improve thier achievement in mathematics (see, Brandford *et al*., 1999; Dhlamini & Mogari, 2013; Dossey *et al*.,2002; Kriek *et al*., 2008; Ogbonnaya, 2007).

2.3.3 Homework activity

Many authors describe homework as an instructional tool consisting of tasks assigned by teachers to students that should be completed outside regularly scheduled class time or contact time (Kiek *et al*., 2008; Kriek *et al*., 2009; Ogbonnaya, 2007). The purpose of homework includes providing additional practice exercises, increasing the amount of time that students actively spend in learning activities, extending time on task, developing problem solving skills, increasing students' understanding and developing their abilities to apply their knowledge in various contexts (Grouws, 2001). Several studies have documented positive influence of homework in teaching and learning settings:

- Cooper (1994) reported that homework accounted to 20 percent of the time students spend on academic tasks in the United States;
- Also, Cooper (1994) said that homework, in addition to other effects, leads to better retention of factual knowledge, increased understanding and better critical thinking;
- Betts (1997) found a positive relationship between the length of hours and spent on homework and students' achievement;
- Eren and Henderson (2006) reported similar findings and further highlighted that relative to school factors like class size, homework appears to have a larger and more significant impact on students' achievement; and,
- A review of 134 studies by Marzano, Pickering and Pallock (2001) reported positive relationship between use of homework and students' achievement.

It seems that homework activity is positively related to students' achievement. It must however be noted that most studies were carried in settings where the parents are educated like in the United States (Chaika, 2000; Cooper, 2000). It might be interesting to investigate the influence of homework in settings where parents are predominantly illiterate, and presumably unable to help their children with homework activities, like in the Berea district where this study was conducted. The significant role of parents in students' homework has been documented by many researchers (Chaika, 2000; Cooper, Lindsay & Nye, 2000; Ogbonnaya, 2007).

2.4 FACTORS INFLUENCING STUDENTS' PERFORMANCE IN MATHEMATICS

There are many other factors linked to students' performance in mathematics.

2.4.1 Language of teaching and leaning

In Lesotho students are taught in their mother tongue from Grade 1 to Grade 4 (Setoi, 1999). During these initial years of primary education English is taught for 30 minutes during each day of the school. According to Matsoso and Polaki (2006), English is a second and foreign language to the majority of students in Lesotho and it presents many challenges. Orton (1997) argues that the language used for thinking is always likely to be the first language. Mathematics is a technical language that needs to be translated into another language to allow thinking to take place. Errors and misconceptions might arise at any stage of the two-way inner translation process. The influence of language on students' performance has been documented extensively (for examples, see, Adegoke & Ibode, 2007; Duncan, 1996; Nor *et al*., 2011; Wasike, 2003).

- Wasike (2003) observed that poor performance is due to the difficult language used in the mathematics classroom;
- Nenty (1999, 2010) found that proficiency in English language accounted for a bigger portion of the variance in Basotho students' scores in Primary School leaving Certificate in Education (PSLE), the Junior Certificate (JC) and the Cambridge Overseas School Certificate (COSC); and,
- Van der Walt and Hattingh (2007) noted that students with high English proficiency are able to write longer pieces with fewer errors than students who are less proficient.

These studies highlight the importance of considering the influence of language when interpreting students' performance in mathematics. The language that is used in everyday context differs from the one used during a mathematics lesson. Jackson concurs that there are words which have a different meaning when used in common day English language compared to when they are used in mathematics. According to Tracy (2002), students in Lesotho public schools have limited English proficiency and cannot cope and do well in the external examination because they are not competent in the usage of English. Given this background it might be reasonable to infer that poor background in mathematics results from a range of factors such as having to learn mathematics in the second language. The key challenge to mathematics education researchers in Lesotho is to develop strategies of using the second language to enable practicing mathematics teachers to improve their teaching approaches in such a way that students' performance in mathematics is also improved.

2.4.2 Teachers' pedagogical content knowledge

Pedagogical content knowledge (PCK) refers to an understanding of instructional strategies to facilitate learning (Matsoso & Polaki, 2006). The PCK includes sound knowledge of various ways of presenting the subject content in a way that is comprehensible to students. In their investigation of mathematics teachers' pedagogical content knowledge Matsoso and Polaki (2006) found that "inadequacy of teachers' pedagogical content knowledge impacts negatively on teachers' ability to engage students in constructive knowledge acquisition rather than execution of mathematical procedures" (p. 59). Khoeli and Polaki (2005, cited in, Matsoso & Polaki, 2006) state that teachers' understanding of the subject matter has a direct impact on students' learning ability in Lesotho secondary schools. The ability to answer mathematics questions quickly and work out problems that are accompanied with detailed explanations gives students not only a more accurate and detailed picture of mathematics, but also the confidence to perform better. It is the researcher's assumption that teachers who have not received specialized mathematics training, may have inadequate pedagogical content knowledge in mathematics, and are more likely to underperform when compared their adequately prepared counterparts.

2.4.3 Parental involvement

Research shows that time spent by a student with parent is crucial to the long-term retention and understanding of mathematics concepts (Polaki & Khoeli, 2005). Matsoso and Polaki (2006) noted that the effectiveness of parental support for children's learning of primary school mathematics was dependent on family socioeconomic background and level of educational attainment of parents. Jackson (2009, p. 17) noted that "parental involvement has a significant effect on the quality of the students' experience of teaching and learning in the school, and also on their performance". According to Deventer and Kruger (2008), both the parent and the teacher have a special and important role to play in the education of the child. Benefits of parental involvement on their children education include improved school performance, reduced dropout rates, decrease in delinquency and a more positive attitude toward the school. A minimal parental involvement in school activities is generally observed in Lesotho high schools.

According to Makgato and Mji (2006), parental involvement transcends an indirect influence on students' achievement. For instance, a study by Steinberg, Lamborn, Dornbusch and Darling 1992) reported a positive relation between perceived parental involvement and students' achievement. Similar findings have been reported in Singh, Mbokodi and Msila (2004). Parents have distinct advantage over anyone else in that they can provide a more stable and continuously positive influence that could enhance and complement what the school fosters on their children. In this regard, parental involvement is undeniably critical. Also with respect to participating in school functions, buying necessary school equipment (books, uniforms, etc.) is important. Contrary to this finding, Mji and Mbinda (2005) noted that with regard to content of what children learn, many parents fall short because in general parents do not possess the necessary education and therefore find it difficult to determine and understand what is done at school.

Parents involved in the education of their children create a climate conducive to teaching and learning (Jackson, 2009). According to Lemmer (2003), without a healthy teacher-parent partnership the restoration of culture of teaching and learning remains an unfulfilled dream and students perform poorly. Schools' ineffective communication with parents often attributes to exclusion of parents from school activities. Calitz, Fuglestad and Uuejord (2000) noted that teachers' exclusion of parents in the school activities contributes to intensified students' poor performance and low self-esteem. Associated with this is teachers' inability to create and maintain a school environment that is physically and psychologically conducive to welcoming parents resulting in very poor academic performance by students (Sebatane, Ambrose, Molise, Motlomelo, Nenty, Nthunya & Ntoi, 2000). Lemmer (2002) revealed that teachers deny parental involvement because they believe that the parents and the community may infringe on their professional terrain in becoming involved in school activities. However, some parents feel that teachers are trained to educate their children and that it is not their responsibility to monitor their children's school work even to support them.

2.4.4 Teacher qualification

Research shows that students who are taught by less qualified teachers seem far less likely to achieve academic success than students who are taught by more qualified teachers (Collias, Pajak & Rigden, 2000; Sanders & Rivers, 1996). Ogbonnaya (2007) noted that the predominance of teachers who are not qualified to teach could be one explanation for poor academic performance in mathematics. According to Matsoso and Polaki (2006), there is a shortage of qualified teachers to teach mathematics in Lesotho schools. In Lesotho anybody who professes to have had some contact with mathematics may be asked to teach the subject. It is not uncommon in Lesotho to come across mathematics teachers whose teaching background and experience has nothing to do with mathematics. This includes teachers who hold a Cambridge Overseas School Certificate (COSC) qualification and teachers who hold other diplomas such as diploma in business management, electrical engineering, basic handcrafts and range management. All these teachers could be found teaching mathematics in Lesotho classrooms. Mulkeen and Chen (2008) indicated that "the supply of newly qualified teachers is very limited in Lesotho" (p. 44). The research of MOET (2003) confirmed that teachers with a wide range of teaching credentials were found to be teaching mathematics. The MOET (2003) reported that potential mathematics teachers often get out of mathematics teaching because they say the program is highly intensive and tough compared to the one followed by their counterparts in the language, social and business education, yet they are paid at the same salary level. Given the recurrence of disappointing results of Lesotho students in mathematics at PSLE, JC and COSC levels, it is likely that too many of the students are not taught by qualified teachers or the teacher's classroom practices do not help the students to achieve good grades in the examinations.

2.4.5 Teachers' experience

According to Stols *et al*. (2009), teachers' years of experience may positively correlate with students' achievement. Betts, Zau and Rice (2003) also found that teachers' experience significantly correlates with students' achievement in mathematics. A report by the Center for

Public Education (2005, cited in, Ogbonnaya, 2007) revealed that there was a positive correlation between teaching experience and students' achievement. Rivkin *et al*. (2005) study found that students who are taught by experienced teachers achieved better than those who are taught by novice teachers. Darling-Hammond (2000) reported that teaching experience is related to students' achievement even though the relationship is curvilinear. It seems the achievement of the students tends to increase as teachers spend more years teaching. Darling-Hammond (2000) maintains that mathematics students who are taught by teachers with less than five years of teaching experience had lower levels of achievement.

Contrary to these findings some researchers have contended that the number of years of teaching is not associated with students' achievement (for examples, see, Hanushek, 1997; Martin, Mullis, Gregory, Hoyle & Shen, 2000; Wenglisky; 2002). According to Martin *et al*., (2000) students' achievement is attributed to the teachers' high level of preparedness as a result of good quality pre-service education and training obtained. Perhaps, there is a need to explore the issue of relationship, if any, between students' achievement and teaching experience.

2.4.6 Teachers' specialization majors

There is evidence supporting the need for teachers to have subject major in mathematics (Ogbonnaya, 2007; Stols *et al*., 2009; Thomas & Raechelle, 2000). Other studies have noted a positive connection between teachers' subject major and high students' achievement in mathematics classrooms. Wilson and Floden (2003) indicated that students who are taught by teachers with mathematics degrees as majors tend to perform better in mathematics. According to Goldhaber and Brewer (1996), teachers who are having a major in their subject area are the most reliable predictor of students' achievement in mathematics and science. Darling-Hammond (2000) found that a major in teaching a subject was the most reliable predictor of students' achievement scores in mathematics and science. Similarly, Wenglinsky (2002) and Greenberg *et al*. (2004) indicated that teachers with mathematics major correlated with higher students' achievement in mathematics.

Nevertheless, a few other researchers reported inconsistent results about the relationship between teachers' subject majors and students' achievement. Ingvarson, Beavis, Bishop, Peck and Elsworth

(2004) noted that a number of studies on the relationship between teachers' subject majors and students achievement in mathematics revealed complex and inconsistent results. According to Martins *et al*. (2000), mathematics majors should not be associated with teacher effectiveness that is linked to meaningful learning, which in turn leads to students' success. Given this background, it is reasonable to suggest further studies need to be conducted to shed more light on the relationship, if any, between students' success and teachers' subject major.

2.4.7 Teachers' highest qualifications

According to Stols *et al*. (2009), a number of studies have examined the ways in which teachers' highest qualifications are related to students' achievement, and many of these studies discovered that teachers' highest qualifications correspond positively with students' achievement. Betts *et al*. (2003) discovered that teachers' highest degree correlates positively with students' achievement. Rice (2003) found that teachers who have an advanced degree in their teaching subjects turn to have a positive impact on the students' achievement. Greenwald *et al*. (1996) found a significant positive relationship between teachers' qualification, which was measured in terms having a masters' degree or not having a masters' degree, and students' achievement. Goldhaber and Brewer (1996) noted that an advanced degree that was specific in the subject taught was associated with high students' achievement. On the contrary, there are studies that reveal the opposing results. For instance, Greenberg, Rhodes, Ye and Stancavage (2004) and Wenglinsky (2000) studies found that postgraduate qualifications at masters or higher level were not significantly related to students' achievement.

2.4.8 Syllabus coverage

According to Miheso (2012) student/ textbook ratio of 1:1 or 1:2 improves syllabus coverage while a similar ratio of 1:3 and could impact negatively on syllabus coverage, leading to poor performance in mathematics. Miheso (2012) maintains that other resources that play a role in syllabus coverage include: students' access to calculators, knowledge of mathematical tables and the availability of graph papers. Otieno (2010) adds that extra tuition by teachers, maximum support by parents, high standard of discipline, exposure to past examination questions, good previous academic records and regular assessment lead to early syllabus coverage, which in turn lead to good performance. Class-entry academic, attention and socio-emotional skills as well as reading and mathematics achievement were noted to lead to overall attention skills necessary for faster coverage of planned work (Duncan *et al*., 2007). Students' attitude, students' understanding and mathematics anxiety also fall in this group of behavior that affects the rate of syllabus coverage (Musasia, Nakhanu & Wekesa, 2012). Team teaching has been found to be useful in specialized content delivery and to effective syllabus coverage (Murawski & Dieker, 2004; Musasia *et al*., 2012). Using team teaching, content is covered through direct instruction at a pace that ensures that all material is presented.

According to Wekesa *et al*. (2012), absenteeism by both students and teachers play a role in non-coverage of the syllabus. Otieno (2010) indicated that understaffing and poor administration also de-motivates teachers causing non-coverage of the syllabus and thus poor performance. The finding that teachers' workload corresponded with syllabus coverage is supported by Egun (2007) and Riberto (2011). School discipline was found to have impact on the dedication by both teachers and students to complete the syllabus. In agreement Allen (2010) suggests that classroom discipline affects the learning transactions that contribute to syllabus coverage.

2.4.9 Teaching resource

Mbugua, Kibet, Muthaa and Nkoke (2012) contend that textbooks are major inputs to students' enhance performance. This view is supported by Psacharopolous and Woodhall (1985) and Chepchieng (1995, cited in, Mbugua *et al.*, 2012). Chepchieng (1995, cited in Mbugua *et al*., 2012) observed that the availability and quality of textbooks in a school are strongly related to achievement among children from lower income families. Musasia *et al*., (2012) noted that poor performance in Kenya is due to poor teaching methods and an acute shortage of textbooks. The fact that as many as six students share one textbook in some schools makes it impossible for them to complete their homework tasks. If the students have access to the variety of resources they are able to progress smoothly and complete their homework activities on their own.

Bolila (2007) states that teaching mathematics without textbook is not the best way to assist a school in achieving performance objectives. According to the 2005-2015's Education Sector Strategic Plan (ESSP), the introduction of free primary education in Lesotho resulted in increased enrolments without being accompanied by enough improvement in quality of teaching resources and the government was to provide each primary school students with a textbook for all subjects by 2015. It is therefore worrying that only about one-half 56% of 4 240 of standard 6 students in 2007 in Lesotho had sole use of mathematics textbooks (SACMAQ II, 2011).

Matsoso and Polaki (2006) conducted a study on the training needs analysis for improving the teaching of mathematics and science in Lesotho secondary schools. Matsoso and Polaki (2006) focused on the extent to which the textbooks were made available to students during the lessons. The study found that in schools that are catered by the Book Rental Project, which is a project running from Form A through Form C in which books are rented to students and students pay a minimal amount, students' performance was high. In contrast, only a small fraction of the students in the low performing schools had the required mathematics textbooks during the lesson. Similarly, a cross-national comparison of primary school children's performance in mathematics using SACMEQ II data for Botswana, Lesotho and Swaziland study showed that compared to sixth-grade students in Botswana and Swaziland, Lesotho had the lowest number of students who reported having their own mathematics textbooks (46.6%). This is an indication that students in Lesotho had less access to mathematics textbooks (Polaki & Khoeli, 2005).

2.5 DEVELOPING A CONCEPTUAL FRAMEWORK FOR THE STUDY

The present study, which was framed on the Bronfenbrenner model of child development and learning, investigated factors contributing to poor mathematics performance of Grade 7 students in the Berea district of Lesotho. The Bronfenbrenner model postulates that students' achievement is best understood as a developmental outcome that emerges as a result of interactions among layers within a complex system (Johnson, 2008). Bronfenbrenner (1989) advocates that research investigating human development should involve a field-theoretical approach in which the interaction of process, person and context are taken into account. Such research would focus on how developmental processes vary as a joint function of the characteristics of the person as well as the environment, and their interactions over the course of time (Bronfenbrenner, 1989).

Bronfenbrenner (1989) noted that the underlying rationale for a process-person-context research approach is that it is applicable to an organizational development as well, and is a useful model for understanding how developmental processes (teaching and learning) and outcomes vary as a joint function of the characteristics of not only the school itself, but also those of the ecological systems or environment surrounding the school. Therefore the Bronfenbrenner ecological model was particularly useful in better understanding the factors contributing to poor mathematics performance of students in Berea district of Lesotho. Thus the ecological systems model is the primary theoretical basis for the current study. The main reason for adopting Bronfenbrenner ecological model for this study was its acknowledgement of the shared responsibility of all the educational stakeholders and the dynamic nature of the relationship involved in the teaching and learning process. In tandem with the ecological systems model the constructivist perspective was also considered important for this study, and the combination of the two theoretical approaches provided a sound theoretical basis for the current study.

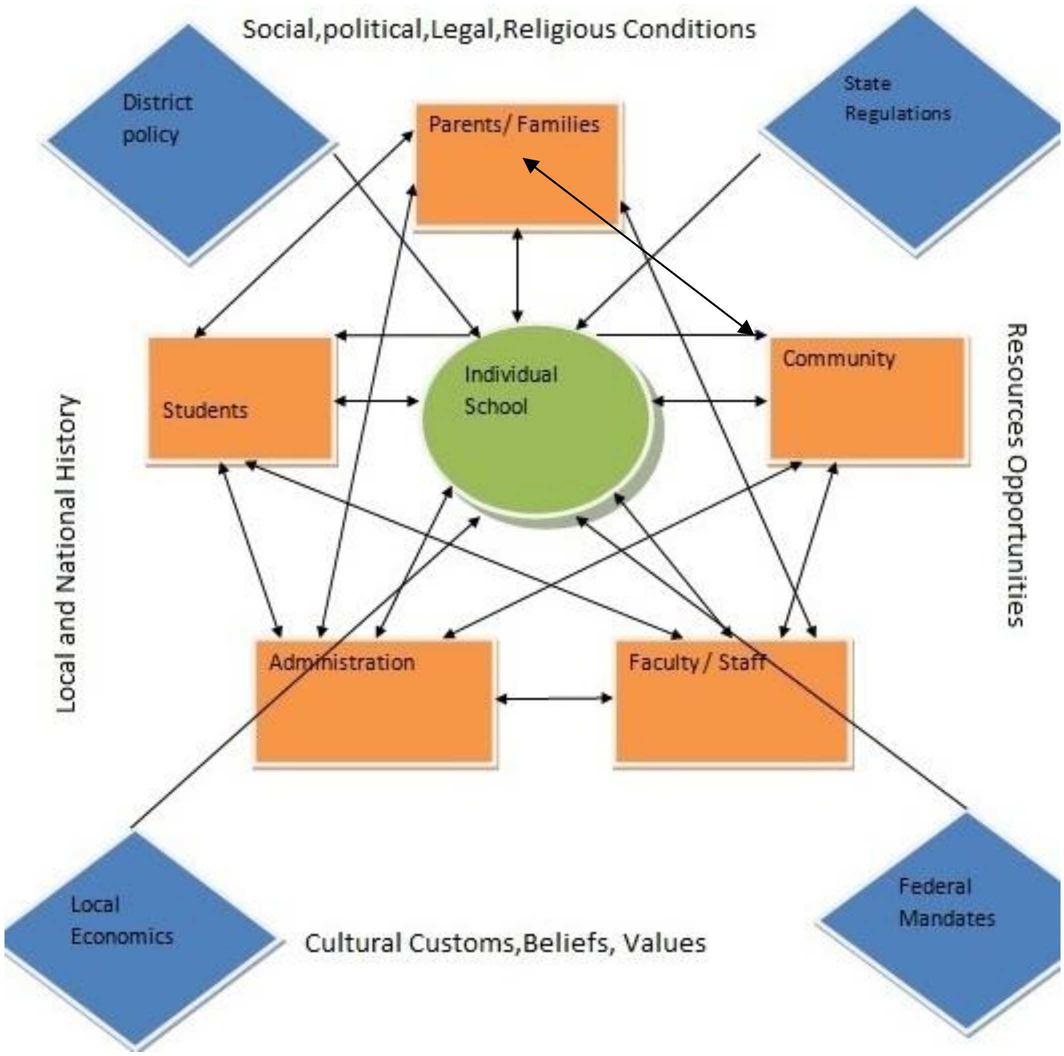
2.5.1 The Bronfenbrenner ecological system model

According to Johnson (2008), organizations such as schools may be modelled using Bronfenbrenner's ecological systems and analyzed using complexity theory as an appropriate and useful alternative to the linear models that often forms the basis of educational research and policy. Bronfenbrenner (1986) defines the ecology of human development as "a scientific study of the progressive, mutual accommodation throughout the life course between an active, growing human being and the changing properties of the immediate settings in which the developing person lives" (p. 188). The Bronfenbrenner initial theory (1989), noted that the environment is comprised of four layers of systems which interact in complex ways and can both affect and be affected by the person's development. Later the initially proposed model added a fifth dimension that comprises an element of time (Bronfenbrenner, 1995). Each of the four system layers are described in this report, and an example of a working model of the ecological context of an individual school is shown in Figure 2.1.

2.5.1.1 Microsystem

The microsystem is defined as the pattern of activities, roles, and interpersonal relationships experienced by a developing person in a particular setting with particular physical and material features and containing other persons with distinctive characteristics of temperament, personality, and systems of belief (Bronfenbrenner, 1995). In other words, these layers form a set of structures within which a person has direct contact and the influences between the developing person and these structures are bi-directional. The person influences, and is influenced by the microsystem. If this theory is extended from human development to organizational development, and an individual is the unit of interest, the microsystem would include students, parents and family members, administration, teachers and the surrounding community.

Figure 2.1: Bronfenbrenner's working model of the ecological context of an individual school



Source: *Johnson (2008*)

2.5.1.2 Mesosystem

The mesosystem comprises the linkage between microsystems (Bronfenbrenner, 1995). Just as the direction of influence between the school and each structure within the microsystem is bi-directional, so is the mesosystem influences between the various structures. An example of the mesosystem of an individual school may be seen in the interactions and dynamics between two of its microsystems, students and parents. Parental expectations regarding academic and extra-curricular success of their children can often create a dynamic that directly and indirectly impacts the atmosphere and climate of the school. Unreasonably high expectations and low tolerance for failure can create a dynamic between parent and child that is characterized by tension and fear. This dynamic impacts the school in various direct and indirect ways, including for example, students behaviour in the classroom resulting from such expectations, pressures to ensure their child's success placed on school personnel by the parent, or an attempt by school personnel to shield students from such parental pressures by restricting the amount of information that is communicated regarding student achievement.

2.5.1.3 Exosystem

The exosystem represents the larger social system, and encompasses events, contingencies, decisions, and policies over which the developing person has no influence. The exosystem thus exerts a unidirectional influence that directly or indirectly impacts the developing person. The exosystem of an individual school might be comprised of such structures as, for example, state regulations, local economics, federal mandates, and local disasters (Bronfenbrenner, 1989).

2.5.1.4 Macrosystem

According to Bronfenbrenner (1989), the macrosystem is the layer comprises of cultural values, customs and laws. This system is generally considered to exert a unidirectional influence upon not only the person but the microsystem, mesosystem, and exosystem as well. The macrosystem of an individual school is embodied not only in the cultural, political, social and economic climate of local community, but that of the nation as a whole.

2.5.1.5 Chronosystem

The chronosystem represents a time-based dimension that influences the operation of all levels of the ecological systems. It can refer to both short and long-term time dimensions of the individual over the course of lifespan, as well as the socio-historical time dimension of the macrosystem in which the individual lives. The chronosystem of an individual school, therefore may be represented by both day-to-day and year-to-year developmental changes that occur in its student body, teaching staff, curricular choices, as well as the overall number of years in operation, for example, a newer school faces challenges and opportunities that differ from those of a school that has been in operation for a length of time (Bronfenbrenner, 1995).

Bronfenbrenner (1979) point to the importance of the settings and circumstances in which students live for understanding children's behaviour and establishing productive programs and policies to promote the development of children and youth. Bronfenbrenner further noted that teachers make many decisions that can be informed by an understanding of the context in which children live. These decisions include curricular and instructional, decisions about materials and methods used in the classroom. With this in mind, the Bronfenbrenner model was adapted when approaching the students' performance in mathematics in the Berea district. This model was used when designing this research study because it allowed the researcher to view students' performance in mathematics as not an event for the individual student, but acknowledge the involvement and influence of all stakeholders (teachers, administrators, parents, education department) in the teaching and learning process.

2.5.2 Adapting the Bronfenbrenner model to the current study

The Bronfenbrenner framework benefitted the current study in three major ways:

- The Bronfenbrenner framework highlighted the notions of interrelated and interconnected systems (Donald, Lazarus & Lolwana, 2006). Within an education setting these notions are essential amongst all stakeholders to enhance students' scholastic performance;
- Hayes (2004) uses Bronfenbrenner framework to introduce the ecological model. According to Hayes (2004), this model may help the investigator "to visualize the complex dynamics in different contexts" (p. 34). This background influenced the methodology that

was adopted in this study, which was both qualitative and quantitative to explore a variety of context. Data collected through the interviews occurred at microsystem level. The mesosystem, the interactions between the students, parents, home environment were also considered during this phase of the study; and,

- Bronfenbrenner (1995) proposed the process-person-context-time model known as Bio-ecological model. In terms of this research, the "process" was investigated in both phase I and phase II of the study. Phase I investigated opinions while phase II gave a more in-depth view of the process in the individual experiences of teaching and learning in Grade 7 classrooms. The "person" element was accounted for in phase 1 and was represented in terms of the information provided on questionnaires about the gender, teaching experience or qualifications of the participants. The personal details given had implications for the context in which respondents were based.

2.6 CONSTRUCTIVIST THEORY

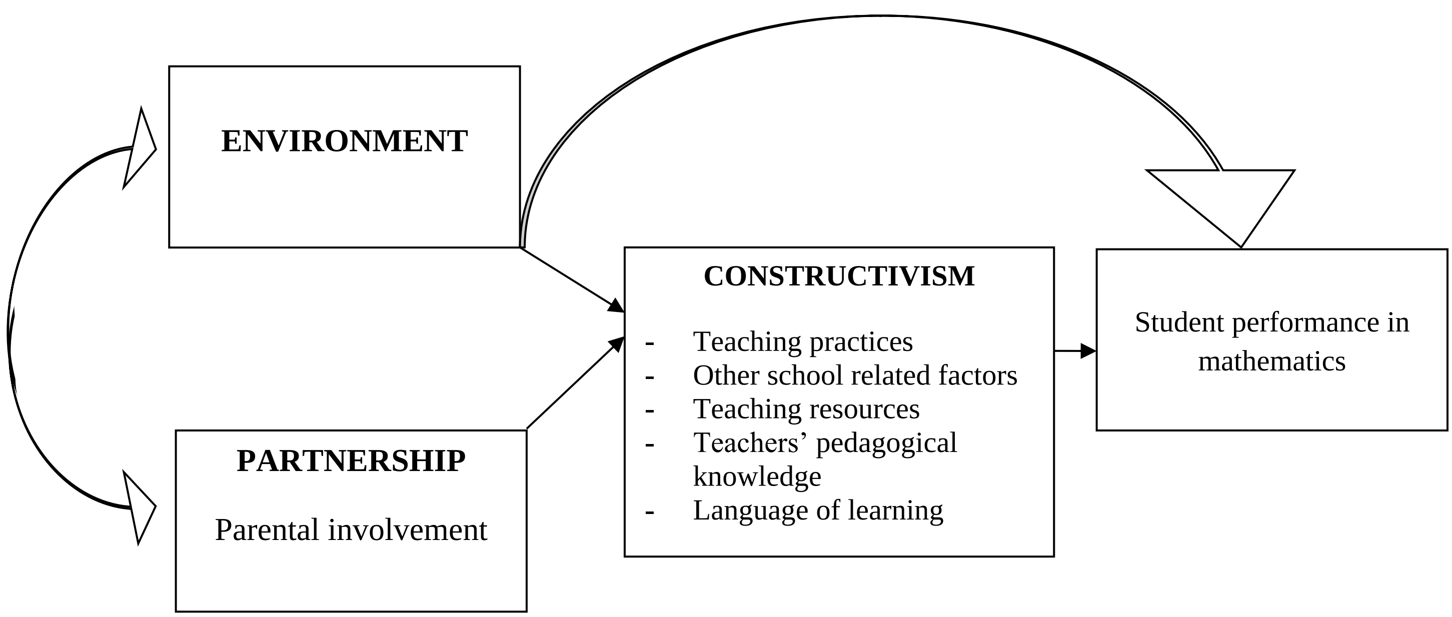
Constructivism is a learning theory in which people construct new knowledge upon their previous knowledge (Brocklebank, 2004). In using a theory to inform teachers' instructions in mathematics, two areas of knowledge are considered, namely, ontology and epistemology. In this study, discussion of ontology will center on the nature of mathematics, that is, what is it and how it is communicated. Epistemology refers to the way mathematics knowledge is spread, since a teacher's ontology and epistemology affect teaching, learning and assessment, and eventually performance (Brocklebank, 2005; Mclaughlin & Talbert, 1993; Ramberg & Kaput, 1999; Silver, Strong & Perini, 2000). This implies that students' learning can be enhanced when teachers acknowledge the knowledge and beliefs that students bring to the class as a starting point for new instruction, and monitor student conceptions as instruction proceeds (Bransford, Brown & Cockings, 1999; Grouws & Cebulla, 2000; Ogbonnaya, 2007).

2.6.1 The relevance of constructivism in the present study

Dewey (1966) viewed learning as a "continuing reconstruction of experiences and a joint activity within people" (p. 39). Dewey (1966) placed greater emphasis on interaction, designing curriculum to reflect the circumstances children faced as members of the living community in the modern world and fostering democracy, independence and real experiences in the classroom. Dewey

(1966) further noted that learning is a social activity which is intimately associated with connections with other human beings, teachers, peers, families, casual acquaintances and the people before or next to students at the exhibit. With this in mind the researcher incorporated constructivism because the researcher viewed students' performance in mathematics as a joint activity between (students, teachers, parents, school boards and education department), which involves interaction between all the stakeholders just like the Bronfenbrenner model discussed in Section 2.5.1. Therefore, it was conceptualized that the following variables: teaching practices, language of learning, teachers' pedagogical knowledge, parental involvement, and other school related factors and teaching resources were the main factors that influenced students' performance in mathematics in Lesotho at the time of conducting the current study. The conceptual framework for this study is provided in Figure 2.2.

Figure 2.2: A summary of the conceptual framework for the current study



Decisions about the inclusion of variables and paths within the model in Figure 2.2 were guided by theoretical considerations. As noted in the literature review many factors are related to students' academic success. Therefore, it is a researchers' thought that a closer inspection on a smaller number of factors could be used to represent the three distinctly different structural levels that influence student learning and each other (i.e., classroom-level, school-level and home-level influences). The "constructivism" factor reflects on the influences at the classroom level (the teaching practices, language of learning, teaching resources and teachers' pedagogical content knowledge). The "environment" factor represents school-level influences such as whether or not respect and responsibility are expected and modelled by school staff and also whether the school is perceived to be safe and studious. The "partnership" factor reflects on the extent of parental involvement to teaching and learning of their children and in the operation of the school.

2.6.1.1 Constructivism and teaching practices

According to Rusbult (2007), a common claim about constructivist teaching is that people construct their own knowledge. A constructivist teacher lets students to construct their own knowledge by discovering it for themselves, without any explanation from a teacher or textbook. Constructivists assume that all knowledge is constructed from previous knowledge, irrespective of how one is taught (Cobb, 1994). According to Mayer (1999), constructivist learning occurs during an instruction that promotes appropriate cognitive processing that includes learning from others, learning by discovery and learning by doing to help students learn valuable ideas and skills. Research has supported a student-centered, constructivist approach to teaching (McCombs, 1998). This approach encourages students' active engagement in academic material, questioning, experimenting, reflecting, discussing, and creating personal meaning (Smith, 1999). Capraro (2001) and Ziegler and Yan (2001) found that students taught by teachers who were high in constructivists beliefs had better problem-solving skills than students taught by teachers with low constructivist beliefs. Given this background, it is a researcher's thought that in constructivist mathematics classrooms, students' performance is enhanced because most effective teaching methods (discovery methods) are designed to stimulate thinking to replace boring passivity with exciting activity in learning.

2.6.1.2 Constructivism and teachers' pedagogical content knowledge

Many researchers believe that teacher quality is by far the single most important determinant of students' performance (Farrow, 1999; King, 2002; Tsang & Rowland, 2005; Wenglisky, 2002). This is more significant when applying constructivism (Darling-Hammond & Falk, 1997). The teachers' knowledge, beliefs and actions all influence the students' performance. Cobb, Yackel and Wood (1992) believed that "mathematics teachers universally accepted that learning is a constructivist process" (p. 4). Research has documented the positive relationship between students' performance and teachers' knowledge, both of mathematics and students' cognition (Swaffort, Jones & Thornim, 1997). Further, teacher knowledge of the students has been shown to be a more powerful predictor of students' performance in mathematics than the teachers' knowledge of the problem solving or number of strategies (Mercer *et al*., 1996). Brook and Brook (1993) believe that the most valuable quality of a teacher applying pedagogy based on constructivism is the "instantaneous and intuitive vision of the student's mind as it gropes and fumbles to grasp a new idea" (p. 20).

According to Confrey (1990), constructivist teachers develop a deep and thorough understanding of the mathematics curriculum, which enables them to pace and direct experiences so that curriculum is covered. Confrey (1990) adds that this knowledge enable teachers to know which questions to expand upon and which questions to move toward. Teachers are highly flexible risk-takers (Confrey, 1990). Together, these skills allow teacher to delight on unexpected questions and deviations, when then allows students to build on their previous learning and relevant experiences. In embracing the understanding of the students and the mathematics curriculum, teachers correct or warrant the knowledge of student's constructs, thus promoting the development of powerful and effective constructions (Confrey, 1990; Ernest, 1994). Teachers direct the students to provide experiences that may question or expand upon their previous learning. Noddings (1990) explains that teachers continuously reassure students that they are doing things right, that their thinking has power, and their errors are correctable. Constructivist teachers allow students to choose activities, ask students to explain answers and prompt all to be involved (Mikusa & Lewellen, 1999).

2.6.1.3 Constructivism and parental involvement

According to Roberts (2014), parental involvement is highly important, especially to struggling mathematics students. Planty *et al*., (2009) reported that subtle parental involvement may contribute uniquely to mathematics performance. According to Jeyness (2005, 2007) parents' attitudes toward mathematics have an impact on children's attitudes. Children whose parents show an interest in and enthusiasm for mathematics around the home are more likely to develop that enthusiasm themselves (Gonzale & Wolters, 2006). According to Yinsqui, Gauvain, Zhengkui and Li (2006), constructivist teacher creates opportunities for parents and teachers to work cooperatively to enrich students' experiences with mathematics. In the constructivist classrooms, teachers inform the parents about the opportunities that homework assignments offer to students. Studies have shown that parents' participation in students' homework may increase performance (Gonzale & Wolters, 2006; Reynolds, 1992). Therefore, it is important for parents to understand the system the teacher uses to assign and evaluate homework, as well as the methods used to teach mathematical concepts. Helping students with homework is counterproductive if parents work at cross purposes with the classroom teachers.

Hartog and Brosnan (2005) noted that constructivist teachers incorporated manipulatives and technology into their instructions and programs to developed parental involvement. Examples of such programs are family mathematics and family computers, both developed to help parents to teach their children mathematics (for example, see, Hartog & Brosnan, 2005). Reynolds (1992) stated that teachers provide learning activities that parents may do with their children, provides information on equity issues in mathematics education, build awareness of the importance of problem solving skills and the ability to talk about mathematics, and help parents develop a positive attitude toward their role in their children's mathematical education.

2.6.1.4 Constructivism and language of learning

According to constructivist approach, learning involves language and the language of learning influences student's achievement (Cohen, 1990). Researchers (see, examples, Matsoso & Polaki, 2006; Nenty, 2010; Orton, 1997; Seotsanyane, 2001) have noted that students talk to themselves when they learn. Vigotsky (1978) noted that language and learning are inextricably intertwined. This point was clearly emphasized in Elaine Gurain's reference to the need to honor native language in developing North American exhibits. The desire to have material and programs in their own language was an important request by many members of Native American communities (Vigotsky, 1978). Stiff (2001) noted that students must verbalize their ideas through the language of learning to clarify their thinking and reach deeper understanding. Students are expected to work through problems in pairs or small groups and to explain their thoughts to classmates in language of learning.

2.6.1.5 Constructivism and teaching resources

Hein (1991) stated that students construct meaning from sensory input. Major (1999) noted that students are given time to explore learning materials before using them to solve problems so that students may discover the materials unique characteristics and gain an understanding of how it is used. In the constructivist mathematics classrooms the specific tool used in any lesson is carefully chosen for its usefulness in leading students to the construction of mathematics. Hein (1991) noted that a constructivist teacher uses school newspapers and library bulletin-boards to communicate the excitement of learning in the classroom. He also noted that a constructivist teacher set aside special time for student presentations of projects and performances because students take greater ownership of their learning and become ready to share their knowledge-constructing ability more publicly (Hein, 1991).

2.7 CONCLUSION

The literature review and the conceptual framework that are presented in this chapter were intended to make a connection between research findings of this study and the theory about students' performance in mathematics. In Section 2.5.1 a diagram of Bronfenbrenner's working model of the ecological context of an individual school was used to explain the interconnection of the systems that influence students' performance in mathematics. Constructivist theory was also used to frame this study because constructivist teaching was demonstrated most effective to enhance students' performance in mathematics. The chapter concluded with the discussion of constructivist theory in terms of the role it plays in influencing students' performance.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research methodology for the current study. According to McMillan and Schumacher (2010), a research methodology refers to *"the procedures used to collect and analyze data"* (p. 29). These procedures should help researchers address the following questions: when to collect data, from whom to collect data, and under what conditions the data is to be collected. The research methodology provides explanations for the following aspects of the study: research design, the research population and sample, data collection instruments, data collection processes, data analyses methods and ethical considerations for the study. The aim of this study was to identify factors that negatively influence students' performance in primary school mathematics in the district of Berea of Lesotho (Section 1.2).

3.2 RESEARCH DESIGN

The study followed a pragmatic paradigm, meaning that the study did not follow a single research methodology to conduct its investigation. Both quantitative and qualitative methods were used to collect data. Within a pragmatic paradigm there is a belief that the scientific method, by itself, is not enough and therefore, common sense and practice are needed in addition to the scientific method to determine the best approach (McMillan & Schumacher, 2010). This study followed a descriptive survey research design and an explanatory mixed-methods design.

3.2.1 Descriptive survey design

The term survey describes "research that involves the administration of questionnaires or interviews" (Gall, Gall & Borg, 2007, p. 230). According to Gall *et al*. (2007), when questionnaires and interviews are used in a descriptive research design, valuable data about opinions, attitudes, and practices can be elicited. The present study explored the views and opinions of school's Principals, Deputy Principals and mathematics teachers about factors contributing to poor mathematics performance in Grade 7 classrooms.

Cohen *et al*. (2001) employed the descriptive survey design because "it enabled him to gain a general understanding of the phenomena and to identify trends from a large population" (p. 21).

According to McMillan and Schumacher (2010), survey data is used to describe and explain the status of the phenomena, to trace changes and to draw comparisons among the phenomena of inquiry. For this study the researcher found a descriptive survey design useful because most data were collected through questionnaires and interviews. The descriptive survey design allowed the researcher to collect data that provided an in-depth description of factors that influence poor mathematics performance in Grade 7 primary schools of Berea district.

A descriptive survey design has been used in several studies (for examples, see, Amadalo, Shikuku & Wasike, 2012; Dhlamini, 2012; Olatunde & Surumo, 2012). Amadalo *et al*. (2012) employed this design to investigate the factors that influence syllabus coverage in secondary school mathematics in Kenya. The study administered questionnaire to head teachers, the head of mathematics department and teachers from 85 secondary schools. Olatunde and Surumo (2012) used the descriptive survey design in a study of performance indicators of secondary school mathematics on 77 mathematics teachers and 525 students. The researchers adopted this design to investigate the indicators of academic performance of students in which questionnaires for teachers and questionnaires for students were administered to collect data.

3.2.2 Explanatory mixed-methods design

Gay, Mills and Airasian (2011) noted that in an explanatory mixed-methods design the quantitative data is collected first, and is more heavily weighted than qualitative data. According to Gay *et al*. (2011), in explanatory mixed-methods design, “the qualitative analysis and interpretations are used by the researcher to explain or elaborate on the quantitative results” (p. 485). It seems the main purpose of employing an explanatory mixed-methods design is to incorporate qualitative methods of looking into the analyzed data to provide in-depth explanation for the observed result. This approach allows the researcher to account for the observed results of the study. This is in line with Cresswell, Gutmann, Hanson and Plano Clark (2003) explanation that in explanatory mixed-methods design the quantitative results provide a general picture of the research problem while the qualitative results refine, explain or extend the general picture.

In the current study the researcher employed this design because the primary data for the study is quantitative (most data were collected through questionnaires from 60 participants) and hence the qualitative data from the semi-structured interviews were secondary. The first phase of this study administered questionnaires to a relatively larger sample and this procedure provided a general overview of the factors. In the second phase a small sample of respondents was interviewed. The qualitative phase was used to augment the statistical data to explain the factors. The collection and analysis of qualitative data and quantitative data occurred in two distinct phases. Firstly, the quantitative data were collected and analyzed, and thereafter, the researcher collected and analyzed the qualitative data (see, Section 3.5 & Section 3.6).

Several studies have used an explanatory mixed-methods design (for examples, see, Ivankova, Creswell & Sticks, 2006; Invankova & Sticks, 2007; Mitchell, Reilly, Bramwell, Lilly & Solnosky, 2004). Mitchell *et al*. (2004) used the explanatory mixed-methods design to study the motivational and psychological consequences of high-school students (n=139) choosing their group-mates in cooperative learning groups with Grade 10 and Grade 11 students in five science classes from a small high school in Canada. The survey results from Mitchell *et al*. (2004) study revealed a decrease in students' willingness to choose their group-mates while the qualitative findings further confirmed and explained that students felt obligated to choose friends as group-mates, and in addition, low-achieving students questioned the value of working with similarly achieving group-mates.

3.3 SAMPLING TECHNIQUES

3.3.1 Population and the sample of the study

The population for the study consisted of school Principals, Grade 7 mathematics teachers and Deputy Principals, all from 98 primary schools in the Berea district, Lesotho. Of the 98 primary schools, 45(45.9%) are owned by the missionaries, 36(36.7%) by the government and 17(17.3%) by the community, hence this study was characterized with a participation profile drawn from various educational contexts. The researcher purposively sampled 15 primary schools from the 98 schools in the Berea district. Of the 15 schools sampled in the study, 6(40%) were missionary schools, 5(33.3%) were government schools and 4(26.6%) were community schools. The 15 schools were purposively sampled on the basis of their persisting poor performance in mathematics in the last two years that preceded this study (see, Table 3.1). Even though the information in Table

1.2 of Chapter 1 reflects on the performance of sampled schools in the academic year 2012, the schools' performance indicators of the years 2010 and 2011 respectively, were also used to determine the average schools' performance trends for Grade 7 mathematics, hence the phrase "*persisting poor performance in mathematics*" was opted. Poor performance refers to the schools that obtained a performance average less than 50% in mathematics in the public examinations over the specified period of performance (see, Examination Council of Lesotho [ECOL], 2012). The average performance scores of Grade 7 mathematics for 2010 and 2011 are provided in Table 3.1 for the sampled schools.

Table 3.1 Average mathematics passes (%) of the 15 sampled schools in Berea for 2010 and 2011

Berea primary school (n=15)	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**
Average passes % in 2010	29.0	33.1	32.2	37.3	28.0	42.3	37.6	41.6	37.6	43.3	39.1	40.3	45.6	48.0	36.3
Average passes % in 2011	30.0	24.6	43.0	33.6	35.3	39.3	20.4	33.6	39.6	41.1	37.1	44.4	38.3	39.9	41.3

Source: *Berea Education Office (2012)*

Unlike in convenience sampling, in which participants who happen to be available are chosen (Gay *et al*. 2011), in this study the researcher purposively determined a performance criteria (poor performance) to select the sample (Table 1.2). In purposive sampling the goal is to select a sample that is likely to be "information-rich" with respect to the anticipated outcomes of the study (Gall *et al*. 2007: 178). According to Gall et al. (2007), purposive sampling is a non-random sampling technique, which can be used in a survey study. The purposive sampling may help the researcher in discovering, gaining insight and understanding of a particular chosen phenomenon, which in the present study constituted the problem of poor mathematics performance in the selected 15 primary schools in the Berea district of Lesotho.

3.3.2 Schools' and participants' profiles

The schools (in Table 3.1) and all participants were given codes to ensure anonymity. The schools were designated the letters A to O. In terms of these designations, the first school (school 1) was allocated letter A (meaning, school1=A), school 2=B, school 3=C, and so on. The letters “P”, “DP” and “T” were used to represent school “Principals”, “Deputy Principals” and “teachers” respectively. For instance, three teachers in school 3 would be identified as CT1, CT2 and CT3 respectively. “CT1” referred to “teacher number one (T1) from school number three (school 3 or C)*”*. In the same vain, AP=school principal from school 1, DDP=deputy principal from school 4). Information regarding the status of the participating schools, participants’ qualifications, participants’ teaching[4] experiences and schools’ mathematics performance of Grade 7 students of the years 2010, 2011 and 2012 is provided in Table 3.2. The information in Table 3.2 was obtained from the Berea Education Department prior to the commencement of the study to determine each school’s suitability to participate in the current study. The 2010, 2011 and 2012 Grade 7 mathematics performance scores from all the participating schools were almost comparable and implied poor performance in mathematics in all selected schools.

According to the Ministry of Education and Training (MOET) (2010), the qualification structure for teacher education was said to be under the authority of Minister of Education’s Policy Act of 2010. This policy outlined that usually teachers’ qualifications include a three-year certificate, three-year diploma, four-year University Bachelors, Honors and Masters Degrees. The three-year college certificate comprises the Primary Teachers Certificate (PTC) and Secondary Teachers Certificate (STC), while the three-year diploma includes Diploma in Education Primary (DEP) and Diploma in Education Secondary (DES) (MOET, 2010). According to the Ministry of Education and Training Circular Notice No. 10 of 2010, teachers with only a three-year college certificates were requested to upgrade their qualifications to a diploma by 2016, hence a three-year college certificate was considered an inadequate qualification for teaching in Lesotho. The Lesotho College of Education (LCE) is currently offering a three-year part-time diploma namely, the Distance Teachers’ Education Programme (DTEP) to upgrade teachers who are deemed to be inadequately qualified (LCE, 2009). Table 3.2 provides the participants’ profiles.

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4. Irrespective of the participants’ varied designated positions within the school, their experiences were considered to be a function of the number of years from the time they started teaching to the time they participated in the current study. Hence the participant’s experience in this context did not take into account the positions of being either a school principal or a deputy principal, only a number of being in the teaching fraternity was considered.

Given this background, and in terms of the Education Act (2010), all participants in Table 3.2 were considered to be qualified teachers. At the time of this study the education policy stated that the principal is responsible for the organization, management and day-to-day running and leadership of a school (Education Act, 2010). Furthermore, the principal is the chief accounting officer of the school and is accountable to the school board, responsible for the discipline of teachers and at the beginning and at the end of the year reports to the education department (Education Act, 2010). The Education Act (2010) stated that the deputy principal shall ensure with the principal, that meaningful teaching and learning takes place at the school, and that the deputy principal shall report to the principal and the school board about each subject and shall (together with the principal) supervise and monitor teachers' and students' performance in the school. Based on the Education Act (2010) at the primary level education the deputy principals are responsible to all the subjects with the assistance of selected teachers in a particular subject. Therefore, in the context of this study, the roles of the deputy principals also encompassed those of the heads of the mathematics department, in which case they are responsible for managing and facilitating instructional activities within Grade 7 mathematics classrooms.

Table 3.2 Schools' and participants' profiles

School code	Status of the school	Participants	Participants' codes	Participants' qualifications	Years of teaching experience	Average pass in 2010(%)	Average pass in 2011(%)	Average pass in 2012(%)
A	Mission	Principal	AP	Diploma	16-20	29.6	30.0	25.1
		Deputy P	ADP	Diploma	6-10			
		Teacher	AT1	Diploma	0-10			
		Teacher	AT2	Diploma	0-10			
B	overnment	Principal	BP	Diploma	Over 20	33.1	24.6	17.0
		Deputy P	BDP	Diploma	6-10			
		Teacher	BT1	Diploma	21-30			
		Teacher	BT2	Certificate	11-2-			
		Teacher	BT3	Certificate	11-20			
C	Mission	Principal	CP	Diploma	16-20	32.2	43.0	38.7
		Deputy P	CDP	Diploma	Over 20			
		Teacher	CT1	Diploma	0-10			
D	Community	Principal	DP	Diploma	16-20	37.3	33.6	27.4
		Deputy P	DDP	Diploma	Over 20			
		Teacher	DTI	Diploma	0-10			
E	Government	Principal	EP	Bachelors	6-10	28.0	35.3	22.0
		Deputy P	EDP	Bachelors	16-20			
		Teacher	ET1	Certificate	11-20			
		Teacher	ET2	Diploma	0-10			
		Teacher	ET3	Certificate	0-10			
F	Community	Principal	FP	Diploma	6-10	42.3	39.3	38.0
		Deputy P	FDP	Masters	11-15			
		Teacher	FT1	Diploma	11-20			
		Teacher	FT2	Bachelors	21-30			
G	Mission	Principal	GP	Diploma	Over 20	37.6	20.4	18.1
		Deputy P	GDP	Bachelors	6-10			
		Teacher	GT1	Bachelors	11-20			
		Teacher	GT2	Diploma	0-10			
H	Government	Principal	HP	Certificate	11-15	41.6	33.6	23.0
		Deputy P	HDP	Bachelors	16-20			
		Teacher	HT1	Certificate	0-10			
		Teacher	HT2	Diploma	11-20			
I	Government	Principal	IP	Diploma	Over 20	37.6	39.6	29.3
		Deputy P	IDP	Diploma	6-10			
		Teacher	IT1	Diploma	0-10			
		Teacher	IT2	Certificate	21-30			
J	Community	Principal	JP	Diploma	16-20	43.3	41.1	38.2
		Deputy P	JDP	Masters	16-20			
		Teacher	JT1	Diploma	0-10			
		Teacher	JT2	Bachelors	0-10			
K	Mission	Principal	KP	Diploma	16-20	39.1	37.1	33.0
		Deputy P	KDP	Diploma	6-10			
		Teacher	KT1	Diploma	Over 20			
		Teacher	KT2	Bachelors	Over 30			
L	Mission	Principal	LP	Diploma	11-15	40.3	44.4	35.4
		Deputy P	LDP	Diploma	11-15			
		Teacher	LT1	Diploma	11-20			
		Teacher	LT2	Diploma	11-20			
M	Community	Principal	MP	Bachelors	11-15	45.6	38.3	36.3
		Deputy P	MDP	Diploma	6-10			

		Teacher Teacher	MT1 MT2	Bachelors Diploma	0-10 0-10			
N	Governme nt	Principal Deputy P Teacher Teacher	NP NDP NT1 NT2	Masters Diploma Diploma Diploma	0-5 11-15 0-10 0-10	48.0	39.9	38.7
O	Mission	Principal Deputy P Teacher Teacher	OP ODP OT1 OT2	Bachelors Certificate Bachelors Certificate	6-10 Over 20 0-10 0-10	36.3	41.3	39.4

Source: *Berea Education Office (2012)*

3.4 INSTRUMENTATION

The data collection instruments for this study were three types of 5-point Likert scale questionnaires and semi-structured interviews. According to MacMillan and Schumacher (2010), a questionnaire is a written set of questions used for eliciting intended data from study respondents. One questionnaire was used for Grade 7 mathematics teachers. The second questionnaire was for the deputy principals and the last one was for the school principals. Maree (2007) describes an interview as a two-way conversation in which the interviewer asks the participant questions to collect data, to learn about the ideas, beliefs, views, opinions and behaviors of the participant, and to further provide suitable explanations for these traits. In this study, interviews were conducted to achieve the following purpose: (1) to enrich data by determining in each school possible causes of poor mathematics performance in Grade 7 (see, Section 1.2); and, (2) to probe participants further to explain and account for the questionnaire responses (see, Section 3.2.2).

3.4.1 The development of the research instruments

3.4.1.1 The questionnaires

According to Jackson (2009), great care and attention must be devoted to the construction of the research tools for a research project. According to Silverman (2008), “the questionnaire is customized and tailored to the specific research questions at hand” (p. 283). Questionnaires have been used in several studies (Amadalo *et al*. 2012; Govender, 2010; Jackson, 2009; Ogbonnaya, 2007; Polaki, 2005; Shava, 2005; Stols *et al*. 2008; Yara, 2012). Amadalo *et al*. (2012) used three questionnaires to collect data from the head teachers, the heads of mathematics departments and mathematics teachers to investigate the factors that influence syllabus coverage in secondary schools in Kenya. Jackson (2009) in his investigation of the factors contributing to the poor performance of Grade 12 students in Lesotho used questionnaires for data collection, and employed the questionnaires for the following reasons: (1) affordability because a questionnaire is the least expensive means of data collection; (2) questionnaires may be given to many people simultaneously which means that a large sample of a target population may be reached; (3) data provided by the questionnaires may be more easily analyzed and interpreted than data obtained from verbal responses.

Given this background and the research design that was followed in the current study, questionnaires were opted as primary data collection instruments. The researcher developed the questionnaires in a manner to avoided biased responses (the responses that strongly favoured one side in an argument or one item in a group). For example, in the head teacher questionnaire (HTQ), the issue of lesson attendance of teachers and students was addressed in item 4 and item 14. Item 4 read: *"Grade 7 mathematics teachers attend their teaching lesson regularly"* and item 14 read: *"Students in my school attend mathematics lesson regularly".* Simple language was used in the questionnaires. The researcher avoided terms like *"instruction"* and *"learners"*. For *"instruction*" the researcher used *"teaching and learning"* and for "*learners"* used *"students"* because they would be more familiar to participants. In deputy principals' questionnaire (DPQ) item 10 read: *"I provide sufficient support for the teaching and learning in Grade 7 mathematics".* Similarly, in DPQ item 13 read: *"I check and sign students' books to monitor their performance in Grade 7 mathematics".* In the mathematics teacher questionnaire (MTQ) item 14 read: *"I give my students enough homework activity to familiarize them with the work"*.

All questionnaires were pilot-tested to identify shortcomings in their construction and administration. It took time and effort to develop the questionnaires and the instrument was re-drafted a number of times before being finalized. All three questionnaires were sub-divided into two sections. Each questionnaire consisted of Section A, which explored participants' demographic information asking about participants' gender, number of teaching years (see, Footnote 4) and the teaching qualifications they possessed. Section B of each questionnaire consisted of almost 15 items arranged in a 5-point Likert scale. Participants responded to each questionnaire by ranking statements on a Likert scale of 1 to 5, with 1 being *strongly agree* and 5 being *strongly disagree* (for example, see, Table 3.3).

Table 3.3: An example of an item in a Mathematics Teacher Questionnaire (MTQ)

	Strongly Agree	**Agree**	**Undecided**	**Disagree**	**Strongly Disagree**
I use a teacher-dominated style to teach mathematics in Grade 7.					

Section B collected information regarding the state of the culture of teaching and learning from the principals, for example, item 14 in HTQ read: *"Generally, there is a positive culture of teaching and learning in my school."* The type of instructional support given to mathematics teachers by the deputy principals as the head of the mathematics department, for example, item 4 in DPQ read: *"I regularly visit and observe teachers in class when they teach mathematics."* The type of instructional methods used by Grade 7 teachers to teach mathematics, for instance, item 1 in MTQ read: *"I use a teacher-dominated style to teach mathematics in Grade 7"* (see, Appendix A).

3.4.1.2 Semi-structured interviews

Semi-structured interviews are commonly used and favored in the research studies because they are flexible and can be used to follow up on incomplete and unclear responses (Harris & Brown, 2010). According to Maree (2007), semi-structured interview schedules basically define the line of inquiry. Semi-structured interviews have been used in several studies (for examples, see, Dhlamini, 2012; Turker, 2006; Shava, 2005). Turker (2006) used the semi-structured one-to-one interviews to collect data from teachers to explore the relationship between mathematics and science performance in COSC results in the 10 districts of Lesotho. Dhlamini (2012) investigated the effect of implementing a context-based problem solving instruction on learners' performance in a Grade 10 Financial Mathematics topic. The Dhlamini (2012) study used the semi-structured interviews to provide respondents with an opportunity to verbalize and externalize their problem solving thoughts and ideas.

The current study used this tool to complement the results of the questionnaires. Literature points out that researchers use semi-structured interviews to gain a detailed picture of a participant's beliefs about, perceptions or accounts of a particular topic (Greeff, 2005). In this study, with the semi-structured interviews, the researcher had a set of predetermined questions on an interview schedule. The items in the interview schedule related to those in the questionnaires. According to Greeff (2005) an interview schedule is a questionnaire written to guide the interviews. The three interview schedules for principals, deputy principals and Grade 7 mathematics teachers were constructed to guide interviews. The questions were carefully formulated, sequenced and developed to address the objectives of the study. The interview schedules probed teachers', school principals' and deputy principals' responses with regard to, (1) types of instructional methods used by Grade 7 teachers to teach mathematics; (2) the state of the culture of teaching and learning in participating schools; and, (3) the type of instructional support given to mathematics teachers in participating schools.

3.4.2 The purpose of each instrument in the study

3.4.2.1 The questionnaires

The aim of the questionnaires was to obtain information regarding the factors contributing to poor mathematics performance in Grade 7 students in Berea district in Lesotho. The questionnaires helped the researcher to address the two research questions of the study (Section 1.6). For, instance, research question 1 (Section 1.6.1) was addressed by the following items in MTQ: 3, 5, 8, 11, 12, 13 and 15, in DPQ: 5, 7, 9, 10, 11, 12, 14, 15, and in HTQ: 3, 5, 6, 7, 10, 11, 12, 13 and 15 (see, Appendices A to C). Item 3 in MTQ read: *"I have enough teaching resources to teach Grade 7 mathematics topics".* The respondents would indicate whether they had the teaching resources or not. Based on the responses the researcher was able to identify whether or not the teaching resources is the factor contributing to poor performance in Grade 7 mathematics and this item addressed the research question 1. Similarly, the research question 2 (Section 1.6.2) was addressed by the following items in MTQ: 1, 2, 4, 6, 7, 9, 10, 13 and 14, DPQ: 1, 2, 3, 4, 6, 8, and 13 while in HTQ was addressed by items 1, 2, 4, 8 and 9 (see, Appendices A to C). For instance, item 14 in MTQ read: *"I allow my students to work in groups when they solve mathematics tasks".* The respondents noted whether they use group work approach or not to improve performance in Grade 7 mathematics and this item addressed the research question 2.

3.4.2.2 The semi-structured interviews

The purpose of the semi-structured interviews was to elicit information, to follow up and provide explanations to the questionnaire responses in relation to investigating the factors contributing to poor mathematics performance in Grade 7 students in Berea (see, Section 3.2.2). The semi-structured interviews assisted the researcher to provide more explanations to the two research questions of the study and the objectives of the study (Section 1.2 & Section 1.6). For example, research question 1 was answered by items 3, 4, 5, 6, 7, 14, 15 in teachers' schedule, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14 in deputy principal's schedule and 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13 in principals' schedule. For instance, item 4 in teachers' schedule read*: "Besides your contribution as a teacher, do you think there are other factors that contribute to students' poor performance in Grade 7 mathematics"?* The respondents mentioned the factors that contribute to students' poor performance in Grade 7 mathematics and this item addressed the research question 1. Similarly, research question 2 was addressed with the following items 8, 9,10,11,12 and 13 in teachers' schedule, 11, 12, 13 and 16 in deputy principals' schedule and 14 and 15 in principals' schedule. For instance, item 8 in teachers' schedule read: *"What teaching methods or strategies do you think are effective to teach mathematics in Grade 7?".* The respondents stated the teaching methods or strategies that are effective to teach mathematics in Grade 7 and this item addressed the research question 2.

3.4.3 Validity and reliability of the instruments

Validity and reliability are the essential ingredients utilized to evaluate the quality of the instruments (Ogbonnaya, 2007), and are of critical importance in understanding issues of measurement in social science research (Jackson, 2009). The validity of an instrument is the degree with which the measured value reflects the characteristics it is intended to measure (Lewis, 1999). According to (Jackson, 2009), the three types of validity are: criterion validity, construct validity and content validity. Criterion validity refers to the relationship between scores on a measuring instrument and an independent variable (criterion) believed to measure directly the behavior or characteristic in question (Jackson, 2009). Construct validity refers to the degree to which test items and the structure of the test can be accounted for by the explanatory construct of a sound theory (McMillan & Schumacher, 2010). Content validity refers to the degree to which the test items actually measure, or are specifically related to, traits for which the test was designed and is to be used (McMillan & Schumacher, 2010).

In the context of this study, content validity was established because there was a necessity to assess whether the questionnaires and interviews explored the factors contributing to poor mathematics performance. To ensure the content validity of these instruments the researcher presented the provisional version to experts (see, Section 3.4.3.1) in the field for their comments prior to the finalization of the instruments. According to Lewis (1999), content validity is a useful concept in evaluating educational tests and research questionnaires. Several studies advocate that the use of expert judgments on validation is necessary in educational studies (see, Dhlamini, 2012; Dermicioglu & Calik, 2009; Donkor, 2010; Hattingh & Killen, 2003).

Construct validity was also established in the questionnaires because items in MTQ, DPQ and HTQ were measured on a 5-point Likert scale to determine which items belonged together in the sense that they were asked similarly and therefore measured the same construct. For instance, the researcher used the questionnaires to investigate factors contributing to poor performance in mathematics, there were quite a number of different factors that included family factors, personal factors, societal factors and school factors; but during the construction of the questionnaires the researcher ensured that a different set of related items asked were about school related factors.

According to McMillan and Schumacher (2010), reliability refers to the consistency of measurement; meaning the extent to which the results are similar over different forms of the same instrument or occasions of data collection. Reliability can be assessed using these methods: inter-rater method, test-retest method, split-half method, or by calculating the Cronbach's alpha coefficient. Cronbach's alpha was utilised in this study to compute the internal consistency of the questionnaire items.

3.4.3.1 The steps of content validation of the questionnaires and interviews

In order to justify whether or not the interviews and questionnaires measured what they were purported to measure, the content validity of each instrument was tested by giving all the questionnaires and interview schedules to the following experts: (1) to two college lecturers in the research department; (2) one educational officer primary inspectorate in Berea Education Department; (3) one assistant subject officer for mathematics and science in Examination Council of Lesotho (ECOL); (4) one Grade 7 mathematics teacher. Experts had to examine the validity properties of data collection instruments. To facilitate this process the researcher developed the validation forms for the questionnaires and interviews in which each of expects would record their impressions of the items in the instruments. All experts worked independently. The researcher personally delivered the validation forms and later collected the feedback in person.

3.4.3.2 Comments of validation

The judges (experts who validated the data instruments) made comments on both instruments.

3.4.3.3 Comments on questionnaires

As an example, one of the experts commented on MTQ, item number 10, which read: *"I have attended a workshop(s) on mathematics teaching in the last three years".* The feedback from this expert indicated that item 10 (quoted above) was not specific in terms of distinguishing whether or not the workshop(s) was for teaching methodology, teaching skills or teaching approaches. Given this feedback, item 10 was recast and read: *"In the last three years I have attended a workshop(s) on how to teach Grade 7 mathematics topics"*.

3.4.3.4 Comments on interviews

One of the experts suggested that one of the items in the teacher interview schedule be reviewed and recast. The item: *"How can teachers change the students' attitude towards mathematics?"* The revised version read: *"What is the general attitude of students in your Grade 7 class?"*. The researcher agreed with the revised version because students' attitude towards mathematics could not only be changed by teachers, even students could contribute in changing their own attitude towards mathematics.

3.4.4 Reliability of instruments

3.4.4.1 Reliability of the questionnaires

According to McMillan and Schumacher (2010), internal reliability of an instrument refers to the consistency of measurement when the instrument is administered. All three questionnaires were pilot-tested in two schools of the study population. Data collected from a pilot study was used to compute the internal consistency reliability of the questionnaires. Cronbach's alpha was used to compute using Statistical Package for Social Sciences (SPSS) statistic 21 because the questionnaires offered more than two choices of responses for each item. According to Gay *et al*. (2011), *"if numbers are used to represent the response choices, analysis for internal consistency can be accomplished using Cronbach's alpha"* (p. 168). The internal consistency reliability of scores for the questionnaires (three of them) was found to be reliable because it was in agreement with the values of George and Mallery (2003) to interpret Cronbach's alpha's values: "Value > 0.9" is *excellent*; "Value > 0.8" is *good*; "Value > 0.7" is *acceptable*; "Value > 0.6" *questionable*; "Value > 0.5" is *poor*; and, "Value < 0.5" is *unacceptable* (see, Section 4.2.2).

3.4.4.2. Reliability of semi-structured interviews

In order to enhance reliability in the semi-structured interviews, the researcher personally conducted all the interviews. The researcher read each question from the interview schedule to each respondent in order to preserve uniformity. For consistency, the researcher was the only person who conducted the interviews and strived to preserve the same interviewing conditions in all participating schools, even though the interview sessions did not take place in the same time, and at the same place. However, the researcher ensured that all interviews took place at each participant's school, after school hours for each participant and trying to allocate the same time for each participant. All interviews were audio-recorded to facilitate the analysis process.

3.5 DATA COLLECTION FOR THE STUDY

The current study consisted of two components, namely, the pilot study and the main study. In each component of the study data were collected in two phases. The first phase was characterized with the collection of data through questionnaires; and the second phase was characterized with the collection of data through semi-structured interviews.

3.5.1 The pilot study

According to Strydom and Delport (2005), "the pilot study is usually informal, and a few respondents possessing the same characteristics as those in the main investigation are involved in the study" (p. 331). For this study, the data collection instruments (questionnaires and interviews) were piloted in two primary schools of the same district. The pilot sample consisted of principals (n=2), deputy principals (n=2) and Grade 7 mathematics teachers (n=3). The pilot schools share similar characteristics with schools in the main study, in terms of students' performance in Grade 7 mathematics. The two pilot schools were not included in the main study.

3.5.1.1 Phase 1: Administering questionnaires in the pilot study

In the first phase of pilot study the researcher had a meeting with participants in the different schools prior the distribution of questionnaires. In this meeting, the researcher explained in details how to complete the questionnaires. Later, the researcher personally administered the questionnaires to the participants, namely, the principals, deputy principals and Grade 7 mathematics teachers. The participants were given a timeframe of one week to complete the questionnaires. The researcher made arrangements with the school principals to collect questionnaires on behalf of the researcher to ensure that there was 100% return rate. This arrangement was applicable to all participants.

3.5.1.2 Phase 2: Conducting interviews in the pilot study

In the second phase of the pilot study, the semi-structured individual interviews were conducted at schools (see, Section 3.4.3.2.2). The three groups of participants, namely, principals, deputy principals and Grade 7 mathematics teachers were all interviewed during after school hours after contact time through appointments with each participant. All the interviews were audio-recorded.

3.5.2 The main study

3.5.2.1 Phase 1: Administering questionnaires in the main study

In the first phase of the main study the researcher held a meeting with participants in their respective schools before the administration of questionnaires. The researcher explained to participants the method of questionnaire distribution and data collection processes. The questionnaires were handed out by the researcher to all participants for completion during their spare time. A timeframe of one week was given to each participant to complete the questionnaire. The participants were notified to contact the researcher in case of clarity-seeking questions while completing the questionnaires. The questionnaires were distributed to and collected from each school by the researcher. The researcher made arrangements with each school principal for the collection of the completed questionnaires. All collections were done through the school principals, and hence there was 100% return rate.

3.5.2.2 Phase 2 conducting interviews in the main study

Informed by the data analysis of the first phase the second phase was initiated consisting of semi-structured interviews with a purposive sample that was selected from the main sample of study (n=60). The former was selected to further elaborate on the results of the questionnaire data to further assist the researcher to explain the observed results from the questionnaire. Given that participants and schools were given codes, (see, Section 3.3.2), the researcher was able to link questionnaire items that needed further probing to respondents (participants) who were likely to provide explanations of the observations. Therefore the questionnaires for teachers, deputy principals and principals were not completely anonymous. It must however be mentioned that the system of anonymity that was used in this study was not completely anonymous to the researcher, but completely anonymous to anyone else. This arrangement meant that the researcher would still be able to track down the respondent to any of the items in either the questionnaires or the interviews. This arrangement was necessary because the researcher had to be able to identify and go back to some of the questionnaire respondents for interviewing purposes in order to make follow-ups to specific questionnaire responses.

The purposive sample for the interviews consists of teachers (n=7), deputy principals (n=4) and principals (n=4). The researcher ensured that the sample for interviews was unbiased in terms of gender. In each case, the researcher used an interview schedule or guide. The researcher preferred individual interviews so that each participant could express his or her real feelings in private. Given that the interviews were semi-structured the researcher probed participants on items that needed further explanation. For instance, in teacher schedule item 12 read*: "Do you know of any specific Grade 7 mathematics topics that give students problems?"* The respondents were probed further to mention those topics.

All the interviews were pilot-tested in order to make the necessary adjustments in terms of the language use, focus of the question, etc. The codes that were selected for interviews were CP, FP, IP, NP, BDP, FDP, IDP, ODP, AT1, BT2, DT1, ET3, GT1, JT2 and MT2. For instance, in school B two respondents were selected based on the school's deteriorating performance (see, Section 3.3.2). In MTQ, items 1 and 2 needed further explanation. Item 1 read: *"I use a teacher-dominated style to teach mathematics in Grade 7"* and item 2 read: *"I use a student-centered approach to teach mathematics in Grade 7".* The above quoted items are about teaching methods as a result the researcher found it necessary that teachers explain between the two which methods are effective to teach mathematics in Grade 7. Therefore the researcher incorporated in teachers' schedule item 8 that read: *"What teaching methods or strategies do you think are effective to teach mathematics in Grade 7?"* All interviews were conducted between 14H00 and 15H00 through appointments with each participant. All the interviews were audio-recorded to enhance data collection process and facilitate the data analysis process. The names of the interviewees were written under pseudonym to secure data.

3.6 DATA ANALYSIS TECHNIQUES

3.6.1 Purpose of data analysis in the pilot study and main study

By analyzing the pilot data, the researcher focused on specific areas that were unclear in order to make alterations. Data from the pilot study were used to compute the internal consistency reliability of each questionnaire (Section 3.4.3.2). In the main study, statistical methods were used to analyse data from the questionnaires while typological methods of analysis were used to analysis interview data.

3.6.2 Data analysis techniques for the study

In the pilot study quantitative data from questionnaires were analyzed with statistical methods of data analysis. Qualitative methods of data analysis were used to analyze the interviews.

3.6.2.1 Data analysis for Phase 1 the pilot study and main study

For the questionnaires, the mean score of the study sample on each opinion item was determined. Special efforts were made to explore various possibilities to investigate relationships in the survey data in order to make a substantial research contribution than a researcher who limits his or her data analysis to a single variable description. This means that data were used to explore relationships between two or more variables. For instance, a correlation analysis was computed by using the Pearson Product Moment Correlation Coefficient (PPMCC) to appropriate certain underlying relationships between variables. Frequency tables and descriptive statistics were constructed to display results with respect to the study research questions.

According to Maree (2007), PPMCC is a measure of the strength of the linear relationship between two quantitative variables. McMillan and Schumacher (2010) noted that the correlation coefficient is the number that shows the direction and strength of the relationship and is represented by *r*. The numbers that represent the correlation range from -1.00 to 1.00. A high positive value (for example, 0.85; 0.90; 0.96) represents a high positive relationship; a low positive value (for example, 0.20; 0.15; 0.08) a low positive relationship; a moderate negative value (-0.40; -0.37; -0.52) a moderate negative relationship and a value of 0.0 shows no relationship (McMillan & Schumacher, 2010).

Very few studies have used PPMCC (examples include, Amadalo *et al*., 2012; Ogbonnaya, 2007). Amadalo *et al*. (2012) in his investigation of factors that influence syllabus coverage in secondary school mathematics in Kenya used the PPMCC to determine the correlation between syllabus coverage and students' performance and the PPMCC value was r=0.8343. Similarly, Ogbonnaya (2007) computed PPMCC correlation between students' achievement and teaching practices on the following variables: (a) teacher presentation (r=-0.015); (b) whole class discussion (r=0.245); (c) homework (r=0.072); and, (d) group work (r=0.345).

3.6.2.2 Data analysis for Phase 2 of the pilot study and main study

Given that all the interviews were audio-recorded the researcher listened to the recorded data and transcribed the recorded data word for word (verbatim). Transcribed interviews were analysed with thematic content analysis. According to Anderson (2007), thematic content analysis is a descriptive presentation of qualitative data that moves beyond counting explicit words or phrases and focus on identifying and describing both explicit and implicit ideas within the data, that is themes. According to Lee (1971), reliability is greater in thematic analysis than in word-based analysis because more interpretations go into defining the data items (codes) as well as applying the codes to chunks of text.

3.6.2.3 Data analysis for Phase 1 of the main study

For the questionnaires, the mean score of the study sample on each opinion item was determined. Special efforts were made to explore various possibilities to investigate relationship in the survey data in order to make a substantial research contribution than a researcher who limits his or her data analysis to single variable description. This means that data were used to explore relationships between two or more variables. For instance, a correlation analysis was computed using PPMCC to appropriate certain underlying relationships between variables. Frequency tables and descriptive statistics were constructed to display results with respect to the study research questions.

3.7 ETHICAL CONSIDERATIONS

Research ethics (for example, voluntary participation, informed consent and no harm or risk to participants) are the key concepts required for participation in educational research. McMillan and Schumacher (2010) noted that most social researchers deal with human beings and may also require people to figure out their personal information to strangers (Babbie, 2001). It is highly necessary to understand the ethical and legal responsibilities of conducting research.

Ethical considerations include soliciting voluntary participation prior to the commencement of the study, distribution of informed consent letters to participants, ensuring confidentiality, anonymity and rights of participants. In conducting this study, the researcher ensured that participation is voluntary and was without rewards. It was every participant's democratic right to participate or not as a result participants (principals, deputy principals and Grade 7 mathematics teachers) were not compelled, coerced or required to participate in the study. The researcher obtained permission from relevant authorities, namely, the Berea Education Department to access 15 schools (see Appendix K) and a letter of permission was given by the department, the University of South Africa (UNISA) through its Research Ethical Committee and the Research Ethics Clearance Certificate was issued by the committee (see, Appendix E) and to the principals of the 15 schools selected as sites of the study (see, Appendix J).

The aim of the study, the objectives of the study and all processes and procedures of the study were communicated to all participants prior to the commencement of the study. The researcher made sure that the study was conducted with participants who were fully informed and had fully consented to their participation in the study. To avoid possible harm to the participants, their identities and that of their schools were not revealed. Questionnaires were completed anonymously. The meaning of codes was only known and understood by the researcher to protect the identities of the participants. Pseudonyms were used when reporting the findings of the study. Confidentiality was assured by not availing information about participants to anyone who was not directly involved in the study.

In the researchers' experience some of the participants were not 100% willing to participate in the study. This was evidenced by being very economical in their responses and withholding the information as the majority of them chose to give telegraphic responses like "*bad*" or "*poor*" during interviews (see, Chapter 4). Some of the participants eventually participated when they saw the permission letter (see, Appendices G to I) that the researcher had received from the department of education. It is a researchers' view that this behaviour is as a result of a seemingly limited research activity that is taking place in Lesotho and most teachers do not have experiences to deal with the research activity.

3.8 SUMMARY AND CONCLUSION OF THE CHAPTER

The study was conducted in the Berea district in Lesotho. Purposive sampling was followed to choose a sample of n=15 schools that comprises n=15 principals, n=15 deputy principals and n=30 Grade 7 mathematics teachers from the population of 98 primary schools in the district. Data were collected with questionnaires and semi-structured interviews from principals, deputy principals and Grade7 mathematics teachers. There were n=60 participants in this study of which 25(41.6%) came from mission schools, 20(33.3%) from government schools and 15(25%) came from community schools. 17(28.3%) of the participants were male while 43(71.6%) were female. The next chapter will include the results and the findings of the study after the data was collected and analyzed. It contains descriptive statistics of data collected from principals, deputy principals and Grade 7 mathematics teachers, followed by the correlation and typological analysis of data collected.

CHAPTER FOUR

RESULTS AND FINDINGS: QUANTITATIVE AND QUALITATIVE

4.1 INTRODUCTION

This chapter presents the results obtained from the data analyses process. Data for the current study were collected from 15 principals, 15 deputy principals and 30 Grade 7 mathematics teachers. The aim of this Chapter is to provide answers to the research questions posed in Chapter 1 (see, Section 1.6). The aim of this study was to identify factors that negatively influence students' performance in primary school mathematics in the district of Berea of Lesotho (Section 1.2). According to Cresswell and Clark (2007), data analysis in a mixed-methods research study consists of analyzing quantitative data using quantitative methods and the qualitative data using qualitative methods. Since a combined quantitative-qualitative approach was utilized in this study data for these two design components of the study were analyzed separately. Quantitative data were analyzed first and was followed by qualitative data.

4.2 QUANTITATIVE DATA ANALYSIS

Data were collected using a descriptive survey design and explanatory mixed-methods design (Section 3.2.1 & Section 3.2.2,). This section presents and discusses the quantitative data of the study. The frequency tables and descriptive statistics were used to perform the data analysis for the current study. The Statistical Package for Social Science (SPSS) version 21 computer programme for windows was used to compute frequencies and descriptive statistics. The researcher administered 60 questionnaires to all respondents described in Section 4.1. The return rate for the questionnaires was 100% (see, Section 3.5.1.1).

4.2.1 Participants' demographic details

Participants for the current study were drawn from poor-performing schools in mathematics, in the Berea district (see, Section 1.3; Section 3.3.1; Table 1.2 & Table 3.1). Hence it was considered imperative to explore the demographic component of participants to collect data to account for the findings of the study. According to Dhlamini (2012), demographic details of participants provide an "actual background and proves participants' suitability for participation in the research study" (p. 141). Welman, Kruger and Mitchell (2005) add that this kind of data provides a comprehensive and holistic picture of the phenomenon under investigation. In this study participants' demographic details were collected using questionnaires.

Section A of the three questionnaires solicited participants' information regarding their gender, number of teaching years and teaching qualifications. Teaching qualification is a significant factor to take into account when studying students' performance because research has found a significant positive relationship between teacher' qualification and students' performance (Betts *et al*., 2003; Goldhaber & Brewer, 1996; Greenwald *et al*.,1996; Rice, 2003; Stols *et al*., 2009). Similarly, number of teaching years plays a prominent role in understanding students' performance. Stols *et al*. (2009) contends that teachers' years of experience positively correlates with students' performance. Participants' genders were also explored because gender was considered as having influence in the teaching and learning of mathematics (Turker, 2006).

Table 4.1 : Principals' demographic information (n=15)

School principals' characteristics of interest		Frequency	Percentage
Gender	Male	5	33.3
	Female	10	66.6
Years of service	0-5	1	6.6
	6-10	3	20.0
	11-15	3	20.0
	16-20	5	33.3
	Over 20 years	3	20.0
Type of qualifications	Certificate	1	6.6
	Diploma	10	66.6
	Bachelors	3	20.0
	Masters	1	6.6
	Doctorate	0	0.0

Table 4.1 shows that the majority of the principals are females. It is observed that 5(33.3%) of the principal have more than 15 years of service. Of the n=15, 10(66.6%) have a general diploma qualification and it seems most of the respondents were least keen to study towards post-degree qualifications (n=1 Masters & n=0 Doctorate).

Table 4.2: Deputy Principals' demographic information (n=15)

Deputy Principals' characteristics of interest		Frequency	Percentage
Gender	Male	3	20.2

	Female	12	80.0
Years of service	0-5 6-10 11-15 16-20 Over 20 years	0 6 3 4 2	0.0 40.0 20.0 26.6 13.3
Type of qualifications	Certificate Diploma Bachelors Masters Doctorate	1 10 3 1 0	6.6 66.6 20.0 6.6 0.0

Table 4.2 shows that most of the Deputy Principals in participating schools were females [n=12(80%)]. Table 4.2 also shows that most of the Deputy Principals from the selected schools fell within the bracket of 6years to 20years (n=13) experience. Only n=2 were above the service mark of 20years. Most of the Deputy Principals were holding a general diploma qualification.

Table 4.3: Teachers' demographic information n=30

Grade 7 mathematics teachers' characteristics of interest		**Frequency**	**Percentage**
Gender	Male Female	9 21	30.0 70.0
Years of service	0-10 11-20 21-30 Over 30 years	17 8 3 2	56.6 26.6 10.0 6.6
Type of qualifications	Certificate Diploma Bachelors Masters Doctorate	7 17 6 0 0	23.3 56.6 20.0 0.0 0.0

The results in Table 4.3 are almost similar to those in Table 4.1 and Table 4.2. For instance, Table 4.3 shows that in participating schools: (1) most of Grade 7 mathematics teachers were females [21 of 30 teachers (70.0%)]; (2) most of the Grade 7 mathematics teachers were diploma general holders [17 of 30 teachers (56.6%)]; and most importantly, (3) most Grade 7 mathematics teachers had a teaching experience that fell between 0years and 10years [17 of 30 teachers (56.6%)]. Based on this finding, one observe that almost all Grade 7 mathematics teachers who participated in the study had not majored in mathematics and were also inexperienced. Section 2.4.5 demonstrated that lack of experience negatively influence students' performance in mathematics. In Section 2.4.6 Wilson and Floden (2003) indicated that students who are taught by teachers with mathematics degrees as majors tend to perform better in mathematics. Given the findings in Table 4.3 it is difficult to conclude that the teachers who participated in the study could influence learners' mathematical performance positively.

4.2.2 Section B of the questionnaires

Participants responded to each item of Section B by ranking statements on a scale of 1 to 5 (see, Appendices A to C). This section provides samples of participants' responses and views considered to be linked to the factors contributing to poor mathematics performance of Grade 7 students in the Berea district of Lesotho. The following combinations and arrangements were made to facilitate the data analysis process: *Strongly agree* and *agree* were combined to yield a collective *agree* response; *undecided* remained a stand-alone category on its own; *disagree* and *strongly disagree* were combined to represent a *disagree* response. The researcher combined "*strongly agree"* and "*agree*" because both measured the positive statements by asking the extent to which respondents agree with a particular statement while "*disagree"* and "*strongly disagree*" measured the negative statements by asking the extent to which the respondents disagree with a particular statement. The combinations and arrangements resulted in the reduction of categories, which eventually facilitated the analysis and interpretation of data. Descriptive statistics entailed the computation of mean (*M*) and standard deviations (*SD*) for all the questions in each of the three questionnaires of principals, deputy principals and teachers.

4.2.2.1 Participants' responses of Section B of the questionnaires

Participants' ratings of what could be considered as factors contributing to poor mathematics performance of Grade 7 students generated the following factors in Table 4.4.

Table 4.4: Participants' responses in relation to factors influencing mathematics performance

Principals	Deputy principals	Teachers
1. Teaching method.	1. Teaching method.	1. Teaching method.

2.Lesson observations 3. Teachers' attendance at school. 4. Teachers' lesson attendance. 5. Overcrowded classes. 6. Teachers' workshop attendance. 7. Parental involvement. 8. Students' progress monitoring. 9. Mathematics assessment policy. 10. Teachers' qualified. 11. Shortage of teachers. 12. Teachers' Motivation. 13. Culture of teaching and learning. 14. Students' lesson attendance. 15. Students' socio-economic background.	2. Lesson method. 3. Teaching observations. 4. Teachers' files and lesson plans. 5. Teachers' allocation. 6. Mathematics and real world life. 7. Collaboration between Grade 7 teachers. 8. Working plan or programme. 9. Teaching resources. 10. Support given to teachers. 11. Performance targets. 12. Teachers' workshop attendance. 13. Students' progress monitoring. 14. Departmental meetings. 15. Disciplinary measures.	2. Teaching method. 3. Teaching resources. 4. Students' prior knowledge. 5. Students' lesson attendance. 6. Mathematics and real world. 7. Collaboration between Grade 7 teachers. 8. Syllabus completion. 9. Working plan or programme. 10. Remedial classes. 11. Teachers' workshop attendance. 12. Teaching resources. 13. Grouping. 14. Homework. 15. Support given to teachers.

Data were analyzed starting with factors that were commonly mentioned across different participating groups (principals, deputy principals & teachers) and factors that occurred differently across groups were analyzed last. Common factors identified were: teaching methods, lesson observations, school and lesson attendance, teachers' workshop attendance, connection of mathematics and real-world life, collaboration between Grade 7 mathematics teachers, working plans or programmes, teaching resources, students' progress monitoring and support given to Grade 7 mathematics teachers. Different factors were: overcrowded classes, parental involvement, mathematics assessment policy, teachers' qualified, shortage of teachers, teachers' motivation, culture of teaching and learning, students' socioeconomic background, teachers' allocation, performance targets, individual meetings, disciplinary measures, students' prior knowledge, syllabus completion, remedial classes, group work and homework. In the next sections the statistical analysis of variables in Table 4.4 is provided.

Table 4.5: Descriptions of factors generated from participants' responses of Section B

FACTORS	DESCRIPTIONS

Teaching methods	The general principles, pedagogy and management strategies used for classroom instruction.
Lesson observations	Classroom visits by evaluators and administrators with tools to track teachers’ and students’ progress.
Teachers’ workshop attendance	Short training sessions that may be required for teachers to attend to help them teach more effectively.
Students’ progress monitoring	A practice that help teachers to use students’ performance data to continually evaluate the effectiveness of their teaching and make more informed instructional decisions.
Teaching resources	Learning materials used in a classroom to facilitate teaching and learning process.
Working plan or programme	An outline of a set of goals that teachers intend to achieve at the end of a specified time.
Connection of mathematics to students’ real world-life	Linking classroom mathematics lessons to students daily life experiences.
Support given to Grade 7 mathematics teachers	Assistance that is provided to Grade 7 mathematics teachers concerning their teaching.
Collaboration between Grade 7 teachers	Cooperation and team work between Grade 7 mathematics teachers.
School and lesson attendance	The presence of teachers and students at school and also in the classroom during mathematics lessons.
Overcrowded classes	Large number of students in a classroom.
Parental involvement	Inclusion of parents in Grade 7 mathematics activities to enhance students’ performance.
Mathematics assessment policy	A framework that provides the summative measures of students’ performance.
Teachers’ qualified	Teachers with teaching qualifications.
Shortage of teachers	Insufficient number of teachers in schools.
Culture of teaching and learning	School values about teaching and learning.
Students’ socioeconomic background	Students’ living conditions that include among others family income, poverty, infrastructure and parent level of education.
Disciplinary measures	The corrective action when misconduct has occurred.
Departmental meetings	The meetings that are held in the mathematics department.
Performance targets	Objectives set in advance in order to achieve them at the end of the specified time.
Teachers’ allocation	Designating Grade 7 mathematics teachers in the department according to their strengths.
Students’ prior knowledge	Knowledge that students come to the classroom with it.
Syllabus completion	Covering of all the topics in the syllabus.
Remedial classes	Extra classes that struggling students must take to build up on certain aspects before they take regular lessons.
Group-work	A form of cooperative learning.
Home-work	Tasks assigned to students by teachers to be completed outside the class.

4.2.2.1.1 Teaching methods

Teaching practices play a critical role in influencing student's performance in mathematics (Peterson, 1998; Stigler & Hiebert, 1999; Wenglinsky, 2002). The following item appeared in the principals' questionnaire: *Grade 7 teachers use appropriate methods to teach mathematics.*

Table 4.6: Frequency distribution for principals' (n=15) responses

Principals' questionnaire responses	Frequency	Percentage
Strongly agree	4	26.7
Agree	3	20.0
Undecided	2	13.3
Disagree	4	26.7
Strongly disagree	2	13.3
Total	**15**	**100.0**

Table 4.6 shows that 26.7% of principals did not support the teaching methods that the Grade 7 mathematics teachers were using at the time of this study. The mean (*M*=2.30) and standard deviation (*SD*=1.474) were computed from the statistical analysis. The observations in Table 4.6 could suggest that teachers' methods of instruction were considered to be inappropriate, and could impact negatively in students' performance in Grade 7 mathematics (see, Section 2.2 & Section 2.3).

4.2.2.1.1.1 Teacher-dominated approach

Teacher-dominated approach was considered to see if it characterized Grade 7 mathematics instruction. According to Sebatane *et al*. (1994), found that teachers in primary school classrooms use lecture method to teach mathematics (see, also, Section 2.2). Deputy Principals and teachers were asked if teacher-dominated approach characterized mathematics instruction in Grade 7.

Table 4.7 shows that 20% of deputy principals encouraged Grade 7 mathematics teachers to use teacher-dominated approach. Table 4.7 also gives the following output: *M*=3.27; *SD*=1.438. These findings may suggest that teachers' methods of teaching could not be considered as supporting the reformed and student-centered initiatives. Also, Table 4.7 shows that 33.3% of Grade 7 mathematics teachers were using a teacher-dominated approach to teach mathematics in Grade 7. The statistical analysis data revealed the following computations: *M*=2.30 and *SD*=1.003.

Table 4.7: Participants' responses regarding a teacher-dominated approach

Type of response	Questionnaire respondents			
	Deputy Principals		Teachers	
	Frequency	%	Frequency	%
Strongly agree	3	20.0	10	33.3
Agree	2	13.3	10	33.3
Undecided	0	0.0	2	6.7
Disagree	8	53.3	7	23.3
Strongly disagree	2	13.3	1	3.3
Total	**15**	**100.0**	**30**	**100.0**

Given the results in Table 4.7 it could be concluded that teachers' methods of teaching were ineffective and not improving students' performance.

4.2.2.1.1.2 Student-centred approach

Student-centred approach was investigated to see if it characterized Grade 7 mathematics instruction. Ogbonnaya (2007) noted that "the impact of the new knowledge about teaching and learning on the instructional practices is a shift from teacher-centred approach to student-centred approach to teaching" (p. 24). Deputy Principals and teachers were asked if student-centred approach characterized mathematics instruction in Grade 7. Table 4.8 shows that 13.3% of deputy principals discouraged teachers from using student-centred approach to teach mathematics in Grade 7 [(*M*=2.27) & (*SD*=1.223)].

In line with these observations it may be reasonable to infer that the prevalence of poor performance of students in Grade 7 mathematics is as a result of teachers' methods of teaching that are not productive. Regarding teachers Table 4.8 shows that 33.3% of Grade 7 mathematics teachers were undecided about the teaching methods they were using in Grade 7. The statistical analysis yielded the values of *M*=2.57 and *SD*=1.104.

Table 4.8: Participants' responses regarding a student-centred approach

Type of response	**Questionnaire respondents**			
	Deputy Principals		**Teachers**	
	Frequency	**%**	**Frequency**	**%**
Strongly agree	4	26.7	6	20.0
Agree	7	46.7	8	26.7
Undecided	1	6.7	10	33.3
Disagree	2	13.3	5	16.7
Strongly disagree	1	6.7	1	3.3
Total	**15**	**100.0**	**30**	**100.0**

This element of uncertainty by teachers seemed to suggest that the methods used by teachers were liable for the espied existence of poor performance of students in Grade 7 mathematics.

4.2.2.1.2 Lesson observations

Lesson observations were ruminated in this study to find out if appropriate guidance and supervision was provided to Grade 7 mathematics teachers. Kriek (2005) found that the effectiveness of teachers in the classroom can translate into better learning for students if there is enough supervision. Principals and Deputy Principals were asked if lesson observation was a norm in Grade 7 mathematics classrooms.

Table 4.9: Participants' responses regarding the lesson observations

Type of response	**Questionnaire respondents**			
	Principals		**Deputy Principals**	
	Frequency	**%**	**Frequency**	**%**
Strongly agree	0	0.0	1	6.7
Agree	2	13.3	2	13.3
Undecided	0	0.0	0	0.0
Disagree	4	26.7	10	66.7
Strongly disagree	9	60.0	2	13.3
Total	**15**	**100.0**	**15**	**100.0**

The results in Table 4.9 show that 60% of the principals denied that deputy principals observed Grade 7 mathematics lessons. The statistical analysis revealed *M*=4.33 and *SD*=1.047. Furthermore, Table 4.8 shows that 66.7% of deputy principals did not visit and observe Grade 7 mathematics teachers during their teaching lessons. The *M*=3.67 and *SD*=1.113 were also obtained from the statistical analysis affirming lack of lesson observations in Grade 7 mathematics classes. Based on the results in Table 4.9 it may be suggested that lack of lesson observations contribute to students' poor performance in Grade 7 mathematics.

4.2.2.1.3 School attendance and lesson attendance

4.2.2.1.3.1 Teachers' attendance at school

Grade 7 mathematics teachers' attendance at school was scrutinized to determine the level of their absenteeism at school. Amadalo *et al*. (2012) found out that absenteeism by both teachers and students play a major role in non-coverage of the syllabus and thus constitute to students' poor performance in mathematics. Regarding participants' views on this matter see Table 4.10.

Table 4.10: Frequency for principals' (n=15) responses regarding teachers' attendance at school

Principals' questionnaire responses	Frequency	Percent
Strongly agree	3	20.0
Agree	4	26.7
Disagree	8	53.3
Total	**15**	**100.0**

Table 4.10 shows that 53.3% of principals noted that Grade 7 mathematics teachers did not come to school regularly. Statistical analysis revealed (*M*=2.87; *SD*=1.302). These outputs suggest that teachers' absenteeism might be a factor contributing to the observed poor performance of students in Grade 7 mathematics.

4.2.2.1.3.2 Teachers' lesson attendance

Teachers' lesson attendance was acknowledged in this study to confirm if Grade 7 mathematics teachers honored their lessons. Oghuvhu (2003) noted that teachers' lesson attendance correlate with students' academic performance. The following item appeared in the principals' questionnaire: *Grade 7 mathematics teachers attend their teaching lessons regularly.*

Table 4.11: Frequency for principals' (n=15) responses

Principals' questionnaire responses	Frequency	Percent
Strongly agree	4	26.7
Agree	9	60.0
Undecided	1	6.7
Disagree	1	6.7
Total	**15**	**100.0**

Table 4.11 demonstrates that 60% of principals felt that Grade 7 mathematics teachers attend teaching lessons regularly. Statistical analysis showed (*M*=1.93; *SD*=0.799), implying that teachers' lesson attendance is appropriate. These findings may suggest that teachers' lesson attendance did not have a negative influence on students' performance and therefore may not be liable for the observed poor performance of students in Grade 7 mathematics.

4.2.2.1.3.3 Students' lesson attendance

Students' attendance of Grade 7 mathematics lessons was examined to ascertain that Grade 7 students did not purposefully miss mathematics lessons. Dalziel and Henthorne (2005) found that a student may intentionally miss a lesson if he/ she did not like a particular subject. Teachers and the Principals participated to give views on whether students attended the Grade 7 mathematics lesson or not.

In Table 4.12 Principals (40%) agreed that students attended mathematics lessons regularly. Teachers shared similar views as 70% of them acknowledged that students attended mathematics lesson regularly. The results of statistical analysis indicated that Grade 7 students' lesson attendance is good (*M*=2.27; *SD*=1.280). Based on these findings in Table 4.12 it may be inferred that students' lesson attendance may not be a factor contributing to students' poor performance in Grade 7 mathematics.

Table 4.12: Participants' responses regarding students' lesson attendance

Type of response	Questionnaire respondents			
	Principals		Teachers	
	Frequency	%	Frequency	%

Strongly agree	6	40.0	4	13.3
Agree	2	13.3	21	70.0
Undecided	5	33.3	0	0.0
Disagree	1	6.7	5	16.7
Strongly disagree	1	6.7	0	0.0
Total	**15**	**100.0**	**30**	**100.0**

4.2.2.1.4 Teachers' workshop attendance

Teachers' workshop attendance was pursued to find out if Grade 7 mathematics teachers attended short training sessions to help them teach more effectively. Gulambussein (2013) found out that inappropriate attendance of workshops by teachers compromised the quality of students' performance in mathematics. Principals, Deputy Principals and teachers participated to give views on this item. Generally, the item asked; (1) Principals to respond if they help teachers to organize subject-specific workshops; (2) Deputy Principals to give views on whether teachers in their respective departments attended workshops; and, (3) Teachers to respond on whether in the last 3 years they attended a workshop(s) on how to teach Grade 7 mathematics topics or not.

Table 4.13: Participants' responses on the teachers' workshop item

Type of response	**Questionnaire respondents**					
	Principals		**Deputy Principals**		**Teachers**	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
Strongly agree	0	0.0	0	0.0	0	0.0
Agree	2	13.3	0	0.0	0	0.0
Undecided	0	0.0	0	0.0	0	0.0
Disagree	5	33.3	3	20.0	12	40.0
Strongly disagree	8	53.3	12	80.0	18	60.0
Total	**15**	**100.0**	**15**	**100.0**	**30**	**100.0**

Table 4.13 reveals that only 13.3% of principals organized workshops for Grade 7 mathematics teachers to enhance their teaching skills. The output revealed that principals did not organize workshops to develop Grade 7 mathematics teachers (*M*=4.27; *SD*=1.033). Table 4.13 also shows that 100% of deputy principals mentioned that Grade 7 mathematics teachers did not attend workshops. The statistical analysis (*M*=4.80; *SD*=0.414) highlighted that teachers' workshop attendance was inappropriate. Lastly, Table 4.13 shows that none (0%) of Grade 7 mathematics

teachers attended workshop(s) in the last 3 years. The statistical analysis (*M*=4.60; *SD*=0.498) highlighted that teachers did not attend workshop(s). Based on the results in Table 4.13 it may be reasonable to conclude that the continuation of students' poor performance in mathematics is as a result of lack of workshop attendance for Grade 7 mathematics teachers.

4.2.2.1.5 Connection of mathematics and real-world life

Connection of mathematics to students' real-world life was studied to determine whether there was a link between Grade 7 mathematics lessons and students' daily life experiences. According to National Council of Teachers of Mathematics (NCTM, 2014), "connecting mathematics to students' real-world life helps students to value diversity, see mathematics in their lives and cultural backgrounds, and analyze and critique social issues and injustices" (p. 14). Deputy Principals and teachers gave their views on whether or not they agreed that mathematics instruction in Grade 7 considered students' real-world background.

Table 4.14: Participants responses regarding the connection of mathematics with students' real-world

Type of response	Questionnaire respondents			
	Deputy Principals		Teachers	
	Frequency	%	Frequency	%
Strongly agree	0	0.0	5	16.7
Agree	4	26.7	9	30.0
Undecided	10	66.7	11	36.7
Disagree	1	6.7	5	16.7
Strongly disagree	0	0.0	0	0.0
Total	**15**	**100.0**	**30**	**100.0**

Table 4.14 shows that only 6.7% of deputy principals noted that Grade 7 mathematics teachers did not connect mathematics lessons to students' real-world life. However, the statistics revealed (*M*=2.80; *SD*=0.561), indicating that the connection of mathematics to students' real-world life is not a factor contributing to students' poor performance in Grade 7 mathematics. Also, Table 4.14 shows that 16.7% of Grade 7 mathematics teachers did not connect mathematics lessons to students' life experiences. Statistical analysis revealed the existence of connection between mathematics and students' real-world experiences (*M*=2.53; *SD*=0.973). The views of Deputy

Principals and teachers are almost and suggested that the variable of connection of mathematics to students' real-world life is not related to students' poor performance in Grade 7 mathematics.

4.2.2.1.6 Collaboration between Grade 7 mathematics teachers

Collaboration between Grade 7 mathematics teachers was pursued to find out if there was cooperation and team work between Grade 7 mathematics teachers. Murawski and Dieker (2004) many teachers lack full expertise in all content areas and therefore team work is needed. Deputy Principals and teachers participated. Generally, the item asked respondents to either agree if Grade 7 mathematics teachers worked in collaboration or not.

Table 4.15: Participants responses regarding Grade 7 mathematics collaboration initiatives

Type of response	**Questionnaire respondents**			
	Deputy Principals		**Teachers**	
	Frequency	**%**	**Frequency**	**%**
Strongly agree	2	13.3	0	0.0
Agree	3	20.0	2	6.7
Undecided	2	13.3	0	0.0
Disagree	8	53.3	12	40.0
Strongly disagree	0	0.0	16	53.3
Total	**15**	**100.0**	**30**	**100.0**

Table 4.15 shows that 13.3% of deputy principals acknowledged that teachers work together as a team. The statistical analysis results obtained (*M*=3.07; *SD*=1.163). Only 6.7% of Grade 7 mathematics teachers agreed that they collaborate with each other when preparing their lessons and other mathematics related activities. The statistical output was: *(M*=4.40; *SD*=0.679). The results in Table 4.15 suggest that the absence of collaboration between Grade 7 mathematics teachers could be a factor contributing to students' poor performance in Grade 7.

4.2.2.1.7 Working plan or programmes

The influence of working plans was pursued to find out if they were featured in participating schools, particularly in Grade 7 mathematics classrooms. McBer (2000) discovered that three main factors within teachers' control that significantly influence students' progress are teaching skills, working plans and classroom climate. Deputy Principals and teachers gave their views on whether the working plan is significant to facilitate mathematics instruction

Table 4.16: Participants responses regarding the importance of a mathematics working plan

Type of response	Questionnaire respondents			
	Deputy Principals		Teachers	
	Frequency	%	Frequency	%
Strongly agree	0	0.0	14	46.7
Agree	0	0.0	8	26.7
Undecided	0	0.0	1	3.3
Disagree	4	26.7	6	20.0
Strongly disagree	11	73.3	1	3.3
Total	**15**	**100.0**		**100.0**

Table 4.16 shows that none (0%) of deputy principals believed in a working plan to regulate all teaching activities in their department. Similar results were also shown by the statistical analysis (*M*=4.73; *SD*=0.458) affirming lack of working plans. This table also shows that 20% of Grade 7 mathematics teachers did not have the working programmes. The item had generally asked teachers whether they were in possession of this educational material. The mean score and standard deviation for teachers was at (*M*=2.07; *SD*=1.285). In the light of the results in Table 4.16 it can thus be concluded that the absence of working plans contribute to students' poor performance in mathematics in Grade 7.

4.2.2.1.8 Teaching resources

Teaching resources were excogitated to confirm that teaching and learning materials were available and sufficient to facilitate Grade 7 mathematics lessons. Eshiwani (2001) noted that poor performance in mathematics is mostly due to an acute shortage of textbooks. Deputy Principals and teachers gave views on whether (1) Teachers in Grade 7 had enough textbooks for teaching and learning (for Deputy Principals); and, (2) Teachers had enough textbooks for all topics in Grade 7 mathematics (for teachers).

Table 4.17: Participants responses regarding the teaching resources for mathematics

Type of response	Questionnaire respondents			
	Deputy Principals		Teachers	
	Frequency	%	Frequency	%
Strongly agree	0	0.0	1	3.3
Agree	0	0.0	1	3.3
Undecided	0	0.0	0	0.0
Disagree	0	0.0	15	50.0
Strongly disagree	15	100.0	13	43.3
Total	**15**	**100.0**	**30**	**100.0**

Table 4.17 shows that none (0%) of the deputy principals indicated that Grade 7 mathematics teachers had enough teaching resources. The output from the statistical analysis (*M*=5.00; *SD*=0.000) suggest that teaching resources were not sufficient in Grade 7 mathematics classes and hence accountable for the existing poor performance of students in Grade 7 mathematics. Only 3.3% of Grade 7 mathematics teachers in Table 4.17 felt they had enough teaching resources. The results of statistical analysis for teachers (*M*=4.27; *SD*=0.907) implied that teaching resources were very limited in Grade 7 mathematics classes. Based on these findings it may be inferred that the prevalence of poor performance of students was as a result of the teaching resources that were insufficient in Grade 7 mathematics classes. Teachers were further asked to respond if the textbook they were using to teach mathematics was appropriate for the Grade level.

Table 4.18 shows that 16.7% of Grade 7 mathematics teachers did not feel that textbook they were using was appropriate (Disagree). However, the statistical analysis results (*M*=2.83; *SD*=0.913) suggest that the textbooks were appropriate for Grade 7 mathematics topics and therefore not culpable for students' poor performance.

Table 4.18: Teachers' (n=30) responses regarding the appropriateness of the textbook

Teachers' responses	Frequency	Percent
Strongly agree	2	6.7
Agree	8	26.7
Undecided	14	46.7

	Disagree	5	16.7
	Strongly disagree	1	3.3
	Total	**30**	**100.0**

4.1.2.1.9 Support provided to Grade 7 teachers

Support in the context of this study refers to assistance provided to teachers by the education department of education, principals, deputy principals and other teachers in schools regarding mathematics issues. Wachira, Pourdavood and Skitzki (no date) found out that teacher's effectiveness fizzles out due to lack of support from other stakeholders (school administrators, parents and education department). Teachers and deputy Principals participated on this item generally asked Deputy Principals if they supported teaching and learning in their respective schools; and whether teachers felt the support of their Deputy Principals or not.

Table 4.19: Participants responses regarding the support given to mathematics teachers

Type of response	Questionnaire respondents			
	Deputy Principals		Teachers	
	Frequency	%	Frequency	%
Strongly agree	1	6.7	1	3.3
Agree	3	20.0	3	10.0
Undecided	0	0.0	3	10.0
Disagree	6	40.0	13	43.3
Strongly disagree	5	33.3	10	33.3
Total	**15**	**100.0**	**30**	**100.0**

Table 4.19 shows that only 6.7% of deputy principals believed that they provided sufficient support for the teaching and learning of Grade 7 mathematics. The statistical analysis had shown (*M*=4.00; *SD*=0.926), denoting that there was no support provided by the deputy principals who are the heads of mathematics department in schools. Regarding the teachers Table 4.19 shows the results that only 3.3% of Grade 7 mathematics teachers believed that they were supported by deputy principals. The statistical analysis revealed that teachers were not supported by the deputy principals (*M*=3.93; *SD*=1.081) though they are the heads of the mathematics departments. Based

on Table 4.19 it can thus be concluded that lack of support is one of the factors contributing to students' poor performance in mathematics in Grade 7.

4.2.2.1.10 Students' progress monitoring

Students' progress monitoring was investigated to find out if teachers use students' performance data to continually evaluate the effectiveness of their teaching to make informed instructional decisions. Mikhailitchenko (2007) found that the introduction of progressive in-class monitoring significantly improves attendance to class and increases passing rates as well as an average final grade. Principals and Deputy Principals participated. The Principals were expected to give views on whether they periodically met with the Deputy Principals to discuss students' performance. Deputy Principals were also expected to reflect on whether they checked students' books or not in order to track their performance in Grade 7 mathematics.

Table 4.20: Participants' responses regarding the monitoring of students' work

Type of response	**Questionnaire respondents**			
	Principals		**Deputy Principals**	
	Frequency	**%**	**Frequency**	**%**
Strongly agree	2	13.3	0	0.0
Agree	4	26.7	0	0.0
Undecided	0	0.0	0	0.0
Disagree	5	33.3	9	60.0
Strongly disagree	4	26.7	6	40.0
Total	**15**	**100.0**	**15**	**100.0**

Table 4.18 shows that 26.7% of principals met with deputy principals to monitor students' performance in Grade 7 mathematics classes (*M*=3.33; *SD*=1.496). None (0%) of Deputy Principals agreed to regularly signing students' books to monitor their performance (*M*=4.40; *SD*=0.507). given these results it might be reasonable to infer that students' poor performance in Grade 7 is as a result of lack of students' progress monitoring in Grade 7 mathematics classes.

4.2.2.1.11 Overcrowded classes

Overcrowded classes were examined to ascertain the number of students in Grade 7 mathematics classes and their influence on students' performance in Grade 7 mathematics. According to the

Ministry of Education and Training in Lesotho (MOET, 2004), a teacher at a primary school is supposed to teach at most 55 students. Principals participated to give their views if they considered Grade 7 mathematics classrooms to be overcrowded.

Table 4.21: Frequency for principals' (n=15) responses on over-crowdedness

Teachers' responses	Frequency	Percent
Strongly agree	14	93.3
Agree	1	6.7
Total	**15**	**100.0**

Table 4.21 shows that (100%) the principals believed that Grade 7 mathematics classes were overcrowded (*M*=1.07; *SD*=0.258). These results suggested that a large number of students in a class might have a negative impact on performance and as a result contributed on students' poor performance in Grade 7 mathematics.

4.2.2.1.12 Parental involvement

Parental involvement was considered to ascertain the support received by students on mathematical issues. According to Polaki and Khoeli (2005), the time spent by a student with a parent is crucial to the long-term retention and understanding of mathematics concepts, even in elementary mathematics. School Principals participated to indicate if they agreed that they organize meetings to encourage parents to assist their children scholastically.

Table 4.22 shows that 20% of principals did not organize meetings to encourage parental involvement (*M*=3.07; *SD*=1.387). The statistical results in Table 4.22 seemed to suggest that parental involvement did not contribute to students' poor performance. Based on these results it may be reasonable to conclude that parental involvement is not a factor contributing to students' poor performance in Grade 7 mathematics.

Table 4.22: Principals' (n=15) responses on parental involvement

Principals' responses	Frequency	Percent
Strongly agree	1	6.7
Agree	7	46.7

Disagree	4	26.7
Strongly disagree	3	20.0
Total	**15**	**100.0**

4.2.2.1.13 Mathematics assessment policy

Mathematics assessment policy was considered to ascertain if there were frameworks in schools that provided guidelines to administer the summative measures of students' performance in Grade 7 mathematics. Natriello (1987) found that assessment policies have substantial positive impact on students' attitudes and performance. Principals gave responses on whether an assessment policy was available in their schools.

Table 4.23: Frequency distribution for principals' (n=15) responses

Principals' responses	Frequency	Percent
Disagree	3	20.0
Strongly disagree	12	80.0
Total	**15**	**100.0**

The results in Table 4.23 highlights that all (100%) principals did not have the assessment policy for mathematics in the schools. For further statistical analysis, data revealed (M=4.80; SD=.414), suggesting that lack of mathematics assessment policy might be a factor contributing to poor performance in mathematics in Grade 7.

4.2.2.1.14 The nature of mathematics teachers' qualifications

Issues relating to the qualifications of teachers were also explored to determine whether Grade 7 mathematics teachers were sufficiently qualified or not. Research has found that teachers' qualifications correspond positively with students' achievement (see, Betts, Zau & Rice, 2003; Rice, 2003; Stols *et al*., 2008). Principals provided responses to indicate if they agreed that the Grade 7 mathematics teachers were sufficiently qualified.

Table 4.24: Frequency distribution for principals' (n=15) responses on qualifications

Principals' responses	Frequency	Percent
Strongly agree	1	6.7
Agree	2	13.3
Disagree	6	40.0
Strongly disagree	6	40.0
Total	**15**	**100.0**

Table 4.24 shows that 13.3% of the principals believed that Grade 7 mathematics teachers were qualified. The results from the statistical analysis yielded *(M*=3.98; *SD*=1.280), suggesting that students' poor performance could be as a result of teachers that are not qualified in Grade 7 mathematics classes. In contrary to these findings the information the researcher collected from the Education Department (Section, 3.3.2 & Table, 3.1) prior the commencement of the study suggested that all Grade 7 mathematics in participating schools were qualified. It is a researcher's view that this issue warrants further research.

4.2.2.1.15 Availability of mathematics teachers in Grade 7

Teachers' availability was pursued to find out if there either sufficient or insufficient teachers for Grade 7 mathematics. According to Matsoso and Polaki (2006), there is a shortage of qualified teachers to teach mathematics in Lesotho schools. Hence Principals needed to confirm if the Polaki (2006) findings were still applicable at the time of the current study. The item asked: *There is a shortage of Grade 7 mathematics teachers in my school.*

Table 4.25 shows that 20% of the principals believed that there is a shortage of Grade 7 mathematics teachers in the schools. The statistical analysis revealed (*M*=3.40; *SD*=1.682), affirming that Grade 7 mathematics teachers were enough in schools.

Table 4.25: Principals' (n=15) responses on the availability of mathematics teachers

Principals' responses	Frequency	Percent
Strongly agree	3	20.0

Agree	3	20.0
Disagree	3	20.0
Strongly disagree	6	40.0
Total	**15**	**100.0**

Using the results in Table 4.25 it can be concluded that shortage of Grade 7 mathematics teachers is not a factor influencing students' poor performance.

4.2.2.1.16 Teachers' motivation

Teachers' motivation was acknowledged to ascertain the level of teaching inspiration influencing Grade 7 mathematics teachers. Principals' responded to an item that asked them if Grade 7 mathematics teachers in their schools were motivated to teach.

Table 4.26: Principals' (n=15) responses on teachers' motivation

Principals' responses	Frequency	Percent
Undecided	5	33.3
Disagree	7	46.7
Strongly disagree	3	20.0
Total	**15**	**100.0**

The results in Table 4.26 shows that (33.3%) of the principals maintained a neutral view regarding teachers' motivation (*M*=3.87; *SD*=0.743). The findings in Table 4.26 could suggest that Grade 7 mathematics teachers were unmotivated to teach and hence accountable for the observed poor performance of students in Grade 7.

4.2.2.1.17 Culture of teaching and learning

The culture of teaching and learning as a variable was acknowledged to ascertain the school values that could influence teaching and learning activities. According to Polaki and Khoeli (2005), a positive culture of teaching and learning enhance students' performance. The following item appeared in principals' questionnaire: *Generally, there is a positive culture of teaching and learning in my school.*

Table 4.27: Principals' (n=15) responses on the culture of teaching and learning

Principals' responses	Frequency	Percent
Agree	11	73.3
Undecided	1	6.7
Disagree	3	20.0
Total	**15**	**100.0**

Table 4.27 shows that 20% of the principals did not believe that there is a positive culture of teaching and learning in schools. The results of the statistical analysis revealed (*M*=2.47; *SD*=0.834), affirming that there is a positive culture of teaching and learning in schools. Therefore, it is reasonable to conclude that culture of teaching and learning is not a factor contributing to students' poor performance in Grade 7 mathematics.

4.2.2.1.18 Students' socioeconomic backgrounds

Students' socioeconomic background was taken into account to find out about students' living conditions that include, among others, family income, poverty and parent level of education. Dhlamini (2012) noted that "socioeconomic status is an important factor to consider when studying students' performance" (p.142). Principals had to respond to an item that asked if most students in their schools came from good socioeconomic backgrounds.

The results of Table 4.28 show that none (0%) of the principals believed that students come from good socioeconomic background (*M*=4.53; *SD*=0.516). It can thus be suggested that students' socioeconomic background is a factor contributing to poor performance in Grade 7 mathematics.

Table 4.28: Principals' (n=15) responses on students' socioeconomic backgrounds

Principals' responses	Frequency	Percent

Disagree	7	46.7
Strongly disagree	8	53.3
Total	**15**	**100.0**

4.2.2.1.19 Teachers files and lesson plans

Teachers' files and lesson plans were considered to find out if Grade 7 mathematics teachers possessed them. According to Sebatane *et al*. (1994), a carefully planned lesson improves teacher effectiveness in the class. Deputy Principals responded to the following item: *I check teachers' files and lesson plans regularly.*

Table 4.29: Deputy Principals' (n=15) responses regarding teachers' files and lesson plans

Deputy Principals' responses	Frequency	Percent
Strongly agree	2	13.3
Agree	5	33.3
Disagree	4	26.7
Strongly disagree	4	26.7
Total	**15**	**100.0**

Table 4.29 depicts that 33.3% of Deputy Principals checked teachers' files and lesson plans. The results of the statistical analysis showed (M=3.20; SD=1.521) denoting that teachers files and lesson plans were not properly checked by the deputy principals. These findings could imply that deputy principals' ways of supervision were inappropriate and therefore answerable for the recognized students' poor performance in Grade 7 mathematics.

4.2.2.1.20 Teachers' subject allocations

The allocation of teachers was envisaged to verify that Grade 7 mathematics teachers in the department were designated according to their strengths. Daniels and Shumow (2003) contended that acknowledging teacher strengths and weaknesses combat classroom challenges. The following item appeared in deputy principals' questionnaire: *I allocate teachers according to their strengths in Grade 7 mathematics.*

Table 4.30: Deputy Principals' responses regarding teachers' allocation

Deputy Principals' responses	Frequency	Percentage
Strongly agree	4	26.7
Agree	11	73.3
Total	**15**	**100.0**

Table 4.30 shows that all (100%) of the deputy principals allocated teachers according to their strengths in Grade 7 mathematics. The mean and standard deviation (*M*=1.73; *SD*=0.458) denoted that teachers' allocation did not have a negative impact on students' performance, therefore cannot be accounted for students' poor performance in Grade 7 mathematics.

4.2.2.1.21 Performance targets

The influence of performance targets were considered to find out if these formed part of the school [plan for each academic year. Setting specific challenging goals in a classroom can powerfully drive behavior and boost students' performance (see, Ordonez, Schweitzer, Galinsky & Bazerman, 2009). Deputy Principals had to respond if they set such targets each year for Grade 7 mathematics teachers.

Table 4.31 shows that 26.7% of deputy principals did not set performance targets for mathematics in Grade 7. For further analysis, statistical data output affirmed that performance targets were set by deputy principals (*M*=2.67; *SD*=1.175). Based on the findings in Table 4.31 it could be concluded that performance targets is not a factor contributing to students' poor performance.

Table 4.31: Deputy Principals' (n=15) responses regarding performance targets

Deputy Principals' responses	Frequency	Percent
Strongly agree	1	6.7
Agree	9	60.0

Disagree	4	26.7
Strongly disagree	1	6.7
Total	**15**	**100.0**

4.2.2.1.22 Teachers' individual meetings

Teachers' individual meetings were also studied to ascertain that the deputy principals who are the heads of the mathematics departments (see, Section 3.3.2) such interactive sessions with Grade 7 mathematics teachers. Donnelly (2009) found out that recognizing individual needs of teachers through meetings enhance dedication and commitment of teachers. Deputy Principals' responded to the following item: *I meet Grade 7 mathematics teachers individually in my department.*

Table 4.32: Deputy Principals' (n=15) responses regarding teachers' individual meetings

Deputy Principals' responses	Frequency	Percent
Strongly agree	1	6.7
Agree	5	33.3
Undecided	1	6.7
Disagree	4	26.7
Strongly disagree	4	26.7
Total	**15**	**100.0**

Table 4.32 shows that 33.3% of deputy principals met Grade 7 mathematics teachers individually in the departments. The results from statistical analysis revealed (*M*=3.33; *SD*=1.397) affirming that teachers' individual meetings were not conducted by the heads of the mathematics departments. It can be concluded that lack of teachers' individual meetings is a factor contributing to students' poor performance.

4.2.2.1.23 Disciplinary measures

Disciplinary measures were also ruminated to find out if corrective actions were taken to poorly performing Grade 7 mathematics teachers. Deputy Principals participated to indicate if there were measurews to discipline poorly performing teachers in Grade 7 mathematics.

Table 4.33: Deputy Principals' (n=15) responses regarding disciplinary measures

Deputy Principals' responses	Frequency	Percent
Strongly agree	4	26.7
Agree	6	40.0
Undecided	2	13.3
Disagree	2	13.3
Strongly disagree	1	6.7
Total	**15**	**100.0**

Table 4.33 shows that 13.3% of deputy principals did not take disciplinary measures to poorly performing Grade 7 mathematics teachers. The statistical analysis results showed (*M*=2.33; *SD*=1.234) suggesting that disciplinary measures were taken by deputy principals. In line with these findings, it can be concluded that deputy principals' disciplinary measures were appropriate in Grade 7 mathematics classes and thus not culpable for the viewed poor performance of students in mathematics.

4.2.2.1.24 Students' prior-knowledge

Students' prior knowledge was taken into consideration to identify whether students come to Grade 7 with enough pre-knowledge in mathematics. Hailikari, Katajavuori and Lindblom-Ylanne (2008) discovered that prior knowledge from previous courses significantly influence students' performance. The following item appeared in Grade 7 mathematics teachers' questionnaire: *My students come to Grade 7 with enough pre-knowledge in mathematics.*

Table 4.34 shows that only 30% of Grade 7 mathematics teachers believed that students come to Grade 7 with enough pre-knowledge in mathematics. The mean and standard deviation (*M*=3.43; *SD*=1.165) were obtained from the statistics denoting insufficient students' prior knowledge in Grade 7 mathematics. In this light, it may be reasonable to infer that the observed poor performance of students in Grade 7 is due to inadequate students' prior knowledge.

Table 4.34: Grade 7 mathematics teachers' (n=15) responses regarding prior-knowledge

Teachers' responses	Frequency	Percent
Agree	9	30.0
Undecided	6	20.0
Disagree	8	26.7
Strongly disagree	7	23.3
Total	**30**	**100.0**

4.2.2.1.25 Syllabus completion

Syllabus completion was also investigated to verify that Grade 7 mathematics teachers completed Grade 7 mathematics syllabus. According to Amadalo, Shikuku and Wasike (2012), syllabus non-completion influence students' performance in mathematics. Teachers participated to indicate if they completed the Grade 7 mathematics syllabus each year.

Table 4.35: Grade 7 mathematics teachers' (n=30) responses on syllabus completion

Teachers' responses	Frequency	Percent
Strongly agree	4	13.3
Disagree	8	26.7
Strongly disagree	18	60.0
Total	**30**	**100.0**

Table 4.35 illustrates that only 13.3% of Grade 7 mathematics teachers completed the Grade 7 mathematics syllabus to prepare students for Grade 8. The mean (4.20) and standard deviation (1.349) were obtained from the statistical analysis. These observations could affirm that non-completion of the syllabus has a negative impact on students' performance and as a result constitutes students' poor performance in Grade 7 mathematics.

4.5.2.1.26 Remedial classes

Remedial classes were considered to ascertain that Grade 7 mathematics teachers conduct them to assist students who struggle with mathematics. Boylan, Bonham, Claxton and Bliss (1992) found that remedial classes based on carefully defined goal and objectives improve students' performance in mathematics. Teachers' item: *I conduct remedial classes to help students who struggle with mathematics.*

Table 4.36: Grade 7 mathematics teachers' (n=30) responses regarding remedial classes

Teachers' responses	**Frequency**	**Percent**
Agree	1	3.3
Disagree	14	46.7
Strongly disagree	15	50.0
Total	**30**	**100.0**

Table 4.36 shows that only 3.3% of Grade 7 mathematics teachers conducted the remedial classes to help students who struggle with mathematics. Supporting results from the statistical analysis revealed (*M*=4.43; *SD*=0.679), affirming lack of remedial classes in Grade 7 mathematics classes. Therefore, it can thus be concluded that lack of remedial classes constitute to students' poor performance in Grade 7 mathematics.

4.2.2.1.27 Group work

Group work was also studied to find out if Grade 7 mathematics teachers allow students to work in groups. Recently Dhlamini and Mogari (2013) observed that "a group approach has the potential to influence the academic achievement of students in mathematics" (p. 7). Teachers responded if they allowed their students to work in groups while solving mathematics tasks.

Table 4.49 shows that only 20% of Grade 7 mathematics teachers did not use group work. The output of the statistical analysis revealed (*M*=2.40; *SD*=1.003), meaning that group work is not a factor contributing to students' poor performance in Grade 7 mathematics.

Table 4.37: Grade 7 mathematics teachers' (n=30) responses regarding group work

Teachers' responses	**Frequency**	**Percent**
Strongly agree	5	16.7
Agree	14	46.7

Undecided	5	16.7
Disagree	6	20.0
Total	**30**	**100.0**

4.2.2.1.28 Homework

The last variable that was contemplated was homework to find out if Grade 7 mathematics teachers give students. Ogbonnaya (2007) noted that homework may be useful to teachers for monitoring students' learning and identifying their learning difficulties. Teachers responded to the item that asked if they gave their students enough homework to familiarize them with work.

Table 4.38: Grade 7 mathematics teachers' (n=30) responses regarding homework

Teachers' responses	Frequency	Percent
Strongly agree	12	40.0
Agree	13	43.3
Undecided	2	6.7
Disagree	2	6.7
Strongly disagree	1	3.3
Total	**30**	**100.0**

Table 4.38 shows that 6.7% of Grade 7 mathematics teachers did not give students enough homework activity. The results of the statistical analysis noted (M=1.90; SD=1.029), denoting that homework is not a factor contributing to students' poor performance in mathematics.

4.3 QUALITATIVE DATA ANALYSIS

4.3.1 Introduction

Semi-structured interviews were used to collect qualitative data to support the outcomes of the descriptive survey design of the study (see, Section 3.2.1). Burnard (2004) note that "one of the major complaints against the statistical interpretation of data is that details of the actual programme implementation and description of the intervention usually get lost in the process" (p. 85). In this section, qualitative data analysis is accomplished in conjunction with the research objectives

(Section 1.2) and research questions (Section 1.6) of the study. The researcher adapted the procedure from Anderson (2007) and used it as a guideline to the analysis of the qualitative data. Table 4.51 summarizes the procedures for qualitative data analysis.

Table 4.39: The procedure used as a guideline to facilitate the analysis of the qualitative data

STEPS	METHOD OF ANALYSIS	DESCRIPTION OF HOW EACH STEP WAS CARRIED OUT IN THE STUDY
1	The semi-structured interviews were recorded and while listening to recordings, the **notes** were made.	The response regarding either a research question or objective, for example, "students share textbooks and teachers do not complete the syllabus" were considered to be related to the first research question.
2	The general **themes** were identified.	Themes were identified using key words from the research questions and objectives.
3	The themes were divided into **categories.**	Themes belonging to the specific categories were identified.
4	The new list of categories and sub-headings was established to come out with the **final** list.	Certain categories had similar attributes therefore the number of categories was reduced when such categories were combined.
5	All transcripts were worked through and re-read with the list of categories and sub-headings and were **coded** according to the categories and sub-headings.	The researcher initially identified themes correspond with the newly established categories therefore the newly established themes were verified and accepted.

Adapted from Anderson (2007)

4.3.2 Semi-structured interviews

Semi-structured interviews were conducted with four Principals, four Deputy Principals and seven Grade 7 mathematics teachers (totaling to n=15). Appointments with respondents were made in advance. Interviews took place between 14H00 and 15H00 at each participant's respective school, and were voice recorded (see, Section 3.4.2.2). All participants honored the appointments even though one of them requested to change the appointment date more than twice. Pseudonyms were used to protect the identity of the schools and those of participants. See Table 4.40 for the themes, their sources and the interview item to which they are related.

Table 4.40: Themes and the related items in the participants' interview schedules

THEME	SOURCE OF THEME	RELATED INTERVIEW ITEM
Teaching methods	Teachers	Teachers schedule, items: 8, 9, 10 &11.
Students' performance	All participants	Teachers schedule, items: 1 & 2. Deputy Principals' schedule, items: 1 & 2. Principals' schedule, items: 1 & 2.
Causes of students' poor performance.	All participants	Teachers' schedule, items: 3, 4 & 5. Deputy Principals' schedule, items: 3, 4 & 5. Principals' schedule, items: 3, 4 & 5.
Improving students' performance	All participants	Teachers' schedule, item: 6. Deputy Principals' schedule, items: 6, 15 & 16. Principals' schedule, items: 6 & 15.
Syllabus completion	All participants	Deputy Principals' schedule, items; 8 & 9. Principals' schedule, item: 3. Teachers' schedule, item: 14.
Support given to Grade 7 mathematics teachers	All participants	Deputy Principals' schedule, items: 10 & 13. Principals' schedule, items: 13 & 14. Teachers' schedule, item: 5.
Classroom supervision.	Deputy Principals and Principals	Deputy Principals' schedule, items: 11 & 12. Principals' schedule, items: 10, 11 & 12.
Teachers' workshop attendance	All participants	Teachers' schedule, item: 6 & 7. Deputy Principals' schedule: 6, 15 & 16. Principals' schedule: 6 & 15.

4.3.2.1 Biographical data of interview respondents

In Section 4.3.2 four Principals consisted of two males and two females; four Deputy Principals consisted of two males and two females; and, seven teachers consisted of two males and five females, all from 15 schools. Table 4.3 shows that there were six males amongst fifteen participants. Participants had different number of years in teaching service, that is, 20 years or less. Table 4.3 shows that majority (eight of the 15) participants in the interview sample possesses the general diplomas qualification. Two of the seven teachers possessed the certificates.

Based on these findings it is reasonable to infer that Grade 7 mathematics classes were taught by less qualified teachers (see, Table 4.41).

Table 4.41: Biographical details of the participants interviewed

PARTICIPANTS' CODES	GENDER	YEARS OF SERVICE	QUALIFICATIONS
CP	Male	16-20	Diploma

FP	Female	6-10	Diploma
IP	Male	Over 20	Diploma
NP	Female	0-5	Masters
BDP	Female	6-10	Diploma
ODP	Female	Over 20	Certificate
IDP	Male	6-10	Diploma
FDP	Male	11-15	Masters
AT1	Male	0-10	Diploma
BT2	Female	11-20	Certificate
DTI	Female	0-10	Diploma
ET3	Female	0-10	Certificate
GT1	Female	11-20	Bachelors
JT2	Male	0-10	Bachelors
MT2	Female	0-10	Diploma

4.3.2.2 Reporting data in Table 4.40

According to Strauss and Corbin (1998), when tendencies and differences are determined data must be grouped in terms of categories of affirmation. Differences and the patterns are put down in a report. Miles and Huberman (1984) add that patterns may be exposed when they are compared for tendencies, relationships and differences.

4.3.2.2.1 Teaching methods

Six teachers acknowledged that they used teacher-centered methods to facilitate mathematics learning in Grade 7. Of seven teachers, only one stated that she uses a student-centered method. Most responses suggested that teachers advocated teacher-centered approaches when teaching mathematics in Grade 7 mathematics classes, as opposed to the student-centered approaches. This is in agreement with the findings from quantitative (questionnaires) data that teacher-dominated approach is largely used in Grade 7 mathematics classes (see, Section 4.1.2.1.1.1).

4.3.2.2.2 Students' performance

All respondents mentioned the aspect of students' performance. When describing the students' performance the respondents who had been coded CP, BDP and DT1 unanimously described the performance as "Bad". Based on these findings it seems as if almost all the participants were in agreement with the fact that poor performance in Grade 7 mathematics classes was dominant.

4.3.2.2.3 Possible causes of students' poor performance

Participants' responses are discussed in the following sections.

4.3.2.2.3.1 Teaching resources

Teaching resources were largely featured in participants' responses. Of the n=15 participants, n=13 emphasized that the teaching resources were insufficient in their schools. Some of the participants' responses regarding the teaching resources included the following:

> ***ET3:*** *There is lack of teaching and learning materials.*
> ***NP:*** *Lack of resources like textbooks.*
> ***FDP:*** *The students share the textbooks.*

It is observed that teaching resources are not enough in Grade 7 mathematics classrooms. These responses seemed to corroborate the questionnaire findings, which also revealed the lack of mathematics resources participating schools (see, Section 4.1.2.1.8).

4.3.2.2.3.2 Overcrowded classes

Eight participants agreed that the mathematics classes are overcrowded in Grade 7. The responses provided by some Principals, Deputy Principals and teachers included the following:

> ***JT2:*** *The classrooms are overcrowded.*
> ***BDP:*** *Students are too many in classes.*
> ***CP:*** *Classes are overcrowded in Grade 7.*

Grade 7 mathematics teachers were also asked about a number of students in their Grade 7 classes. Teachers BT2, DT1 and ET3 gave the following responses: 76, 67 and 64, respectively. Teachers generally agreed that they were teaching big classes. Only two showed that they taught classrooms that had an average number of students. Based on the participants' responses it is possible that Grade 7 mathematics classes in participating schools were overcrowded. The results of the analysis of quantitative data confirmed that a large number of students in class impact negatively on performance and thus constitutes students' poor performance in mathematics (see, Section 4.2.2.1.10; see, also, Table 4.21).

4.3.2.2.3.3 Issues relating to the qualifications of teachers

Participants ET3, MT2, ODP and IP acceded that teachers are not adequately qualified.

> ***MT2:*** *Mathematics is taught by unqualified teachers.*
> ***ODP:*** *Teachers are not qualified in Grade 7.*
> ***IP:*** *There is a shortage of qualified teachers.*

4.3.2.2.3.4 Students' negative attitude

Six participants noted that students in Grade7 mathematics classes have the negative attitude toward the subject. Upon probing teacher MT2 showed that students with negative attitude toward mathematics are reluctant to work out tasks, do not actively participate during lessons, do not complete and submit given tasks and cannot ask questions for clarity even if they do not understand. The responses regarding the negative attitude included the following:

> ***FDP:*** *Students' negative attitude towards mathematics.*
> ***FP***: *Students hate mathematics.*
> ***MT2:*** *students' negative attitude towards the subject.*

4.3.2.2.4 Support given to Grade 7 teachers

Teachers revealed that there was no support provided to Grade 7 mathematics teachers.

> ***DT1:*** *There is lack of support from colleagues and parents.*
> ***ET3:*** *There is lack of cooperation between teachers and lack of support from the education department.*

Other views about support were solicited from Deputy Principals and Principals when asked if the department of education in Lesotho was providing enough support to promote the teaching and learning of mathematics in Grade 7. All participants agreed that the department did not provide enough support. Their remarks included the following:

***FP**: No, it does not.*

***NP**: No, even though the district resource teachers (DRT) observe them during their teaching once a year.*

BDP: *Not at all.*

Deputy Principals (BDP, FDP, IDP and ODP) were also asked if they provided support to Grade 7 mathematics teachers. Some of their remarks are stated:

***BDP:** I do not provide any support.*

***FDP:** There is no support that I provide.*

***IDP:** I do not provide any support because I have my own class to cater for.*

Based on these responses it is apparent that there was no evidence of support provided to Grade 7 mathematics teachers to promote the teaching and learning of mathematics. Similar results (Section, 4.1.2.1.9) of the quantitative data affirmed that lack of support is one of the factors contributing to students' poor performance in mathematics.

4.3.2.2.5 Improving students' performance

Participants interviewed mentioned several ways of improving students' performance in mathematics. Some of their responses are noted:

***JT2**: School management must cultivate collaboration between teachers and students should be motivated more often and also be encouraged to work hard.*

***IDP:** Workshops, commitment and dedication of both teachers and students are needed.*

***FP:** Regular workshops are needed, teacher-student ratio should be reduced and enough teaching and learning materials should be provided.*

***MT2:** Parents should make sure that they contribute to their children's learning and motivational orientations should be done to students.*

GT1: *Schools should minimize the activities that interfere with teaching and learning and students should be motivated and be inspired about mathematics to improve their negative attitude.*

IP: *District based workshops are essential, district based fares and competitions are highly needed.*

CP: *Teaching and learning materials are needed, workshops and assistance of district resource teachers are essential.*

BDP: *Teachers must practice group work, give students homework daily and must always use student centered approaches.*

Based on these responses it seemed possible that: (1) workshops for teachers; (2) provision of teaching and learning materials; (3) assistance by the district resource teachers; (4) the use of student-centered methods; (5) homework; and, (6) parental involvement, all needed to form part of teaching and learning of mathematics in Grade 7 to enhance performance.

4.3.2.2.6 Syllabus completion

Of the fifteen participants, nine mentioned the issue of syllabus completion and acknowledged that syllabus incompleteness is a factor contributing to poor performance.

DT1: *The syllabus we do not cover with the students.*

IDP: *Teachers don't complete the syllabus.*

FP: *Teachers do not complete the syllabus.*

Deputy Principals were also asked to mention causes of non-completion of the syllabus. Half of them stated that the extramural activities are too many in their schools. The other half mentioned that the content is too much in Grade 7. The responses regarding syllabus non-completion included the following:

ODP: *The content is more in Grade 7.*

IDP: *My school participates in cultural activities and music competitions so these activities consumes a lot of time for students.*

It is apparent that non-completion of the syllabus is a factor contributing to students' poor performance in Grade 7 mathematics. This is in line with the findings of the quantitative data in Table 4.35.

4.3.2.2.7 Teachers' workshop attendance

Almost all participants, except BT2, indicated that workshops are essential to enhance students' performance. Workshops seemed to be a common recurring factor mentioned by all the participants when asked about the causes of students' poor performance. Participants also mentioned this factor when asked about the ways of improving students' performance.

> ***FDP:*** *I suggest that grade 7 teachers should go to the workshops to equip them with skills.*
> ***NP:*** *The department should call teachers for workshops regularly.*
> ***ET3:*** *Schools should hold regular mini-workshops for Grade 7 teachers.*

Based on these findings and those of the quantitative data (Section 4.1.2.1.4) it may be possible to conclude that lack of teachers' workshop attendance is a great factor contributing to students' poor performance in Grade 7 mathematics classes.

4.3.2.2.8 Classrooms' supervision

Responses relating to classroom supervision are discussed in the next sections.

4.3.2.2.8.1 Teaching observations

Of the four Deputy Principals, three indicated that they sometimes observe teachers in their teaching and learning process while one indicated that he does not observe them at all. Some of their responses regarding observation are mentioned:

> ***ODP:*** *I observe them when I have time; at least once a month.*

FDP: *I sometimes observe them in their teaching.*

4.3.2.2.8.2 Students' progress monitoring

Deputy Principals and suggested that they did not monitor students' performance in Grade 7.

NP: *I don't. Because I am busy with administration duties and I also have my own class to take care of.*

BDP: *I have my own class to teach so I do not have time to monitor students' performance in Grade 7 mathematics.*

IP: *I do not monitor it all because I have a lot to do such as office work.*

It might be inferred that lack of supervision is another factor contributing to poor mathematics performance in Grade 7 (see similar results in Sections 4.1.2.1.12; Section, 4.1.2.1.19 & Section 4.1.2.1.22).

4.4 CONCLUSION

Quantitative data were analyzed first using descriptive statistics and qualitative data followed using thematic content analysis. Quantitative identified the following factors: teaching methods, overcrowded classes, teachers' workshop attendance, students' progress monitoring, mathematics assessment policy, teachers' motivation, student socioeconomic background, lesson observations, teaching resources, teachers' attendance at school, teachers files and lesson plans, collaboration between Grade 7 teachers, individual meetings, students' prior-knowledge, support given to Grade 7 teachers, syllabus completion and remedial classes contributing to students' poor performance in mathematics. Similarly, qualitative data analysis affirmed that teaching resources, teaching methods, overcrowded classes, syllabus completion, collaboration between Grade 7 teachers, support given to Grade 7 teachers, classroom supervision and teachers' workshops attendance are in the foreground in contributing to students' poor performance in mathematics. In addition, the other newly emerged factors from qualitative data were unqualified teachers and students' negative attitude towards mathematics.

CHAPTER FIVE

DISCUSSIONS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

This chapter provides a summary of the study. The findings are discussed in terms of the research questions (Section 1.6) and literature review (Chapter 2). Recommendations and the conclusion of the study are also presented.

5.2 SUMMARY OF THE STUDY AND ITS FINDINGS

The aim of the study was to identify factors that negatively influence students' performance in primary school mathematics in the district of Berea of Lesotho (Section 1.2). Data were collected from Principals, Deputy Principals and Grade 7 mathematics teachers using a five point Likert scale questionnaires and semi-structured interviews. The quantitative data were analyzed first using descriptive statistics. Factors identified to contribute to students' poor performance in mathematics were explained and affirmed by the interviews. Quantitative and qualitative results revealed the following: teaching methods, teaching observations, teaching resources, overcrowded classes, teachers' workshop attendance, syllabus completion, students' progress monitoring, collaboration between Grade 7 teachers, support given to Grade 7 teachers, teachers' files and lesson plans, departmental meetings, teachers' motivation, teachers' attendance at school, mathematics assessment policy, students' prior knowledge, students' socioeconomic background, remedial classes and students' negative attitudes towards mathematics.

5.3 ANSWERING THE RESEARCH QUESTIONS OF THE STUDY

5.3.1 The first research question

- *What factors contribute to the poor performance of Grade 7 students in Berea district?*

In terms of answering the first research question the study identified the following factors:

5.3.1.1 Teaching methods

The findings of the study in Table 4.6 indicated that a large percentage of teachers (66.7%) use teacher dominated approach. Interviews revealed that most teachers use teacher centered approaches (Section 4.3.2.2.1). The high percentage of teachers using teacher dominated approach may be connected to the high rate of students' poor performance in mathematics in Lesotho. This finding confirmed the findings of Kriek, Ogbonnaya and Stols (2008); Sebatane *et al*. (1994) and Shava (2005). Many studies hold a view that the influence of teachers is the single-most important factor in determining students' achievement (Collias, Pajak & Ridgen, 2000; Sanders & Rivers, 1996). The teacher sets and determines the pace of teaching, what to teach, how and when to impact subjects contents.

5.3.1.2 Teaching resources

Table 4.17 indicated that teaching resources are not sufficient in Grade 7 mathematics classes. Qualitative results (Section 4.3.2.2.3.1) showed that participants agreed that teaching resources are insufficient in schools. These results are in consonant with prior findings by Eshiwani (2001); Matsoso and Polaki (2006); Polaki and Khoeli (2005) and Southern African Consortium for Monitoring Education Quality (SACMEQ, 2011). This implies that an improvement in provision of teaching resources can be connected with an improvement in students' performance. It is very unlikely that students in a mathematics classroom without teaching resources will be able to understand the intricacies that underlie mathematics to enable them to construct the relevant knowledge.

5.3.1.3 Overcrowded classes

Table 4.21 demonstrated that almost all the principals 15(100%) agreed that Grade 7 mathematics classes are overcrowded. Interview data affirmed that overcrowded classes cause students' poor performance in mathematics. According to the Ministry of Education and Training (MOET, 2004), a teacher in a primary school is supposed to teach at most 55 students. Students' poor performance in mathematics could be a result of classes that are overcrowded. This finding is in agreement with the findings of Makgato and Mji (2006) and Rivera-Batiz and Marti (1995). Rivera-Batiz and Marti (1995) found that students in overcrowded classrooms scored significantly lower on both mathematics and reading examinations than did similar students in underutilized schools.

5.3.1.4 Teachers' workshop attendance

Table 4.13 revealed that Grade 7 mathematics teachers did not attend workshops to develop them in their teaching. These results showed that teachers' workshop attendance is the greatest predictor of students' performance in mathematics in Lesotho. The qualitative data revealed that teachers' workshop attendance was mentioned by all the participants. Students whose teachers attend workshops would likely perform better in mathematics than students' whose teachers do not attend workshops. This finding is affirmed by the findings of Gulamhussein (2010) and Vanderburg and Stephens (2010). As teachers acquire short training sessions to help them teach more effectively there is little improvement in their students' performance.

5.3.1.5 Syllabus completion

According to Table 4.35, 86.6% of Grade 7 mathematics teachers did not complete the syllabus. The mean and deviation scores (*M*=4.20; *SD*=1.349) confirmed that syllabus non-completion affect students' performance in mathematics (Section 4.2.2.1.25). The interviews revealed that syllabus incompleteness cause students' poor performance in mathematics (Section 4.3.2.2.6). These findings are in line with the findings of Makgato and Mji (2006), and those of Amadalo, Shikuku and Wasike (2006). In other words, non-completion of the syllabus may be connected to students' poor performance in mathematics that over the years has continued to show a downward spiral in Lesotho (MOET, 2012). This implies that if all teachers were able to complete the syllabus, students will likely have better performance in mathematics than they had over the past years.

5.3.1.6 Teaching observations

Table 4.9 revealed that Grade 7 mathematics teachers were not observed in their teaching. Table 4.9 indicated that 66.7% of Deputy Principals did not observed Grade 7 mathematics teachers in their teaching even though they are the heads of the mathematics departments (see, Section 3.3.2). Qualitative data in Section 4.3.2.2.8.1 revealed that Deputy Principals did not observe Grade 7 mathematics teachers frequently. The absence of teaching observations may be connected to the high rate of students' poor performance in mathematics in Lesotho. This finding confirmed the findings of Manullang (2005). It can be argued that the strong connection existing between teaching observations and students' poor performance implies that as teachers acquire classroom visits by evaluators with tools to track teachers and students progress, students' performance tend to improve.

5.3.1.7 Students' progress monitoring

Table 4.20 demonstrated that students' progress was not monitored in Grade 7 mathematics. For instance, Table 4. 20 revealed that none (0%) of deputy principals displayed an agreement on signing students' books to monitor their performance. In addition, the results of qualitative data (Section 4.3.2.2.8.2) affirmed that students' performance was not monitored in Grade 7 mathematics. It may very well be that this unpleasant state of affairs is connected with the prevalent high rate of students' poor performance in mathematics in Lesotho. This supports the findings of Wright and Wright (2010). The results seems to imply that teachers without supervision are not effective in their teaching and are unable to make more informed instructional decisions and this tend to affect the quality of teachers' instruction which is essential in facilitating meaningful learning.

5.3.1.8. Support given to Grade 7 teachers

Table 4.19 demonstrated that there is no support given to Grade 7 mathematics teachers. Table 4.19 revealed that 76.6% of Deputy Principals did not support Grade 7 mathematics teachers though they are the heads of the mathematics departments. Interviews showed that both Deputy Principals and the department of education in Lesotho did not provide any support to Grade 7 mathematics teachers. Students' whose teachers are assisted in their teaching are likely to perform better in mathematics than students whose teachers are not. This finding confirms those by Wachira, Pourdavood and Skitzki (undated). It may very well be that teachers' effectiveness fizzles out when there is no support from other stakeholders mainly because students' performance in mathematics is a joint activity which involves interaction between all the stakeholders just like the Bronfenbrenner model discussed in Section 2.5.1.

5.3.1.9 Collaboration between Grade 7 mathematics teachers

Table 4.15 showed that there is no collaboration between Grade 7 mathematics teachers. Statistical analysis documented (M=4.40; SD=0.679), affirming the absence of collaboration between Grade 7 mathematics teachers (see, Section 4.2.2.1.6). Qualitative data revealed that collaboration between teachers was suggested by other participants. For instance, teacher (JT2) stated that *"school management must cultivate collaboration between teachers"* (see, Section 4.3.2.2.5). This is in line with Murawski and Dieker (2004) and York-Barr *et al*. (2004). According to Murawski and Dieker (2004), in normal situations many teachers lack full expertise in all content areas. There is thus a need to ensure greater students exposure to diverse fields of knowledge and practice by teachers who are experts in those areas. In this way collaboration, ease of content coverage and skill provision is ensured.

5.3.1.10 Teachers' attendance at school

Table 4.10 highlighted that 53.3% of principals noted that teachers' absenteeism influenced students' performance in Grade 7 mathematics. The findings agree with Amadalo, Shikuku and Wasike (2012) and Okuom *et al*. (2012). Amadalo *et al*. (2012) found that absenteeism by both teacher and the students played a major role in non-coverage of the syllabus.

5.3.1.11 Mathematics and assessment policy

Table 4.23 established that 100% of the principals indicated that there are no mathematics policies in their schools. Students in schools with mathematics assessment policies would likely perform better in mathematics than students in schools without mathematics assessment policies. This is in line with Natriello (1987) who observed that assessment practices have established substantial positive impact on students' attitudes and achievement.

5.3.1.12 Teachers' motivation

According to Table 4.26, 46.7% of principals noted that Grade 7 mathematics teachers were not motivated to teach. The results are consonant with the prior findings by Otieno (2010) who found out that understaffing and poor administration also de-motivates teachers causing non-completion of the syllabus and thus poor performance in mathematics.

5.3.1.13 Students' socioeconomic background

The results in Table 4.28 showed that all 100% of the principals agreed students in their schools come from low socioeconomic background. The presence of this high percentage of principals noting students' poor socioeconomic background may be linked to the high rate of students' poor performance in mathematics in Lesotho. Dhlamini (2012) in agreement suggests that it is unlikely to expect students from low socioeconomic backgrounds to enjoy meaningful parental support to enhance their mathematics and thus constitute students' poor performance in mathematics. Similar views were observed by Buland (2004) and Lewis and Naidoo (2004).

5.3.1.14 Teachers' individual meetings

Table 4.32 showed that 53.4% of deputy principals justified that they did not meet Grade 7 mathematics teachers individually in their department. Based on this it may be reasonable to infer that lack of teachers' individual meetings is the other factor contributing to students' poor performance in Grade 7 mathematics. This finding confirmed the findings of Donnelly (2009) who found out that recognizing the needs of teachers individual through meetings enhance dedication and commitment of teachers and thus improves students' performance in mathematics. Hoyles (2008) discovered that the importance of a good mathematics department is to work collaboratively in all circumstances and is very effective in meeting staffing challenges. This means that regular departmental meetings would likely improve students' performance in mathematics.

5.3.1.15 Students' prior knowledge

The results of the quantitative data in Table 4.34 showed that 50% of Grade 7 mathematics teachers did not believe that students come to Grade 7 with enough pre-knowledge in mathematics. In other words, students who come to Grade 7 with enough pre-knowledge in mathematics would likely perform better in mathematics than students who come to Grade 7 with insufficient prior knowledge. This finding was also verified in work by Hailikari, Katajavuori and Lindblom-Ylanne (2008) who found out that prior knowledge from previous courses significantly influenced student's performance and that the results of prior knowledge assessment may be used as a tool for student support in addressing areas of deficiency. After all, research has supported constructivist approach to teaching which advocates that students' build more advanced knowledge from prior understandings (Smith III, DiSessa & Roschelle, 2009).

5.3.1.16 Remedial classes

Table 4.36 affirmed that 96.7% of Grade 7 mathematics teachers did not conduct remedial classes to help students who struggle with mathematics. In other words, the presence of this high percentage of teachers not conducting remedial classes may be connected to the high rate of students' poor performance in mathematics in Lesotho. This finding confirmed the finding of

Grubb (1998) who found out that "remedial education had been developed as a solution to a particular problem, the lack of progress of many students hence no one views it as valuable in its own right" (p. 3). Similar views were documented by Boylan, Bonham, Claxton and Bliss (1992) who also discovered that remedial instruction based on carefully defined goal and objectives was associated with improved student performance. This implies that in order for Lesotho to improve this unpleasant state of affairs of poor performance in mathematics, there might be a need to prioritize the conduction of remedial classes.

5.3.1.17 Teachers' files and lesson plans

Table 4.29 verified that 53.4% of Deputy Principals did not check teachers' files and lesson plans regularly. This means that Deputy Principals ways of supervision as head of mathematics departments are inappropriate and therefore contribute to students' poor performance in Grade 7 mathematics. This implies that an improvement of supervision can be associated with an improvement of students' performance. This further supports the earlier findings of Harden and Croshy (2000) and Hesketh *et al*. (2001) who found out that effective supervision of teachers involves provision of skills, giving feedback on performance both informally and through appraisal, initial training and continuing education planning, monitoring progress and ensuring provision of career advice.

5.3.1.18 Students' negative attitude

The results of the qualitative data (see, Section 4.3.2.2.3.4) justified that students' negative attitude toward mathematics is the other factor contributing to students' poor performance in Grade 7. Six participants noted that students in Grade 7 mathematics classes have negative attitude toward mathematics. FP remarked that "*students hate mathematics*". This implies that students' positive attitude toward mathematics would likely improve students' performance in mathematics. This finding is also verified in work by Ames and Archer (1988) who documented that students who perceived an emphasis on mastery goals in the classroom reported using more effective strategies, preferred challenging tasks, had a more positive attitude toward the class, and had a stronger belief that success follows from one's effort.

5.3.2 The second research question

- *What characterizes teaching and learning of mathematics in Grade 7 classrooms of participating schools?*

The current study was framed on the constructivist theory and this theoretical perspective is used in this section to answer the second research question of the study (see, Section 1.6 & Section 2.6). Constructivism proposes that people construct new knowledge upon their previous knowledge (Brocklebank, 2004; see, also, Section 2.6). This view must inform teachers' instructions in mathematics and inform them to implement reformed instructions that are largely student-centred, as opposed to teacher-dominated approaches (Section 2.2.1; Section 2.3). In Chapter 2 of this report some examples of student-centred instructions are provided: (1) Group learning approach (Section 2.3.2); and, (2) approaches that expose students to more homework activities (Section 2.3.3). In addition, the conceptual framework of this study was grounded on the Bronfenbrenner ecological system model, which takes into account the influence of various factors (role players) on the teaching and learning process and the child' developmental phases (see, Section 2.5; see, also, Figure 2.1). Among these factors the Bronfenbrenner model highlights the influence of community on the scholastic performance and development of the child, which in the current study represented the component of parental (home) and school influence. The culture of learning generated in these two settings could determine the type of learning that a child is exposed to (Section 2.5).

In line with these theoretical dispositions this study found that:

1. Teaching and learning activities in participating schools are less influenced by constructivist views of learning. In Section 4.2.2.1.1 the study found that teachers' methods were inappropriate in that they were not grounded on student-centred approaches. Section 4.2.2.1.1.1 showed that methods used to teach Grade 7 mathematics were largely teacher-dominated. In terms of the constructivist theory it might be reasonable to conclude that teaching and learning activities in the Grade 7 mathematics classrooms of the Berea district were less compliant to constructivist views of teaching and learning (see, also, Section 4.2.2.1.5; Section 4.2.2.1.16; Section 4.2.2.1.23; Section 4.2.2.1.26; Section 4.2.2.1.27; Section 4.3.2.2.1; Section 4.3.2.2.3.2); and,

- The communal influence on teaching and learning activities in participating schools is not in such a manner to influence students' mathematical performance positively. In relation to the Bronfenbrenner ecological system model this study generated the following findings: (1) there is minimal parental involvement in the mathematical learning of students (see, Section 4.2.2.1.11); (2) the culture of teaching and learning in participating schools minimally enhanced good performance in Grade 7 mathematics (see, Section 4.2.2.1.16; see, also, Section 4.2.2.1.18; Section 4.2.2.1.20; Section 4.2.2.1.24); and, (3) schools were doing very little to support and enhance the learning of mathematics (see, Section 4.3.2.2.8.2).

In terms of these findings it is reasonable to conclude that the second research question of the study is answered: Generally, teaching and learning activities in participating schools least enhanced students' performance in Grade 7 mathematics classrooms.

5.4 THE AIM OF THE STUDY

The current study aimed to identify factors that negatively influence students' performance in primary school mathematics in the district of Berea of Lesotho (Section 1.2). In the light of the discussions in Section 5.3 this aim is achieved. Factors influencing students' mathematical performance in the Berea district of Lesotho are indented. In terms of the related objectives of the study this investigation was able to determine the culture of teaching and learning activities in participating schools, which was largely related to the poor mathematical performance in Grade 7 in participating school. Therefore the objectives of this study are achieved

5.5 RECOMMENDATIONS

The following recommendations are made based on the findings of the study:

5.5.1 Recommendations to the Ministry of Education

The Ministry of Education should review the curriculum to make it relevant and flexible to the diverse needs of different districts and background of the students. To mitigate on the inadequacy of teaching/learning materials and equipments; the government needs to enhance their provisions to schools. In addition, the government and other stakeholders such as Non-governmental Organizations (NGOs) need to sensitize the local community to discard beliefs such as "*mathematics is not for everyone"* that prohibit effective participation which result to poor performance in mathematics. The Ministry of Education and the schools managements should also motivate teachers especially after the release of examination results.

5.5.2 Recommendations regarding teachers' qualifications and teaching experience

The study showed that teachers' qualifications and teachers' experience are both associated with students' performance. It is therefore extremely vital that the Teaching Service Department (TSD) and the management of schools hire candidates who have high academic qualifications (at least a bachelor's degree). Motivational efforts should be made (for, instances, putting in place contract signing bonus) to attract highly qualified teachers, certain incentives be used to retain veteran teachers and teachers be encouraged to further their studies to upgrade their qualifications. Also, they should consider teachers with more than five years of teaching experience where possible. Teachers with more years of experience are likely to have acquired a broader additional knowledge of students thinking and misconceptions in mathematics which would enable them to tailor their teaching in more beneficial ways to the students.

5.5.3 Recommendations regarding professional development

Professional development includes among others workshops or seminars, teaching practices and teachers' pedagogical content knowledge. The results of the study showed that teachers' workshop attendance and teaching methods correlate with students' performance in mathematics. Therefore, teachers should be encouraged to regularly attend workshops related to deepening teachers' mathematics content knowledge, understanding students thinking in mathematics and on how to assess students learning in mathematics. Professional development activities should be coherent and not loose standing in order to be of great importance. In addition, training on how to effectively use various teaching methods can be included in the professional development activities. This will enable teachers to be effective in using these methods in their classes.

5.6 LIMITATIONS OF THE STUDY

One limitation of the present study, in reminiscence, is that data about Grade 7 mathematics teachers and their teaching was collected using questionnaires and semi-structured interviews. This was insufficient. A more balanced technique would have been to use both in-depth interviews with the Grade 7 teachers and classroom observations of their teaching. In-depth interviews as well as classroom observations would have given a researcher a clearer insight into the teachers teaching methods. Observer's report of the classroom practices would have been more accurate than teachers self-report about teaching methods.

Another limitation is that participation was not purely voluntary. Participants were very economical in their responses and withholding the information as majority of them chose to give telegraphic responses like "bad" or "poor" during interviews (see, Section 4.2). Moreover, even though it was explained in the consent letters that the study was for educational purposes only and that participants' responses would be treated confidentially, some teachers might have felt that their deficiencies would be exposed to the government and therefore might have provided false responses to some questions. Some might have provided biased responses because they considered they had to respond to questions in an "acceptable" way (Mayer, 1999).

In addition, changes of the appointments were frequent and it required the researcher to be quite flexible because the researcher was at times forced to shift the appointments for interviews. For example, an interview with teacher (BT2) was postponed two times and the researcher was patient and was lucky to be able to interview the teacher at last. Some principals were quite unreceptive at first while others simply took a long time to finally attend to requests such as completing the questionnaires. Again the cost of frequently calling on the participants (principals, deputy principals and Grade 7 mathematics teachers) to set and verify the appointments was a major constraint. On the positive side, the cooperation of the Berea Education department and the Examination Council of Lesotho (ECOL) with the researcher, the links made with the Ministry of Education that held some authority as well as the influence of the lead assisted the researcher in finally getting the study completed.

5.7 CONCLUSION

The current study that investigated factors contributing to poor mathematics performance of Grade 7 students in the Berea district of Lesotho has not been conducted before. Therefore, the findings add to the body of knowledge at hand. Some findings are in consonant with the findings documented by the literature. The present study also highlighted some factors that were not shown by the literature. Generally, the study indicated that teaching methods, overcrowded classes, teaching observations, teachers' workshop attendance, students' progress monitoring, teaching resources, collaboration between Grade 7 mathematics teachers, support given to Grade 7 mathematics teachers, teachers' attendance at school, syllabus completion, mathematics assessment policy, teachers' motivation, students' socioeconomic background, teachers' individual meetings, students' prior knowledge, remedial classes, teachers' files and lesson plans and students' negative attitude are the factors contributing to students' poor performance in mathematics in Grade 7.

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APPENDIX A: MATHEMATICS TEACHER QUESTIONNAIRE (MTQ)

School code: ___________________ **Teacher code: ____________________**

General instructions

1. Answer all questions in Section A and Section B.
2. Follow instruction(s) for each section.

SECTION A: Demographic information

Represent your choice by using a tick (√).

1. Indicate your gender: [1] Male [2] Female
2. Indicate the category the represents your years of teaching mathematics in Grade 7:
   [1] 0-10 years [2] 11-20 years [3] 21-30 years [4] Over 30 years
3. The following option generally represents your qualification level in mathematics:
   [1] Certificate [2] Diploma [3] Bachelors [4] Masters [5] Doctorate

SECTION B: Mathematics instruction

1. Answer the questions that follow to describe the teaching of mathematics in your class. Use (√).
2. All questions reflect on your teaching experiences as a Grade 7 mathematics teacher.

	Strongly agree	**Agree**	**Undecided**	**Disagree**	**Strongly Disagree**
I use a teacher-dominated style to teach mathematics in Grade 7.					

	I use a student-centred approach to teach mathematics.						
	I have enough teaching resources to teach Grade 7 mathematics topics.						
	My students come to Grade 7 with enough pre-knowledge in mathematics.						
	My students attend my mathematics lessons regularly.						
	I connect the teaching of mathematics to the real-world experiences of my students.						
	I work with other Grade 7 mathematics teachers when preparing my lessons and other activities.						
	I complete the Grade 7 mathematics syllabus to prepare my students for Grade 8.						
	I have a working program that I follow when teaching mathematics in Grade 7.						
	I conduct remedial classes to help students who struggle with mathematics.						
	In the last 3 years I have attended a workshop(s) on how to teach Grade 7 mathematics topics.						
	The textbook I use to teach mathematics is appropriate to teach Grade 7 mathematics.						
	I allow my students to work in groups when they solve mathematics tasks.						
	I give my students enough homework activity to familiarize them with the work.						
	My HOD supports me in the teaching of Grade 7 mathematics.						

APPENDIX B: HEADS OF MATHEMATICS DEPARTMENT QUESTIONNAIRE (HMDQ)

School code: ___________________ **HOD code: ____________________**

General instructions

1. Answer all questions in Section A and Section B.
2. Follow instruction(s) for each section.

SECTION A: Demographic details

Represent your choice by using a tick (√).

1. Indicate your gender: [1] Male [2] Female
2. Indicate the category that represents your years of serving as the Head of Department:
[1] 0-5 [2] 6-10 [3]11-15 [4] 16-20 [5] Over 20 years
3. The following option represents my general qualification level in mathematics:
[1] Certificate [2] Diploma [3] Bachelors [4] Masters [5] Doctorate

SECTION B: School culture of teaching and learning

1. Answer the questions that follow to describe the teaching of mathematics in your class. Use (√).
2. All questions reflect on your management experiences as an HOD for mathematics in your school.

	Strongly agree	**Agree**	**Undecided**	**Disagree**	**Strongly Disagree**
I encourage Grade 7 mathematics teachers to use a teacher-dominated approach.					
I encourage Grade 7 mathematics teachers to use a student-centred approach.					

	I regularly visit and observe teachers in class when they teach mathematics.					
	I check teachers' files and lesson plans regularly.					
	I allocate teachers according to their strengths in Grade 7 mathematics.					
	Grade 7 teachers connect mathematics lessons to students' real-world life.					
	Grade 7 teachers in my Department work together as a team.					
	I have a working plan to regulate all teaching activities in my Department.					
	Teachers in Grade 7 have enough teaching resources for mathematics.					
	I provide sufficient support for the teaching and learning of Grade 7 mathematics.					
	Each year we set performance targets for mathematics in Grade 7.					
	Teachers in my Department attend Grade 7 workshops organized for mathematics.					
	I check and sign learners' books to monitor their performance in Grade 7 mathematics.					
	I meet Grade 7 mathematics teachers individually in my Department.					
	Disciplinary measures are taken to poorly performing Grade 7 mathematics teachers.					

APPENDIX C: HEAD TEACHER (PRINCIPAL) QUESTIONNAIRE (HTQ)

School code: ____________________ **School principal code: ____________________**

Questionnaire instructions

1. Answer all questions in Section A and Section B.
2. Follow instruction(s) for each section.

SECTION A: Demographic details

Represent your choice by using a tick (√).

1. Indicate your gender: [1] Male [2] Female
2. Which option represents your years of serving as a principal:
[1] 0-5 [2] 6-10 [3]11-15 [4] 16-20 [5] Over 20 years
3. The following option generally represents your school management qualification:
[1] Certificate [2] Diploma [3] Bachelors [4] Masters [5] Doctorate

SECTION B: School culture of teaching and learning

The following items describe the culture of teaching and learning of mathematics in your school. Use tick (√) to represent your selected option.

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Grade 7 teachers use appropriate methods to teach mathematics.					
HODs observe teachers in class when they teach Grade 7 mathematics.					
Grade 7 mathematics teachers come to school regularly.					

	Grade 7 mathematics teachers attend their teaching lessons regularly.					
	Grade 7 mathematics classes are over-crowded.					
	I help to organize workshops to develop Grade 7 mathematics teachers.					
	I organize parents meetings to encourage parental involvement in school.					
	I meet with HOD to monitor performance in Grade 7 mathematics.					
	The school has assessment policy for mathematics.					
	Teachers are sufficiently qualified to teach Grade 7 mathematics.					
	There is a shortage of Grade 7 mathematics teachers in my school.					
	Grade 7 mathematics teachers in my school are motivated to teach.					
	Generally, there is a positive culture of teaching and learning in my school.					
	Learners in my school attend mathematics lessons regularly.					
	Most learners at my school come from good socioeconomic background.					

APPENDIX D: INTERVIEW GUIDE FOR TEACHERS

School code: ________________ **Teacher code: _________________**

1. In the past three years, how would you describe the mathematics performance of Grade 7 students in your school?
2. In the past three years, how would you describe the general performance of Grade 7 mathematics students in the Berea district?
3. What do you think are the causes of students' poor performance in mathematics in Grade 7?
4. Besides your contribution as a teacher, do you think there are other factors that contribute to students' performance in Grade 7 mathematics?
5. If YES, what are these factors?
6. What can be done to minimise the negative influence of these factors?
7. What is the average teacher-student ratio in your Grade 7 mathematics classrooms?
8. What teaching methods or strategies do you think are effective to teach mathematics in Grade 7?
9. How do you engage or involve your students in your Grade 7 mathematics topics?
10. Do you allow students to talk to each other while working in mathematics task in Grade 7?

11. Do you allow students to work in groups while solving a Grade 7 mathematics problem?
12. Do you know of any specific Grade 7 mathematics topics that give students problems?
13. If any, why do you think these topics give students problems?
14. Why do you think it is difficult for Grade 7 teachers to complete the mathematics syllabus?
15. What is the general attitude of students in your Grade 7 mathematics class?

APPENDIX E: INTERVIEW GUIDE FOR HEADS OF DEPARTMENT

School code: _______________ **Teacher code: ________________**

1. In the past three years, how would you describe the mathematics performance of Grade 7 students in your school?
2. In the past three years, how would you describe the general performance of Grade 7 mathematics students in the Berea district?
3. What do you think are the causes of students' poor performance in mathematics in Grade 7?
4. Besides the contribution of a teacher, do you think there are other factors that contribute to students' performance in Grade 7 mathematics?
5. If YES, what are these factors?
6. What can be done to minimise the negative influence of these factors?
7. Do you think teachers in your Department are properly trained to teach Grade 7 mathematics?
8. Do all teachers who teach mathematics in Grade 7 complete the syllabus?
9. If NO, what causes the non-completion of the syllabus in Grade 7 mathematics classes?
10. How do you provide support to your Grade 7 mathematics teachers?
11. How do you ensure that Grade 7 mathematics teachers implement effective teaching methods to teach mathematics in Grade 7?
12. How do you monitor students' performance in Grade 7 mathematics?

13. Do you think the Department of Education in Lesotho is providing enough support to promote the teaching and learning of mathematics in Grade 7?
14. Do you think it is necessary to encourage your Grade 7 mathematics teachers to work with teachers from other schools in your district?
15. As the Head of Department for mathematics, what are the mechanisms do you have in place to curb the problem of poor performance in your school?
16. Do you any suggestions to improve the Grade 7 mathematics in the primary schools of Berea district?

APPENDIX F: INTERVIEW GUIDE FOR HEAD TEACHERS (SCHOOL PRINCIPALS)

School code: ________________ **Teacher code: _________________**

1. In the past three years, how would you describe the mathematics performance of Grade 7 students in your school?
2. In the past three years, how would you describe the general performance of Grade 7 mathematics students in the Berea district?
3. What do you think are the causes of students' poor performance in mathematics in Grade 7?
4. Besides the contribution of a teacher, do you think there are other factors that contribute to students' performance in Grade 7 mathematics?
5. If YES, what are these factors?
6. What can be done to minimise the negative influence of these factors?
7. Do you think teachers in your school are properly trained to teach Grade 7 mathematics?
8. Do you all Grade 7 mathematics students attend their lessons regularly?
9. Do you all Grade 7 students attend the mathematics lessons regularly?
10. As a principal, how do you monitor the performance of students in Grade 7 mathematics?
11. How does the HOD for mathematics report the performance of Grade 7 students to your office?
12. How does the school account to the Department of Education on the performance of Grade 7 students?

13. Do you think teachers in your school attend workshops that help them to teach Grade 7 mathematics?
14. Do you think the Department of Education in Lesotho is providing enough support to promote the teaching and learning of mathematics in Grade 7?
15. Do you have any suggestions to improve the performance of Grade 7 mathematics in the Berea district?
16. If YES, what are your suggestions for improving Grade 7 students' performance for mathematics in Berea district?

APPENDIX G: CONSENT LETTER FOR PRIMARY SCHOOL PRINCIPALS AT BEREA DISTRICT OF LESOTHO

Dear Sir/ Madam

My name is Mary Masekhohola. I am a student at the University of South Africa and am presently enrolled for the structured master's degree with a specialization in inclusive education. In order to complete the requirements for the degree, I have to become acquainted with aspects of doing research that is related to the area of my specialization. I will like to conduct my research at your school which will focus on investigating some of the factors that contribute to poor mathematics performance at Grade 7, in the Berea district. If possible, I plan to work with the following groups in your school: the principal, the Head of Department (HOD) for mathematics and Grade 7 mathematics teachers. The participation of these groups will involve the answering of structured items in the questionnaire.

If the permission is granted, the researcher will hold a meeting with all participants to explain the objectives of the research, and all its related activities that the participants are likely to be involved in. All clarity-seeking questions will be answered. The research will not interfere with tuition and will only be conducted between 14H00 and 15H00. Participants will be given a week to complete a 30 minutes questionnaire and an hour to answer interview questions.

If you allow me to use your school as a site for this research I will share the findings of this research with your school. The identity of your school, and those of research participants, will be written under pseudonym. Participation in this research is completely voluntary and withdrawal of participation at any stage of the research is permissible at no penalty. After reading this letter, please complete the attached consent form and return to the researcher.

I hope to hear from you soon. You are welcome to contact me for any issues related to my research. My phone number is 58574193.

Yours faithfully

Mrs Nyamela Masekhohola Mary

APPENDIX H: CONSENT LETTER FOR GRADE 7 MATHEMATICS TEACHERS AT BEREA DISTRICT OF LESOTHO

Dear Sir/ Madam

My name is Mary Masekhohola. I am a student at the University of South Africa and am presently enrolled for the structured master's degree with a specialization in inclusive education. In order to complete the requirements for the degree, I have to become acquainted with aspects of doing research that will involve Grade 7 mathematics teachers in your school. My research will focus on investigating some of the factors that possibly contribute to poor mathematics performance in Grade 7 in Berea district. I wish to invite you to participate in this research.

Should you decide to participate in this research you will be requested to complete a questionnaire that will address some aspects of teaching mathematics in Grade 7. The main objective will be to collect data that is related to factors presumed to influence the performance of Grade 7 learners in mathematics. Your identity, and that of your school's name, will not be revealed. In reporting about the findings from this research pseudonyms will be used, and the findings will be aggregated. Given your participation, the results of this research will be made available to you and to your school. Your participation in this research may contribute in improving the teaching and learning of mathematics in the Berea district of Lesotho. All activities related to this research will be conducted between 14H00 and 15H00 in order to minimize interference with the teaching time in your school. Participants will be given a time frame of a week to complete a 30 minutes questionnaire and an hour to answer interview questions. Prior to the commencement of the research the researcher will convene a meeting with all participants to explain the objectives of the study and clarify other issues relating to this research. You will be free to withdraw your participation at any stage of the research without a penalty. After reading this letter, please complete the attached consent form and return to the researcher.

I thank you in advance for reading this letter and I hope to hear from you soon. If you have questions about this research you are free to call me at 58574193.

Yours truly

Mrs Mary Masekhohola Nyamela

APPENDIX I: CONSENT LETTER FOR HEADS OF DEPARTMENT FOR MATHEMATICS

Dear Sir/ Madam

My name is Mary Masekhohola. I am a student at the University of South Africa and am presently enrolled for the structured master's degree with a specialization in inclusive education. In order to complete the requirements for the degree, I have to become acquainted with aspects of doing research that will involve Grade 7 mathematics teachers in your school. My research will focus on investigating some of the factors that possibly contribute to poor mathematics performance in Grade 7, at the Berea district.

If you agree to participate in this research you will be requested to complete a questionnaire that will address some aspects of management that relate to the teaching of Grade 7 mathematics in your school. As the Head of Department for mathematics in Grade 7 you may provide useful information relating to the type of support that your school provides to mathematics teachers in Grade 7, as well as providing information in terms of the implementation of curriculum policies to enhance the teaching of mathematics in your school. Your identity, and that of your school, will not be revealed. In reporting about the findings from this research pseudonyms will be used. In the end, the results of the study will be made available to you and to your school. All activities related to this research will be conducted between 14H00 and 15H00 in order not to interfere with teaching time. Participants will be given a timeframe of a week to complete a 30 minutes questionnaire and an hour to answer interview questions. Prior to the commencement of the research the researcher will convene a meeting with all participants to explain the objectives of the study and clarify other related issues. Should you decide to participate in the study, you are free to withdraw your participation at any stage of the research without a penalty. After reading this letter, please complete the attached consent form and return to the researcher.

I thank you in advance for reading this letter and I hope to hear from you soon. If you have questions about this research you are free to call me at 58574193.

Yours truly

Mrs Mary Masekhohola Nyamela

APPENDIX J: RESPONSE RECEIPT FOR CONSENT LETTERS FOR ALL STUDY PARTICIPANTS

After reading and understanding the content of the request letter that was given to me by the researcher, I ……………………………………, the principal/ the Head of Department for Grade 7 mathematics/ the Grade 7 mathematics teacher, agree to participate in the research that will be conducted by Mary Masekhohola Nyamela, in which she will be investigating factors contributing to poor mathematics performance in Grade 7 in the Berea district of Lesotho.

I give consent to participate in the following research activities:

- To complete the **questionnaire** that will be given to me for data collection.
  Yes ☐ or No ☐ [Use a tick (√) to indicate your choice]

- To be **interviewed** if I am further selected for the interview session.
  Yes ☐ or No ☐ [Use a tick (√) to indicate your choice]

- To be **video-recorded** during the course of the interviews.
  Yes ☐ or No ☐ [Use a tick (√) to indicate your choice]

Signed : ……………………………………….   Date : ……………………………………….

APPENDIX K: PERMISSION LETTER FROM THE DEPARTMENT OF EDUCATION

MINISTRY OF EDUCATION AND TRAINING

The department Of Mathematics Education
University Of South Africa

Dear Sir/Madam

Re: Permission for Mrs Masekhohola Nyamela to conduct school-based research in Berea schools.

The above matter bears reference.

This is to confirm that Mrs Masekhohola Mary Nyamela has been granted a permission to conduct a school-based research in Berea district schools as a partial fulfillment of her Master in Inclusive Education.

Thanking you in advance.

E.M.Hoohlo (Mrs) - Senior Education Officer

APPENDIX L: ETHICS CLEARANCE CERIFICATE FROM THE UNIVERSITY

Research Ethics Clearance Certificate

This is to certify that the application for ethical clearance submitted by

Nyamela MM [48766631]

for M Ed study entitled

T Investigating factors contributing to poor mathematics performance of grade 7 students in the Berea district of Lesotho

has met the ethical requirements as specified by the University of South Africa College of Education Research Ethics Committee. This certificate is valid for two years from the date of issue.

Prof CS le Roux
CEDU REC (Chairperson)
lrouxcs@unisa.ac.za
Reference number: 2013 November/48766631/CSLR

28November 2013