

**THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING
MATHEMATICS AT SELECTED PRIMARY SCHOOLS IN EAST LONDON
EDUCATION DISTRICT**

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Education**

**University of Fort Hare
South Africa**

By

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2018

DECLARATION

I, Kemi Olajumoke Adu, student number 201510102, solemnly declare that this dissertation titled “The use of textbooks by teachers in teaching Mathematics at selected primary schools in East London education district” is my original work. All sources used or quoted in the study have been indicated and acknowledged by way of reference.

Kemi Olajumoke Adu

A handwritten signature in black ink, appearing to read 'Kemi Olajumoke Adu', is written over a horizontal line.

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ABSTRACT

Mathematics is the foundation for the economic and technological development of any nation. It has been asserted that Mathematics is expected to help in accelerating social, economic and technological progress of any society. The Primary school level is very important in any educational system and any lack at this level would permeate to other levels of the educational system. Hence, this dissertation examines the use of textbooks by teachers in teaching Mathematics at selected primary schools in East London Education district. The study adopted the interpretivist paradigm and employed the qualitative approach in investigating the phenomenon. The dissertation made use of phenomenology research design as it attempted to understand people's (learners' and teachers') perceptions, perspectives and understandings of the use of textbooks in teaching Mathematics. Semi-structured interviews and observation were used to elicit information from the six mathematics teachers and three heads of department who were purposively selected. The data collected were analysed using thematic approach where themes were developed from the research questions after transcribing, sorting and categorizing them. The findings of the study demonstrated that the participants selected textbooks from the ones prescribed by the department that were written in the CAPS documents. They had no influence or decision on textbook selection. All the teachers believed that lesson plan is very important and it is a must to have a very detailed and comprehensive lesson plan that is well-aligned to the contents of CAPS document and the textbook. The study further revealed that, for effective delivery of lesson and planning, there is need for a practical use of textbooks by the teacher. The study concluded that one of the most fundamental issues to consider is the fact that, as good as the use of textbook for planning and delivery of lesson activities is, it can also be a problem if not carefully and professionally planned and used accordingly. The over-dependence on textbooks at the expense of other resources may cause ineffective learning and teaching of mathematics.

DEDICATION

This project is dedicated to the glory of Almighty God and also to my lovely husband and our children, Alice, Rachael, Paul and Silas.

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To God be the glory, honor and adoration for the strength, favor and grace to complete my Master's degree in Education successfully.

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KEY ABBREVIATIONS AND ACRONYMS USED

CAPS:	Curriculum and Assessment Policy Statement
ICT:	Information and Communication Technology
COS:	Course of Study
NBE:	National Board of Education
NCTM:	National Council for Teaching Mathematics
UNESCO:	United Nations Educational and Scientific Organization
SSA:	Sub-Sahara Africa
NCS:	National Curriculum Statements
NEEDU:	National Education Evaluation and Development Unit
FP:	Foundation Phase
IP:	Intermediate Phase
HLP:	Home Language Project
UNICEF:	United Nations International children Education Fund
EFA:	Education for All
SAHRC:	South African Human Rights Commission
TIMSS:	Trends in International Mathematics and Science Study
NSTA:	National Science Teachers' Association
DoE:	Department of Education
DBE:	Department of Basic Education
LSEN:	Learners with Special Education Needs
ANA:	Annual National Assessments
GPLMS:	Gauteng Programme for Language and Mathematics Strategy
NZMoE:	New Zealand Ministry of Education
AERA:	American Education Research Association
SMT:	Senior Management Team

Table of Contents

DECLARATION.....	i
PLAGIARISM DECLARATION.....	ii
DECLARATION ON RESEARCH ETHICS CLEARANCE	iii
ABSTRACT.....	iv
DEDICATION.....	v
ACKNOWLEDGEMENT.....	vi
KEY ABBREVIATION AND ACRONYMS USED	vii
CHAPTER ONE.....	1
INTRODUCTION AND BACKGROUND TO THE STUDY.....	1
1.1 INTRODUCTION	1
1.2 BACKGROUND TO THE STUDY	1
1.2.1 Features of textbook.....	5
1.2.2 Features of primary Mathematics teaching.....	6
1.2.3 Use of textbooks in Mathematics teaching in African primary schools.....	14
1.2.4 Effect of textbook shortage on learning	19
1.2.5 The use of text books in South African schools	20
1.3 STATEMENT OF THE PROBLEM	25
1.4 RESEARCH QUESTIONS	26
1.4.1 Main research question.....	26
1.4.2 Sub-research questions	26
1.5 PURPOSE OF THE STUDY	26
1.6 RESEARCH OBJECTIVES	27
1.7 SIGNIFICANCE OF THE STUDY.....	27
1.8 DELIMITATION OF THE STUDY	27
1.9 BRIEF METHODOLOGY	28
1.10 DEFINITION OF TERMS	28
1.10.1 Textbooks.....	28
1.10.2 Primary schools.....	28
1.10.3 Mathematics.....	29

1.10.4 Instructional materials	29
1.11 CHAPTER DEMARCATION.....	29
1.12 SUMMARY	30
CHAPTER TWO	31
THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE	31
2.0 INTRODUCTION	31
2.1 THEORETICAL FRAMEWORK	31
2.2 REVIEW OF LITERATURE	33
2.3 TEXTBOOK FOR TEACHING MATHEMATICS AT PRIMARY SCHOOL	33
2.3.1 Factors influencing the role of Mathematics textbooks.....	37
2.4 THE USE OF TEXTBOOKS IN LESSON PLANNING AND DELIVERY	40
2.4.1 Conceptualization of the Use of Textbook in Lesson Planning.....	40
2.5 THE CHALLENGES PRIMARY SCHOOL TEACHERS ENCOUNTER IN THE USE OF TEXTBOOKS.....	48
2.5.1 The pacing and sequencing of lessons	50
2.5.2 The selection of texts for classroom teaching	51
2.5.3 Measuring readability	54
2.5.4 Language proficiency	55
2.6 TEACHERS' BELIEFS ABOUT MATHEMATICS EDUCATION AND TEXTBOOK USE.....	57
2.6.1 Teachers' beliefs about the use of technology in Mathematics education.....	61
2.7 OTHER MATHEMATICS ARTIFACTS USE IN SCHOOLS.....	62
2.8 STUDIES ON THE USE OF TEXTBOOKS	64
2.8.1 Developmental and formative role of Mathematics textbook	66
2.9 APPROACHES TO TEACHING MATHEMATICS	67
2.10 SUMMARY	70
CHAPTER THREE	71
RESEARCH METHODOLOGY	71
3.1 INTRODUCTION	71
3.2 RESEARCH PARADIGM.....	71
3.2.1. Positivism	74
3.2.2 Interpretivism	75

3.2.3 Post-Positivism	76
3.2.4 Pragmatism	77
3.3. RESEARCH APPROACH: QUALITATIVE	79
3.3.1 Strengths and weaknesses of the qualitative method	80
3.4 Research Design: Phenomenological	81
3.5 POPULATION	82
3.6. OVER VIEW OF SAMPLING PROCEDURE	83
3.6.1 Sampling Procedure	83
3.6.2 Sample	84
3.7 DATA GATHERING INSTRUMENTS	85
3.7.1 Interviews	86
3.7.2 Advantages of the interview	87
3.7.3 Face to face interviews	88
3.7.4. Semi-structured interviews	89
3.8 OBSERVATIONS	89
3.9 DATA COLLECTION PROCEDURE	90
3.10 DATA ANALYSIS	90
3.11 RELIABILITY	91
3.11.1. Trustworthiness	92
3.12. ETHICAL CONSIDERATIONS	94
3.12.1. Permission	96
3.12.2. Informed consent	96
3.12.3. Rights of participants	99
3.12.4. Confidentiality and anonymity	100
3.12.5. Harm to participants	101
3.12.6 Rapport and Friendship	101
3.12.7 Intrusiveness	102
3.12.8 Data Interpretation	102
3.12. 9 Reporting back to participants	102
3.13 CHAPTER SUMMARY	103
CHAPTER FOUR	104

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION	104
4.1 INTRODUCTION	104
4.2 RESEARCH SITES	105
4.3 PERSONAL INFORMATION OF PARTICIPANTS	105
4.3.1 DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS	106
4.4 THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS	107
The selection of textbooks for teaching Mathematics	107
4.4.1 Prescribed textbook	108
4.4.2 Easy language	109
4.4.3 Clarity and comprehensiveness	110
4.4.4 The contents of curriculum	112
4.4.5 Supplement with other resources	113
4.4.6 Link between textbook and plan book	114
4.4.7 Wide range of activities	115
4.4.8 Teaching method	117
4.4.9 Quality of textbook	118
4.4.10 Suitability of Textbook for homework	119
4.4.11 Content coverage	120
4.4.12 Introduction and conclusion of a lesson	121
4.4.13 Poor quality of prescribed textbook	123
4.4.14 Too loaded textbook	124
4.4.15 Acquisition of textbook	125
4.4.16 Shortage of the textbooks	125
4.4.17 Aligning the contents of the textbook with the curriculum	126
4.5 HODS' VIEWS ON THE SELECTION OF TEXTBOOKS	128
The selection of textbooks for teaching Mathematics	128
4.5.1 Involvement in the selection of the textbook	129
4.5.2 CAPS Compliance	129
4.5.3 Time of selection	130
4.5.4 Assistance given to teachers in selection of textbook	131
4.5.5 Textbook as a guide	133
4.5.6 Alignment of lesson plan with the content of the textbook	133

4.5.7 Method of teaching	134
4.5.8: Time of planning.....	134
4.5.9: Knowledge of the teacher	135
4.5.10 The contents of the textbook.....	137
4.5.11 Textbook as a teaching method during lesson delivery	137
4.5.12 Evaluation of the use of textbook	138
4.5.13 Follow up with teachers	138
4.5.14 Engaging the learners	139
4.5.15 New edition of the textbook.....	142
4.5.16 Language used to write the textbook.....	142
4.5.17 Acquisition of the textbook.....	142
4.5.18 Shortage of textbook	143
4.5.19: Changes in curriculum	143
4.6 SUMMARY	144
CHAPTER FIVE.....	146
SUMMARY OF THE FINDINGS, RECOMMENDATIONS AND CONCLUSIONS.....	146
5.1 INTRODUCTION	146
5.2 RESTATING THE SUB-RESEARCH QUESTIONS	146
5.3 SUMMARY OF FINDINGS	147
5.3.1 The selection of textbook for teaching Mathematics	147
5.4 The use of Mathematics textbook for lesson planning	148
5.4.1 Heads of department views towards the use of textbook for lesson planning	148
5.5 The use of Mathematics the textbook for lesson delivery	148
5.5.1 Heads of department's views towards the use of textbook for lesson delivery	149
5.6 The challenges teachers encountered in the use of Mathematics textbooks	149
5.6.1 Heads of department views on the challenges teachers encounter in the use of Mathematics textbook.....	150
5.7 CONCLUSIONS.....	150
5.7.1 The selection of Mathematics textbook by the teachers.....	150
5.7.2 The use of Mathematics textbook for lesson planning	151
5.7.3 The use of Mathematics textbook for lesson delivery	152

5.7.4 Challenges encountered by teachers in the use of Mathematics textbooks.....	153
5.8 CONTRIBUTION OF THE STUDY	154
5.9 RECOMMENDATIONS.....	155
5.9.1 Parents.....	156
5.9.2 Teachers.....	156
5.9.3 Head of department	156
5.9.4 The school authority	157
5.9.5 Department/Policy makers.....	157
5.10 SUGGESTIONS FOR FURTHER STUDY	158
5.11 CONCLUDING REMARKS	158
REFERENCES	160
APPENDIX A: ETHIC CLEARANCE CERTIFICATE.....	177
APPENDIX B: LETTER OF PERMISSION TO SCHOOLS	179
APPENDIX C: PERMISSION LETTER FROM THE DEPARTMENT.....	182
APPENDIX D: LETTERS OF CONSENT-CHILD ASSENT TEMPLATE	184
APPENDIX E: LETTERS OF CONSENT-PARENT CONSENT FORM.....	188
APPENDIX F: CONSENT FORM.....	193
APPENDIX G: INTERVIEW QUESTIONS FOR HEADS OF DEPARTMENT.....	195
APPENDIX H: INTERVIEW QUESTIONS FOR TEACHERS.....	197
APPENDIX I: OBSERVATION PROTOCOL	199
APPENDIX J: LANGUAGE EDITING CERTIFICATE.....	200

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

The roles of a good Mathematics textbook are: fostering discovery by the learner, presenting life-like tasks and problems to solve, as well as popularizing Mathematics among the children. In order to fulfil those tasks, the textbook writers should, not only be keen Mathematics scientists, but also very well informed in pedagogy. They ought to be aware of the functions of textbooks (Manolescu, 2004; Karlovitz, 2005; Kojanitz, 2005), and of the requirements they have to meet, so that the primary school children would have really good Mathematics textbooks to use. Although a number of studies have examined the role of new technologies in terms of tool use (Lerman, 2006), the role of the Mathematics textbook as an instrument for teaching and learning has not gained much attention. So far, a number of studies have examined the use of Mathematics textbooks by teachers (Haggarty & Pepin, 2002; Johansson, 2006; Pepin & Haggarty, 2001; Remillard, 2005) but there is a dearth of research into the use of Mathematics textbooks by students. This is striking because, as pointed out by Lerman (2006), textbook authors regard the student as the main reader of the textbook and effective interaction with them and the subject matter lead to the achievement of desired outcomes.

This chapter explores international and national use of Mathematics textbooks by the primary school teachers, which the study relates to the South Africa context. The problem statement, research questions, research objectives, significance of the study, and the study scope is discussed.

1.2 BACKGROUND TO THE STUDY

Mathematics is the foundation for the economic and technological development of any nation. It has been asserted that Mathematics is expected to help in accelerating social, economic and technological progress of any society (Azuka, 2014). The Primary school level is very important in any educational system, because any inadequacies at this level permeate to other levels of the education system (Kolawole, 2010). According to Michael (2013), Mathematics can be broadly interpreted as

something a person does in order to solve real life situations. It can also be likened to a tool to solve problems, such as in Science and Geography. In the teaching and learning of Mathematics at the primary school level, there is an array of materials that the teacher can choose from, that will be appropriate for the level of the students (learners) being taught. Of these various materials, textbooks are germane, as they facilitate the teaching and learning process at whatever level of instruction (Michael, 2013).

From one continent to another, the teaching and learning of Mathematics varies. Therefore, the practice of Mathematics teaching and learning shall be briefly examined from different contexts. Textbooks are among the most important artefacts in Mathematics education. "The textbook should arouse students' interest in learning Mathematics, help students to study Mathematics actively, develop students' potential in creativity through the process of learning basic knowledge, improve students' mathematical thinking when trying to understand the essence of Mathematics knowledge, and raise students' awareness to apply Mathematics knowledge in everyday lives" (Lepik, 2015:6)

One crucial role teachers play in the school context is to transform and implement curricular ideas in classrooms. In their implementation processes, they often benefit from different types of curriculum materials, including textbook and other written resources. Curriculum materials are an integral part of teachers' daily work, and offer ongoing support for pedagogy and subject matter throughout an entire school year (Collopy, 2003). They provide ideas and practices which frame classroom activity via text and diagrammatic representations (Brown, 2009). The written curriculum materials such as the textbook, worksheet, and teachers' guide are mostly used as curriculum materials in the school context. The textbook is one of the widely used and trusted curriculum materials that is directly related to teachers' teaching and students' learning (Beaton, Mullis, Martin, Gonzalez, Kelly, & Smith, 2006). Although the term 'curriculum materials' has a general meaning involving a variety of resources, this study focused on the use of Mathematics textbooks and accompanying student workbooks, teacher guidebooks, and other written resources available to teachers.

In general, the Mathematics curriculum materials such as textbooks, texts, computer software, and geo boards are built into mathematical and instructional intentions and

possibilities for school Mathematics (Adler, 2001). Mathematics curriculum materials have been viewed as a critical resource for students' learning of mathematical content and teachers' mathematical instructional decisions; and teachers are accustomed to using them to guide instruction (Stein & Kim, 2009). There is, therefore, a sense in which the Mathematics textbook is used "as source of problem and exercises, as reference book, and as a teacher in themselves" (Howson, 1995: 25). Teachers often rely heavily on textbooks for many decisions, such as what to teach, how to teach it, and what kinds of tasks and exercises to assign to their students (Robitaille & Travers, 2002). It is reasonable to agree that the Mathematics textbooks as important as they are can create challenges to both teachers and learners.

Studies carried out over the past 25 years on how curriculum is actualised in schools, have investigated the teachers' interactions with curriculum materials and the role of the curriculum materials (Robitaille & Travers, 2002) Understanding the curriculum contents of Mathematics depends on understanding what teachers do with Mathematics curriculum materials, why and how their choices influence the classroom environment (Remillard, 2009). The value of the materials most likely depends on the ways in which they are used (Cohen, Raudenbush, & Ball, 2003). In this sense, teachers' understanding of the use of textbooks and other relevant written resources plays an important role in exploring the pedagogies used in the classroom.

Research has shown that when teachers interact with curriculum materials, they do so in dynamic and constructive ways, rather than in a straightforward process (Brown, 2009; Davis & Krajcik, 2005; Remillard, 2005). Teachers frequently make changes to the curriculum intentions and modify the changes according to the structure and the purpose of lessons. In the adaptation to these changes, the availability, quality, and flexibility of the curriculum materials plays a critical role in teachers' decisions. In general, teachers transform the curriculum ideas, lesson plans, and mathematical tasks into real classroom activities (Remillard, 2005). In doing this, there will be effective teaching and learning to enhance desired outcome.

Understanding the teachers' interactions with curriculum materials requires an integrated analysis of the curriculum materials use in the classroom teaching and

learning context. For example, Brown (2009) identifies a way of interaction between teacher and curriculum materials which involves multiple steps. According to this interaction, teachers first *select* materials. However, the selection is often decided by others. Second, they *interpret* these materials in planning and during instruction with regard to their perception of materials. Third, they *reconcile* their perceptions of the intended plan with their own goals and with the limitations of the setting. Fourth, they *accommodate* the students' interests, experiences, and limitations. Finally, they *modify* the setting according to their own decisions and to their students' capacities. These steps partly reflect the dynamic and constructive relationship between teachers and textbooks.

The value of textbooks in primary school Mathematics education is hotly debated (Zevenbergen, Dole, & Wright, 2004), and more than any other subject area, Mathematics teacher relies heavily on their use (Johansson cited in Jamieson-Proctor & Byrne, 2008). The mandated use of a set textbook series across Grades or classes in a school is not uncommon in Australia; with some schools employing them as pseudo-curricula (McNaught, 2005). While quality textbooks are usually published with teacher-manuals which provide a range of teaching activities that include the textbook as a resource, it is not unusual for these manuals to be unavailable for teachers, and for the textbook to form the basis for Mathematics lessons (McNaught, 2005).

Textbooks are traditionally connected with a transmission model of teaching (Alsup, 2003; Boaler, 2008). This model focuses on a procedural approach to the teaching of Mathematics, and subsequently promotes a procedural rather than conceptual understanding of Mathematics, which has limited value when students are placed in unfamiliar situations (Boaler, 2008). This approach also focuses on the production of correct solutions rather than the thinking processes involved in coming to a solution (Wood, Williams, & McNeal, 2006). It often sees the culture of the Mathematics classroom embodied in correctness, precision, prompt recall, and speedy task completion (Bauersfeld, 2002).

A good Mathematics curriculum is based on rich mathematical tasks (Williams cited in Skoss, 2005); tasks that are "authentic", have a variety of solution paths, and require

thinking and understanding, rather than memorizing facts, procedures and techniques (Booker, 1999: 2). Mathematical tasks that are investigative and open-ended in nature encourage students to work mathematically and develop mathematical understanding (Catholic Education South Australia, 2004). In reform-oriented classrooms, written work is designed to help students develop a deep understanding of the Mathematics, enabling them to clarify their thinking, make connections, and understand new concepts. In such contexts, writing is used to support explorations and investigations by recording and/or explaining procedures, student thinking and solution attempts (Waters & Montgomery, 1993), enabling teachers to gain insights into students' thinking (Booker, 1999; Waters & Montgomery, 1993). This type of written work is consistent with the 'substantive communication' element of the New South Wales (NSW) model of pedagogy, where students are regularly engaged in "sustained [oral, written or artistic] conversations about the concepts and ideas they are encountering" (NSW Department of Education and Training, 2003: 11).

1.2.1 Features of textbook

Mathematics textbooks, as all textbooks, have to align with the subject curriculum. The subject curriculum contains the pedagogical content on offer for each subject for a school year. The subject curricula from Romania have a unitary structure built up of the following blocks: general and detailed design requirements, learning activities, learning content, output descriptors, methodological suggestions, and assessment methods (Fodor, 2015).

The textbook is the document that conveys information and processes, and lets information be processed (Fodor, 2015). To the teacher, it gives direction and guidance while to the learner it is the main tool for scientific learning and discovery. Textbooks have spread in Romania owing to a reform in education. Unfortunately, it is not always possible to choose from several Mathematics textbooks in Hungary, as there are study years for which only one Mathematics textbook has been designed.

For the textbooks to fulfill their real function, they need to meet certain requirements. Let me sum up the criteria that textbooks should meet according to literature. Five important criteria are: appropriate look/design (esthetical criterion), style, correct

and high- quality language use, structure, as well as content and approach (Karlovit, 2005; Kojanitz, 2005).

1.2.2 Features of primary Mathematics teaching

In the Hungarian schooling system, there is a smooth transition between kindergarten and Year 1 Mathematics. At the early stage, the learners focus on mental progress in counting and calculations, relations and orientations, while preparing for digit and sign writing. They practice vertical, horizontal then slanting line patterns, in square grid rows, followed by curved line patterns. The grid size is gradually reduced to the normal size. While children work on this, the teacher monitors, corrects and evaluates (praises) the work of each child at any time (Burghes, 2012).

During the first two years of schooling, many teachers prepare colorful demonstrative models for the questions which they have developed or use the textbooks. Demonstrative models are used for whole class interactive work or for discussion after the individual work. As children progress into the third year, the presentation of the Mathematics lessons becomes less colorful and there is a greater emphasis on performance and competition. There is little use of ICT in Hungarian primary Mathematics lessons apart from the use of overhead projectors (Burghes, 2012).

In the autumn term, children are introduced to the reading and writing of number digits from 1 to 10 in a very systematic way, followed by numbers up to 20 in the spring term. Many different models of the number are connected to the digit, either in the textbooks or in the classroom. Decomposing, completing, taking away and adding, comparing, relations and ordering are always modelled with pictures, drawings or manipulative tools such as corn pieces, coins or sticks. The operations of addition and subtraction are always introduced at the same time, along with open sentences (equations and inequalities), relations and ordering. These are frequently built in real life or fantasy contexts. When pupils have become skilled at reading and writing numbers, they are introduced to representations on number lines (Burghes, 2012).

During the first two years of schooling, many teachers prepare colorful demonstrative models for the questions which they have developed or use the textbooks. These are used for whole-class interactive work or for discussion after the individual work. As children progress into Year 3, the presentation of the Mathematics lessons becomes less colorful and there is a greater emphasis on performance and competition.

The Mathematics curriculum in Hungary includes the introduction of mental multiplication and division from Year 2, and the four operations involving numbers up to 100 in that year. From Year 3, formal addition, subtraction and multiplication is taught, and formal division is introduced from Year 4. In contrast to the Mathematics curriculum in other countries, Hungarian primary pupils are taught about decimals and percentages only from Year 5 and the use of rectangle or circle fraction models is frequent. They rarely encounter negative numbers until Year 4, these make the use of textbooks very important at all level.

Furthermore, data handling and probability are not taught prior to Year 5, and pictograms are rarely used. Often, long text word problems pose difficulties for many Hungarian pupils as well as shorter context questions. For example, Hungarian pupils are more experienced in combination of questions (Burghes, 2012).

In Japan, due to a large wave of teacher retirement in recent years, as reflected in a Ministry report (2013), Japanese elementary schools have been experiencing a radical demographic transition. Moreover, it is expected that about 37% of elementary school teachers will be at the retirement age of 60 years in the next ten years. This has left newly hired teachers without the collegial support of experienced teachers necessary to develop skills needed to teach through problem solving.

In addition to the above challenge, the 2008 course of study (COS) increased the emphasis on mathematical processes such as thinking mathematically and expressing thoughts and ideas using mathematical representations, such as diagrams and equations. In order to address these new concepts, all classroom teachers are expected to regularly provide each student with opportunities to think mathematically and to express their own thoughts. In order to implement the new COS, Japanese teachers, especially those who have had less than 10 years of experience, need to consider, not only how the amount of content has changed, but also how to design lessons that will push all students to think mathematically and to communicate their ideas in such a way as to learn multiple ways of thinking mathematically (Fujii & Litaka, 2012).

In order to overcome the above challenges, the latest edition of a major Mathematics textbook series includes more resources to assist teachers in their instruction through problem solving, and to help students to learn through problem solving. The book-

series contains alternative approaches for solving a problem, provides diagrams meant to help students solve problems independently, and includes separate pages that teach students how to take notes effectively.

The following section highlights how the text has increased its support of problem solving, and relates the changes to recent trends in Japanese Mathematics textbook design by comparing the latest two editions of the best-selling elementary Mathematics textbook series—the 2006 edition and the 2011 edition (Fujii & Litaka, 2012)

The 1990's was a very fruitful decade in Finnish Mathematics education. The National Board of Education published a guide book (Seppälä, 2014) to help teachers in implementing the curricular framework (NBE 2014). Furthermore, new textbooks (usually three or four competing series) were published according to the curricular framework. For that decade, both in the elementary level (Grades 1–6) and in upper level (Grades 7–9) of the comprehensive school, there was a published book series devoted to, especially, developing pupils' thinking and problem solving skills. For example, the Mathematics book for Grades 7–9 of the comprehensive school, "Matka matematiikkaan" [A Journey to Mathematics] as it is called in Finland (Espo & Rossi, 2016), was launched. The focus of this textbook was teaching Mathematics via problem solving. Almost all the content was introduced via real problem situations. On one hand, the use of the book demanded much preparatory work from teachers' side, but on the other hand, it made Mathematics teaching more interesting and an adventure for pupils. But the time seemed not ripe for such radical textbooks, since teachers were not willing to accept them, preferring to stick to traditional Mathematics books. For example, the upper school textbook (Espo & Rossi, 2016) was selected only by a few teachers, less than 10%. However, the influence of these books can be seen in the next generation of Mathematics text books from other printing houses.

Within differing levels of education in Finland, there is an emphasis on different aspects of teaching; alongside the role of the teachers and their beliefs about what is important in teaching (Leino, 2014; Pehkonen & Lepman, 2014). Teachers' beliefs influence their methods of teaching, which in turn, convey ideas about the nature of Mathematics to pupils. For example, a traditional view of Mathematics considers it as a hierarchical construction of knowledge, where the knowledge represented is objective, faultless and

universal. The main aim of teaching is therefore, to convey this knowledge. In contrast, the view of Mathematics as a human activity considers the strategies people use to solve problems, the context in which continuous change, cultural factors, school subjects and the practice that represents them are of great importance to values and imperfection. Alternatively, the teaching of Mathematics can emphasize problem-centered teaching and the process of teaching Mathematics itself (Leino, 2014).

The Finnish National Core Curriculum of Mathematics (2004) advocates Mathematics teaching which is underpinned by the theory of constructivism. Therefore, emphasis is placed on the meaning of the language for both thinking about mathematical concepts and learning mathematical knowledge. There is also the recognition that pupils require experiences which involve meaningful learning processes. Teachers take an important role in identifying pupils' levels of development and providing appropriate opportunities for pupils to create their own internal models of the mathematical knowledge in question (Yrjonsuuri, 2008).

The key purpose of teaching Mathematics is to offer pupils' possibilities to develop mathematical thinking, learn mathematical concepts, and develop efficient strategies to solve problems or tasks. Effective teaching strategies develop both creative and exact thinking and guide pupils to analyze problems and find solutions. Systematic Mathematics teaching forms a solid basis for pupils to develop an understanding of mathematical concepts and structures (Espo & Rossi, 2016). However, poor textbook cannot support pupils to bridge their experiences and mathematical reasoning with the abstract mathematical system. There is a need to provide pupils with everyday problems which can be solved through mathematical thinking or the effective use of mathematical operations. Also information technology should be used to support pupils' learning process (The Finnish National Core Curriculum of Mathematics, 2004).

In Finland in Grades 1 to 2, the main tasks in Mathematics teaching are to develop mathematical thinking, to practice concentrating, listening and communicating, and to gain enough experience to be able to form the basis for the understanding of mathematical concepts and systems. In Grades 3 to 5, the basic task of teaching is to develop mathematical thinking, prepare the ground for learning mathematical thinking strategies, strengthen the number concept and the four fundamental arithmetical operations, and gain experience that forms the basis for understanding mathematical

concepts and systems. During Grades 6 to 9, the main task is to deepen the understanding of mathematical concepts and offer sufficient basic skills, namely: modelling of everyday problems; learning the mathematical models of thinking; and practicing remembering, concentrating and expressing things in a precise way (Espo & Rossi, 2016).

The focus of the research carried out in Finland is to determine how students and teachers at Finnish upper secondary schools perceived and described their use of the theory, examples and exercises presented in their Mathematics textbooks. Seventy-one students participated in a short survey, and six of them and three of their teachers were interviewed. The results indicated that the theory, examples, and exercises presented in the textbooks had a strong influence on teachers' work, but for the students the textbooks primarily represented a source of exercises.

A textbook is a very essential element in the teaching and learning of Mathematics. It is an important tool for students, but it may also affect a teacher's choices in a number of different ways. It is generally known that teachers base a major part of their teaching on textbooks. As long ago as the late 1970s, it was found that in Germany and the USA, roughly half of all teachers used no other materials besides their textbooks in their preparation of lessons (Haggarty & Pepin, 2002).

The role of textbooks has changed gradually in the past few decades. In Sweden, for example, the education inspectors conducting a school evaluation found that the teaching of Mathematics at Swedish lower secondary schools relied on the use of textbooks more than was the case for any other subject (Johansson, 2006). Johansson (2006) found in her study that students were working individually with textbook tasks for more than half of each lesson, and the students' homework was also taken from the textbook.

Results regarding the quantity of use of student textbooks in Australian schools are consistent with the findings of published research from international studies, which found out that textbooks are basically used as the defector curriculum (McNaught, 2005; Watt, 2002). Findings from a recent nationwide study conducted on the role of curriculum materials in Australian Schools indicated that textbooks used 86.6% of the time during scheduled lessons and played an important role in the development of the curriculum (Watt, 2002). Despite the lack of Australian evidence endorsing

their positive value, student textbooks are a mainstay in primary Mathematics classrooms, and in many instances, are used daily by the classroom teacher. Despite this reality, very little research carried out in the Australian context, particularly in recent times, has been dedicated to examining the efficacy of textbook use in primary Mathematics classrooms, nor the reasons teachers rely on them so extensively (McNaught, 2005).

Estonia has a long tradition of developing its own Mathematics textbooks. Nowadays, there are several alternative textbook series on the market for every Grade. Textbooks are free for pupils studying at the compulsory school level, and schools supply all pupils with the necessary textbooks. Normally, teachers make a joint decision at the school level regarding which textbook series will be used. It is also common practice that schools prescribe textbooks to be circulated. They are used for two or three consecutive years. This means that a quick change of the textbook used is not possible (McNaught, 2005).

Typically, materials presented in Estonian textbooks are structured according to the topics which include material for several sequential lessons. Every topic starts with the presentation of new content, and often there are examples, followed by a set of tasks and activities. In order to meet the different needs of pupils, the tasks in the textbooks are organized in modules based on their complexity. Thus, there are always more challenging tasks available for more able pupils. And it is a prerequisite for pupils to have the textbook for every lesson. Learning Mathematics with a textbook comprises activities such as reading explanatory texts and acquiring a new content, analyzing tables and graphs, looking through worked examples, solving tasks, etc. It is the teacher who arranges the students' use of textbook materials during the lesson. So, the same textbook, playing the role of an instructional tool, could be used differently in different Mathematics classrooms. Teachers may, or may not, use the textbook in the lessons; they may simply use it as a source of exercises or they may utilize the full potential of the materials presented in the textbook.

Pupils have a limited access to different components of textbooks, and in this way, textbooks are not fully used as multi-faceted resources for pupils' learning. Textbook use in Mathematics classrooms in Estonia has not been studied systematically, and it appears that the different ways in which our teachers and pupils employ textbooks in their lessons are relatively unknown. We therefore, miss information on the way

the textbook is used as an instructional tool in Mathematics classrooms, and on which components of the textbook are actively used and which are not (McNaught, 2005).

In Czech Republic, textbook usage in primary and lower secondary schools still requires approval by a central authority; namely the Ministry of Education. Non-approved materials can be used, but are not subsidized by the state. However, schools can choose from quite a large selection of prior-approved textbooks, usually between six and ten, on each subject by various publishers. Upper secondary students are expected to purchase textbooks themselves, which causes some problems, especially in vocational schools. As a rule, primary and lower secondary school teachers may decide, as committees, on their choice of textbooks. The head teacher of the subject or department holds the final vote. Students are provided with textbooks for all subjects, with the exception of Arts and Physical education. Textbooks are provided free of charge to first Grade pupils. From second to ninth Grade, textbooks are supplied on loan for the year. Students may take their textbooks home. Depending on the financial situation of the school, every five or six-years, textbooks are changed and students provided with newly selected titles (Ferrini-Mundy, 2010).

According to Ferrini-Mundy (2010), Czech educational system is traditionally tied to textbook use. Even though usage is not obligatory, teachers and students are expected to work with textbooks extensively. The curriculum reform that has recently been carried out in Czech primary and secondary schools has yielded two notable changes which have implications for textbook use, namely: an educational model primarily aimed at acquiring generic competences, and decentralization in curriculum decision-making. The reform based educational programs have been developed centrally. Teachers in schools need to transform them into school educational programs according to the local conditions (Ferrini-Mundy, 2010).

In the United States of America, there is no national curriculum. Each State or education district (within a state) develops its own curriculum, assessment policies and procedures. Professional development initiatives are aligned to the national academic standards that stipulate what a learner should know and be able to do. A standardized math tests is used to determine these competencies (Ferrini-Mundy, 2010). Mathematics teaching is geared towards preparing learners for the workplace, further education and for citizenship. The National Council for Teaching

Mathematics (NCTM) developed Principles and Standards that insist on Mathematics being taught as an activity, and that guide the instructional efforts to shape the learners' abilities to explore, conjecture, reason logically, formulate and solve problems, communicate mathematically, as well as develop their confidence in doing Mathematics (NCTM, 2012: vi). For teachers to be effective in Mathematics teaching, they should understand what learners know and need to learn, and then challenge and support them to learn it well (NCTM, 2012: 2). It is, however, noted that the teaching of Mathematics is done differently from district to district or state to state across the country. For example, the state of Connecticut developed 'Math Connections' that seek to show learners the interrelationship among topics within Mathematics, and between Mathematics and other subjects; and also introduces learners to technology through computers and graphic calculators (Hopkins, 2012).

According to Hopkins, 'Math Connections' has been acclaimed because: in post-high school education, learners who used the programme tend to outperform those who do not; it also helps learners apply their knowledge, critical-thinking and problem-solving skills; and it integrates different topics in Mathematics and, as a result, learners no longer have a piece-meal perception of Mathematics (i.e. as a set of disjointed aspects). Furthermore, it provides real world situations and contexts to make sense of various mathematical aspects, and it thus, enables learners to use Mathematics in their everyday lives and makes Mathematics exciting and fun to learn.

The Mathematics teaching approach in Connecticut is different from that in other parts of the United States of America. Dossey, Halvorseen and McCrone (2012) noted heavy reliance on textbooks that contain theoretical tasks intended to practice routine problem solving procedures. This means that no connection is made between real life context and mathematical aspects in class. Calculator use has become popular over the years (Dossey, Halvorseen & McCrone, 2012) whereas calculators are forbidden in Japan (Mastrull, 2002). In their excerpt on the effects of calculator use on the arithmetic proficiency of undergraduate Mathematics students, we found that those who started to use calculators early in their schooling and those who habitually used calculators, were disadvantaged in mental computations (Mogari & Faleye,

2012). Dossey, Halvorseen and McCrone (2012) also indicate that the Mathematics curriculum is topic-based and learners tend to select topics to study. There have been attempts to blend topics such as algebra, geometry, functions and data analysis in highly connected and integrated body of knowledge where emphasis is on modelling and applications but, regrettably, the number of learners enrolled in such Mathematics courses has remained small (Hirsch, 2007).

1.2.3 Use of textbooks in Mathematics teaching in African primary schools

The availability of educational material, such as textbooks and manuals, is another factor that impacts education quality. Several studies in Africa have documented the strong positive effects of textbooks on learning achievement (PASEC, 1999; Mingat & Suchaut, 2000; Pôle de Dakar, 2002; UNESCO, 2004).

In Nigeria, the monitoring of learning achievements in Mathematics involves the processes of testing, measurement, assessment and evaluation. A test is a set of questions, tasks or problems intended to measure an individual's knowledge, skill, aptitude, intelligence etc. Testing is therefore, a systematic procedure of presenting a set of questions, tasks, or problems to test, and elicit their response to the items, either orally or written, and sometimes by performance within a specified time schedule. Measurement is the assignment of numbers or marks to observed event or response to testing. Assessment is the process of using the results from measurement to take decisions about the object of assessment. Evaluation is a systematic process of determining the extent to which the learners have achieved the stated instructional objectives. Assessment provides the logic and justification for the judgmental stance of evaluation (Anikweze, 2010).

Assessment is an integral part of the teaching-learning process and is expected to contribute to students' learning. If assessment does not contribute to the teaching learning process, then it is not necessary to assess the students. Evaluation is an important aspect of good teaching and learning process because, no matter how efficient the teacher is, how intelligent the pupils are, how adequate the audio-visual equipment is; if no provision is made for some evaluation of progress, the teaching may be invalidated. Unfortunately, some teachers see assessment as an isolated

activity from the teaching and learning processes. Hence, some teachers haphazardly carry out the assessment processes of the pupils without utilizing the goals and benefits of assessment in the classroom. Some of the teachers see assessment mainly for the purpose of grading the pupils (Anikweze, 2010). From the onset, one of the functions of textbooks are to help in the assessment of learners' understanding.

In the Nigerian education system, Continuous Assessment was introduced in 1982 for the assessment of students at all the levels of the education system. This replaced the one-shot, or end of course only summative evaluation practiced in the past. Under this system, teachers evaluate the learners using written tests, assignments, projects and other assessment instruments during the course and at the end of the term or session. The continuous assessment given during the course accounts for about 30-40%, while the end of term assessment accounts for 60-70% of a pupil's scores. This gives teachers the opportunity to monitor and assess the learning progression of the pupils in his class (Anikweze, 2010).

The continuous assessment is guidance oriented. This requires the skills of teachers in test construction, administration and record keeping. Teachers are expected to construct valid and reliable tests which can be used in all schools with the help of textbook, following established procedures and practices of test construction. In addition to test construction (which is mainly on cognitive aspect of learning), teachers should also be able to measure the learners' affective attributes such as attitudes, motives, interests, values and other personal characteristics. The teachers should also be able to provide clues or measures about the physical alertness and patterns of learners' psychomotor attributes. The continuous assessment is regarded as comprehensive as it is expected to measure the cognitive, affective and psychomotor domains of learners; hence the role of textbooks cannot be overemphasized in achieving the desired learning outcome.

The school curriculum in Zimbabwe is underpinned by Ralph Tyler's four considerations of purpose, experience, organization and evaluation (Mogari, 2014). According to Ncube (2013), effective Mathematics teaching is more prevalent in private schools than in public schools where teachers display low morale due to low salaries and poor working conditions. Nevertheless, there are still traces of hard-work and commitment among some public school teachers, who unlike their

disheartened colleagues, make clear the topics they intend teaching, the objectives to be achieved, and also link content taught with the one already taught (Ncube, 2013).

In a typical lesson, a teacher first introduces the content of the day then provides illustrative example(s), and thereafter, learners are given tasks to collaboratively work on (Mthetwa, 2013). Mthetwa also reports that problem-solving activities are virtually non-existent in lessons, and despite group-work approach being generally used, responding in chorus to questions the teacher poses is predominant.

In most countries, the supply of reading and Mathematics textbooks for pupils in public primary schools is not sufficient (Ncube, 2013). This suggests that some children have to share textbooks or would not have access to textbooks. In three out of ten countries' reporting data, there are two or more pupils per reading book, while – with the exception of Benin, Central African Republic, Chad and Gambia – the availability of Mathematics textbooks is even worse than for the other subject textbooks.

The situation is particularly acute in Cameroon and the Central African Republic. In the former, there is only 1 reading textbook for 11 pupils and only 1 Mathematics textbook for 13 pupils. In the Central African Republic, 8 pupils on average must share the same reading or Mathematics textbook (Kojanitz, 2005).

In Cape Verde and Mauritius, the ministries of education report that Mathematics textbooks are free and provided by schools to pupils in all Grades of primary education. In Burkina Faso, Guinea, Madagascar, Mali, Niger and Rwanda, there is enough Mathematics textbook for every pupil. Similarly, in Benin, Niger, Nigeria and Rwanda, there are as many Mathematics textbooks as pupils. However, while national-level data may suggest that all pupils have access to books in these countries, this may hide sub-national disparities. For example, pupils in some schools may have a textbook per learner, while shortages may persist in others (Burger, Sukhdeep & Trucano, 2015).

While the paucity of data makes it difficult to know how the availability of textbooks has changed over the past two to three decades, textbooks were very scarce in sub-Saharan Africa (SSA) in the 1980s and 1990s. Across the region, the stagnation of education budgets in the 1980s and early 1990s led to decline in public expenditures per pupil, often resulting in the imposition of school fees and/or the need for parents

to pay for textbooks, for example, data for 14 SSA countries for the late 1980s indicate that the majority of primary school students in most countries did not have textbooks or the number of students per book was very high (Lockheed & Verspoor 1990, 36). Books were particularly scarce in rural areas, and mostly had to be purchased by parents, sometimes at subsidized prices (Colclough, 2003).

The desperate need for textbooks has been established in one appraisal report after another, where pupil-textbook ratios range anywhere from 1:5 to 1:10, or worse. School children in tiny Sao Tome e Principe had no textbooks in the late 1980s. Across Zambia in 1993, schools had only one textbook in English for every five pupils, one in Mathematics for every eight, and one in social science for every twenty. In the same year in Uganda, the ratio averaged 1:6 of Mathematics textbook despite two previous infusions of textbooks under IDA credits. Acute shortages were most often caused by financial austerity, inadequate management, or logistical impediments. Books were destroyed in civil wars in Angola and Sierra Leone; in Burundi and Rwanda by genocidal conflicts; and in Mozambique by floods. Colclough (2003, 183), providing data on book availability for nine countries (Ethiopia, Ghana, Guinea, Malawi, Mali, Senegal, Tanzania, Uganda, and Zambia) found that, on average, about five pupils shared one Mathematics textbook; with the range being from two in Ghana to ten in Guinea.

The much higher growth in domestic and external education funding since 2000 has eased some public budget constraints on textbook provision, and facilitated a move away from school fees. This shift has also facilitated a strong and welcome increase in enrolments and, thus, a sharp increase in the need for textbooks. For example, in 1990, the average gross enrollment ratio for SSA was only about 74 percent. The ratio was below 40 percent in about 10 countries, and the highest enrolment was in urban areas. By 2010, enrolment had increased dramatically, with the average gross enrollment ratio at 103 percent, with only five countries having GERs fewer than 80 percent. Over this 20-year period, primary school enrollment in the region more than doubled (from 62 million to about 133 million), including an increase of 46 million between 2000 and 2010. Secondary school enrollment nearly tripled over this period, from 15 million in 1990 to 44 million in 2010 (Burger, Sukhdeep & Trucano, 2015).

In order to deal with this rapid enrollment increase, and to remedy the past low book provision, it necessitated a sharp increase in textbook provision over the past decade. However, most SSA countries did not manage to respond adequately. The problem of inadequate supplies of books and materials is, especially acute at the primary level where an annual expenditure of about \$5 per pupil should meet minimum requirements (Burger, Sukhdeep & Trucano, 2015). Data on textbooks availability are inconsistent and often difficult to compare across countries. Even when textbooks are physically available in a school, they may not be available for students to use. Anecdotal information suggests that available books might be locked up instead of being distributed to the students, either because they are costly and difficult to replace, and teachers therefore copy the text from them on a black board; or teachers are absent and students don't have access to the books.

Colclough (2003) laments the shortage of textbooks in different parts of sub-Saharan Africa. This is a fact corroborated by a recent finding of some scholars that explored the acute shortage of books and materials supplies, especially at the primary school level. The argument advanced by Colclough (2003) is buttressed by figure 1 that shows the primary pupil-textbook ratio for reading and Mathematics in 2010 (Burger, Sukhdeep & Trucano, 2015).

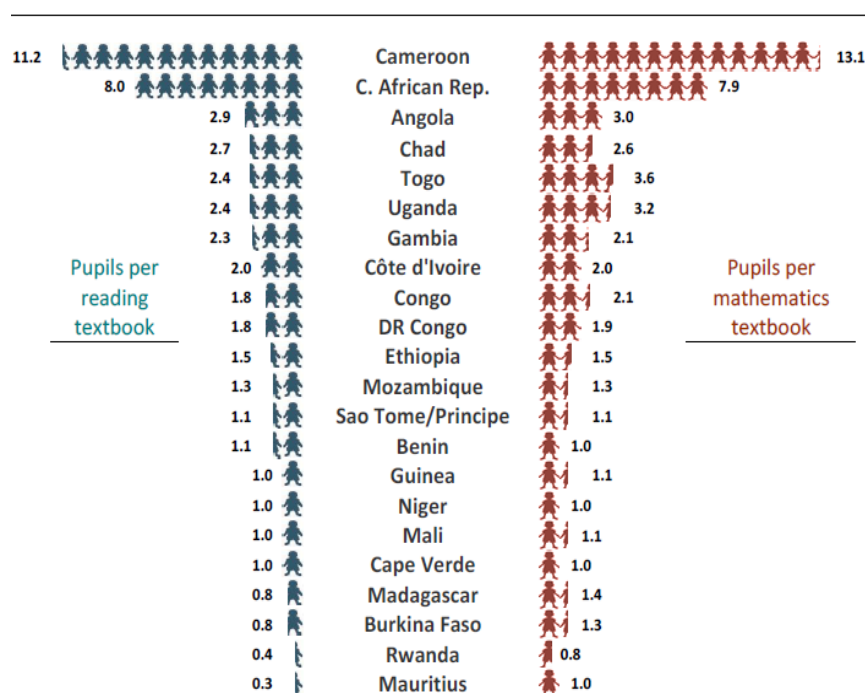


FIGURE 1 PRIMARY PUPIL-TEXTBOOK RATIO FOR READING AND MATHEMATICS, 2010 OR LATEST YEAR

Source: UNESCO (2012:6) Institute for Statistics database

The acute shortage of relevant and useful mathematics textbook observed long time ago, seems to prevail at present. Figure 1 shows the number of pupils per Mathematics textbook and reading textbook. The highest level of disparity in terms of ratio of pupils per Mathematics textbook is in Cameroon which stands at 13.1, Central African Republic at 7.9, and Angola at 3.0 etc. According to Global education monitoring report of 2016, countries such as Kenya, Nicaragua, Sri Lanka, and Tanzania release grants en-bloc for textbooks and other teaching and learning materials but these have been grossly insufficient due to budget cuts from their respective governments. Coupled with the inadequacy of funds for textbooks and other teaching and learning materials, is the fact that the budget allocation is released late, and therefore, there are no available funds to buy textbooks on time (UNESCO, 2016).

1.2.4 Effect of textbook shortage on learning

The importance of appropriate textbooks in improving the quality of education has been increasingly highlighted since the 1990s (Burger, Sukhdeep & Trucano, 2015). In developing countries where there are limited resources, textbooks in appropriate

languages and at appropriate levels of difficulty are shown to be relatively low-cost inputs with high returns in terms of student achievement. A growing body of evidence confirming the critical role of textbooks in improving student achievement has influenced education policies. Swaziland has been providing free textbooks to all primary school pupils since 2003 (Burger, et al. 2015). Other countries, including Guatemala and Nicaragua, have also introduced free textbook programs targeting the most disadvantaged. In Ghana, an impact evaluation of a programme supporting basic education found that progress in Mathematics and English test scores between 1988 and 2003 was partly due to the increased availability of textbooks (Burger et al. 2015). In South Africa, students, especially girls, do better on reading tests when they have their own copies of textbooks (Zuze & Reddy, 2014).

A cross-country analysis based on data from regional assessments in 22 sub-Saharan African countries shows that pedagogical resources, especially textbooks for the core subjects of reading and Mathematics, are effective in improving learning. Providing one textbook to every student in a classroom increased literacy scores by 5–20% (Burger et al. 2015), in Burkina Faso, Cameroon, Côte d'Ivoire, Madagascar and Senegal, even when a limited number of pupils had access to textbooks in the classroom, literacy skills of their peers who have textbooks assisted them to improve with the help of knowledge sharing (Burger et al. 2015). However, while the above assertion might be true if the pupil-to-textbook ratio moves from 1:1 to 1:2, a World Bank study has shown the negative impact on learning to be far more significant when moving from a ratio of 1:2 to 1:3. Based on the aforementioned, the researcher finds it imperative to examine how textbooks are used by teachers in the teaching of Mathematics in primary schools in East London education district.

1.2.5 The use of text books in South African schools

Curricular changes in South Africa have run parallel with varying views on the development and use of textbook resources in schools which have not always been beneficial to the school teaching and learning community. Between 1996 and 1998, under Curriculum 2005, policy textbooks were presented in a poor light and teachers were discouraged from using them. The strong push in the C2005 years for teachers to produce their own resources rather than use resources developed by commercial materials developers, unfortunately led to resistance on the part of some teachers when the use of resources was once again encouraged with the implementation of the

National Curriculum Statements (NCS). Taylor (2008) notes this in his report, 'what's wrong with South African Schools?' He says, "Teachers have turned their backs on what is common practice around the world – [the use of school textbooks]" (2008:24). Taylor's report strongly advocates the use of text books in schools, pointing out their usefulness: "A good textbook contains, in a single source, a comprehensive study programme for the year- it lays the curriculum out systematically; providing expositions of the concepts, definitions of the terms and symbols of the subject in question, worked examples of standard and non-standard problems, lots of Graded exercises, and answers" (Taylor, 2008:19). Textbooks can facilitate the job of a teacher effectively because they offer guidance on curriculum content coverage; enable assessment coverage, and offer appropriate pacing and weighting of content, and assist teachers with lesson and year planning.

Taylor's report was followed a year later by the Report of the Task Team for the Review of the Implementation of the National Curriculum Statement Final Report October 2009, Pretoria, (pages 51-54), which clearly contextualized the importance of textbooks in South African Mathematics classrooms, at the same time noting several challenges that arose during NCS curriculum years when production of learner textbooks burgeoned, resulting in a large quality assured set of textbooks on the market. The challenges that were highlighted included: uneven quality of textbooks, insufficient provisioning of textbooks for all learners, teachers not working systematically through a single book. Teachers were encouraged to "dip in and out" of textbooks, and to develop their own worksheets and other curriculum support materials.

Most recently, the National Education Evaluation and Development Unit (NEEDU) National Report 2012 (May 2013) notes that there is still resistance to the use of textbooks particularly in the Foundation Phase (FP), stating that, "[t]here was a consensus across the schools evaluated that maths textbooks as such, were not appropriate in the FP. This attitude towards maths textbooks in the FP reflects the ubiquitous worksheet culture that dominates South African schools." (NEEDU, 2013:43).

The NEEDU report refers to the DBE learner workbooks as an "important initiative" (NEEDU, 2013:43), noting that these workbooks have been mandated for use

“supplementary to the textbooks purchased annually by schools” (NEEDU, 2013:43). The report also notes that “in the large majority of classes, learners were not issued with textbooks in Mathematics” (NEEDU, 2013:43). This report was written with the latest curriculum policy document in place (Curriculum and Assessment Policy Statement) – CAPS, but the attitudes towards the use of Mathematics textbooks do not seem to have shifted significantly since C2005. Although the national workbooks have been provided, textbooks to which these workbooks are proposed as supplementary resources are not available in schools. Some textbooks are stored in warehouses or kept in storerooms because they are not in line with the national curriculum. Also there are delays in requisitions of Mathematics textbooks, and budget constraints which affect procurement and delivery of textbooks at the right time (NEEDU, 2013). All of these points are important when considering the issue of Foundation/Intermediate Phase CAPS Mathematics textbooks.

A selection of practicing lead teachers and subject advisors in Gauteng used a screening tool to evaluate the Intermediate Phase (IP) Mathematics textbooks currently used in schools. The screening was done with a view to recommending an IP textbook for use for a large scale intervention in the province – the Gauteng Primary Literacy and Mathematics Strategy (GPLMS). The screening process looked at all the books on the national catalogue that had already been screened by experts and the Department of Basic Education focusing on quality of the Mathematics textbooks in the national catalogue (2012) and, especially those versioned into the nine official languages.

The results of this screening process were dismal, pointing to the poor quality of the books on the national catalogue list. A template was used in the screening process which called for specific examples (with page references) for comments made (both positive and negative) so that these comments could be followed up with reference to each textbook reviewed. A summary of the types of issues that arose rather than the examples from particular textbooks was drawn up for the GPLMS screening report. Review comments given by screening committee members revealed the following across the range of Mathematics textbooks which were screened (Sapire, 2012): poor coverage of the CAPS curriculum in most books, particularly the versioned books; topics broadly covered but not in enough depth or with enough substance for learners to fully achieve the CAPS requirements should they work conscientiously through the

book; use of inaccurate mathematical language which could lead to inadequate generalization of mathematical terminology and concepts by learners; worked examples provided, but the adequacy of the range of examples within the CAPS topics required not consistent across the text books, and lacking in several books; careful sequencing of topics that would build up learner knowledge and understanding not well represented across the books; poor quality of translation into all official languages from English; errors of translation of mathematical terms, missing explanations of terms (e.g. terms given without explanation), general language errors (e.g. activity instructions) and faulty layout of mathematical exercises (errors after translation). The provision of IP Mathematics textbooks on the national catalogue list, according to this screening, needs to be reviewed and reconsidered.

Similarly, at FP level, the issue of multilingual approach affect materials provision in the FP. Such an approach would endorse the current language policy in supporting all of the national languages of South Africa, while at the same time promoting improved opportunities for learning. The need for good quality multilingual Mathematics material for Foundation Phase learners is supported by academic research (Adler, 2001, Setati & Duma, 2009) as well as project activities which have been carried out in South Africa over a period of at least 20 years.

The Home Language Project (HLP) has shown, both through research and project practice, that: the education of the majority of SA scholars is negatively affected by language inequality. Multi-bilingualism is offered as an appropriate post-apartheid approach that can counter the disadvantage of having to use a second language as a medium of instruction. It involves the use of two languages for learning (a common medium plus every learner's home language), irrespective of the number of language groups in the class (Sapire, 2012:1).

Learners and teachers in the Foundation Phase (FP, Grades 1-3) in South African schools are often faced with a dilemma in Mathematics classes as a result of multiple languages present in their classes and a dearth of good quality materials for the support of learning and teaching in different languages. The current language policy for Foundation Phase schools is supportive of a multilingual culture but does not adequately provide for bridging the transition between home language Mathematics instruction and the move to learning Mathematics in English once learners move into

the Intermediate Phase (IP) (Grades 4-6). Experience of teachers in the field indicates the need for an interpretation of policy that would optimize learning of maths on the part of the child. This interpretation is supported by a multilingual approach to teaching.

Multilingual materials would pave the way for later Mathematics learning, since the support of the “common language” of learning and teaching from early Grades would allow learners to be exposed, both to the terminology and the conceptual discussions in their home language, and in English. This could help to alleviate the situation in the Intermediate Phase (IP) where, “when children begin to be taught in English full time, they spent most of their time trying to catch up instead of grasping what they are being taught” (Sapire, 2012).

The amount of money a country spends on learning materials at both foundation and intermediate phase level of education is an index or yard-stick of government efforts and commitment to providing qualitative education for all (EFA); a vision set by United Nations International children Education Fund (UNICEF) that by the year 2020, every child must have access to basic education. According to Mogari (2014), in order for teachers to be effective in their teaching, it is paramount for them, among others, to deeply understand the learning process and their role in learning, so that they can prepare and plan lessons in such a way that learning can be more conceptually inclined.

For teachers to be effective in Mathematics teaching, they should understand what learners know and need to learn, and then challenging and supporting them to learn it well. According to Macro Indicator report of 2013, South Africa, as at 2012, had 12.4 million learners; 425,167 teachers, 826 schools including 1571 registered independent private schools which imply that 6% of schools in the country are privately owned. There were 12,428,069 learners in South Africa, 504,395 learners accounting for 4% attend private schools as at 2012. The ratio of learners to state paid educators in public ordinary schools in 2012 was estimated to be 32.3 to 1 (Department of basic education, 2012).

In South Africa, there are three phases of basic education; Grade R to 12, which spans through thirteen (13) years of foundation phase that covers Grade R to 3; Intermediate phase, Grade 4 to 6 and the GET phase, Grade 7 to 9. These three phases span a period of 13 years. The South African Human Rights Commission (SAHRC) reports

the access to education has three (3) overlapping dimensions: there must be no discrimination; education must be physically accessible in terms of geographic distance and safety while travelling to school, and thirdly; it must be economically accessible, affordable for all and free at the primary level (SAHRC, 2012). Education in South Africa is compulsory for children between the ages of 7 and 15 (Grade 1-9), and the government must ensure that no child is denied his right to education due to socio-economic factors.

Textbooks are designed to complement the teacher's effort in the delivery of instruction and also serve as a guide to complement what they learn in school. According to United Nations Educational and Scientific Organization (UNESCO) 2016 report, textbooks are particularly relevant to improving performance of the learners, especially those from poor countries with over bloated classrooms, a number of unqualified teachers' coupled with shortage of instructional materials and time. Mathematics textbooks, as all textbooks, have to be in accordance with the subject curriculum. The subject curriculum contains the pedagogical content on offer for each subject for a school year and serves as the basis of the work schedule design (Baranyai & Stark, 2011).

1.3 STATEMENT OF THE PROBLEM

The value of textbooks in primary school Mathematics education is hotly debated (Zevenbergen, Dole & Wright, 2004), yet more than any other subject area, Mathematics relies heavily on their use (Johansson cited in Jamieson-Proctor & Byrne, 2008). Some schools employ them as pseudo curricula (McNaught, 2005). While quality textbooks are usually published with teacher-manuals, which provide a range of teaching activities that include the textbook as a resource; it is not unusual for these manuals to be unavailable for teachers and for the textbook to form the basis of Mathematics lessons (McNaught, 2005).

The use or non-use of textbooks in teaching Mathematics at all levels of instruction, especially at the primary school level, which is the bed-rock or foundation on which education is laid, has been a major source of concern for the government, parents, teachers, learners and the society at large (Baranyai & Stark, 2011). The teaching of

Mathematics in South African schools seems to be the worst in the world. In 2011, the Trends in International Mathematics and Science Study (TIMSS) showed that South African learners had the lowest performance among all 21 middle-income countries that participated (McCarthy & Oliphant, 2013). One of the reasons was attributed to inadequate textbooks, hence, the desperate need for textbooks and their use by teachers in the teaching of Mathematics has been identified in one report after another.

Studies reveal that, countries which achieve well mathematically begin by developing strong mathematical foundations in the primary phase of education, something that seems missing in the foundation phase of Mathematics in South Africa (Burghes, et al 2012). Learners who succeeded are those who were encouraged and enabled to think mathematically and be creative and confident in using and applying their mathematical knowledge. In the light of this, the study investigated the use of textbooks in teaching Mathematics in selected primary schools.

1.4 RESEARCH QUESTIONS

This study was guided by one main and four sub-research questions as follows:

1.4.1 Main research question

How do teachers use textbooks in teaching Mathematics?

1.4.2 Sub-research questions

- a) How do teachers select textbooks for teaching Mathematics?
- b) How do teachers use text books in lesson planning?
- c) How do teachers use text books in lesson delivery?
- d) What challenges do teacher encounter in the use of textbooks?

1.5 PURPOSE OF THE STUDY

The purpose of this study was to establish how teachers used textbooks in the teaching of Mathematics in primary schools in East London Education district of South Africa. This study also aimed at exploring the strategies educators can use for lesson delivery with Mathematics textbooks.

1.6 RESEARCH OBJECTIVES

This study aimed:

- a) To investigate how teachers selected textbooks for teaching Mathematics.
- b) To establish how teachers used text books in lesson planning.
- c) To explore how teachers used text books in lesson delivery.
- d) To ascertain what challenges teachers encountered in the use of textbooks in teaching Mathematics.

1.7 SIGNIFICANCE OF THE STUDY

It is envisaged that the empirical results of this study will provide a basis for future planning by the government, Department of Basic Education (DBE), school governing boards (SGB's) interested private participants in education, non-governmental organizations (NGO's) as well as parents affected by the use or non-use of textbooks by teachers in the teaching of Mathematics in primary schools in East London education district.

The study is expected to contribute to the body of knowledge on the efficacy of textbooks for lesson planning and delivery at primary education level and prepares learners better before entering secondary school, it helps educational planners in the DoE in East London particularly, and in other provinces in South Africa in general, with the use of Mathematics textbooks appropriately. Furthermore, researchers, teachers, the school governing board, communities and learners will benefit from the findings of this research work. It is expected that, the findings of this research will stimulate further research on other areas of textbooks usability by teachers in the teaching of Mathematics in high schools in Eastern Cape Province.

1.8 DELIMITATION OF THE STUDY

In terms of its scope, this study will focus on the use of textbooks by Grade 4 teachers in the teaching of Mathematics in selected primary schools in East London Education district of Eastern Cape province of South Africa. Grade four is chosen because it is

the beginning of intermediate phase and it will allow the researcher to get along properly during the observation and interview due to the use of English even though code-switching is allowed.

1.9 BRIEF METHODOLOGY

The study adopted interpretivist paradigm with qualitative approach and phenomenological design to investigate the perceptions and understanding of primary school teachers about the use of Mathematics textbook for lesson planning and delivery at the selected schools in East London education district, South Africa. The study used semi-structured interview and observation to elicit information from teachers and head of department selected for this study.

1.10 DEFINITION OF TERMS

For the purpose of clarity, the following terms are defined and operationalized

1.10.1 Textbooks: A textbook is a manual of instruction in any branch of study. Textbooks are produced according to the demands of educational institutions. Schoolbooks are textbooks and other books used in schools (Sapire, 2012). According to this study, textbooks are manuals of instruction for Mathematics, and an effective tool for lesson delivery (method of teaching)

1.10.2 Primary schools: A primary school or elementary school is a school in which children receive primary or elementary education from the age of about five to twelve, coming after pre-school and before secondary school (in some countries there is an intermediate stage of middle school between primary and secondary education). In most parts of the world, primary education is the first stage of compulsory education, and is normally available without charge, but may be offered in a fee-paying independent school. The term Grade School is sometimes used in the US though this term may refer to both primary education and secondary education (UNESCO, 2012). For the purpose of this study, primary schools are institutions where elementary education is received by students aged 6 to 12 (Grade 1-7)

1.10.3 Mathematics: Mathematics is a language that makes use of symbols and notations to describe numerical, geometric and graphical relationships. It is a human activity that involves observing, representing and investigating patterns and quantitative relationships in physical and social phenomena and between mathematical objects themselves CAPS (DBE, 2011). Michael (2013) succinctly said Mathematics can be broadly interpreted as something a person does in order to solve real life situations.

1.10.4 Instructional materials: Instructional materials are the tools used in educational lessons, which include active learning and assessment. Basically, any resource a teacher uses to help him teach his students is an instructional material (McCarthy & Oliphant, 2013). In this study, instructional materials are any teaching aids that assist the teacher to effectively disseminate information in order to achieve desired outcomes.

1.11 CHAPTER DEMARCATION

Chapter One: Introduction and background to the study

This chapter explored international and national literature on the use of Mathematics textbooks by the primary school teachers which dovetailed into the South Africa context. The problem statement, research questions, research objectives, significance of the study and its scope were discussed.

Chapter Two: Theoretical frame work and literation review

This chapter explains the theoretical framework that underpins this study, which is Tetrahedron model of textbooks. The researcher also reviewed some existing literature that are relevant and related to the use of Mathematics textbook and associate challenges teachers face while teaching Mathematics in the classroom.

Chapter Three: Research methodology

This section describes the methods and procedures that were used to collect data. The researcher described the research paradigm, research approach, research design, population, sample and the sampling techniques employed, as well as the data

collecting methods and data analysis procedures before discussing the ethical considerations.

Chapter Four: Data analysis, findings and discussion

The chapter analyzes and presents data collected on the use of textbooks by teachers in teaching Mathematics at selected primary schools in East London education district.

Chapter Five: Summary, conclusion and recommendations

This chapter summarizes the entire study and draws conclusions from the study. The chapter proffers recommendations to different education stakeholders.

1.12 SUMMARY

In this chapter, it was noted that the textbook influences the teacher's decisions regarding the instructional approaches used in the classroom. Several empirical studies have shown that textbooks play a role in teachers' pedagogy by conveying pedagogical messages and providing an encouraging or discouraging curricular environment for them to employ different teaching strategies. Textbooks are equally important resources for both the teachers and the learners. Teachers use them to plan and teach Mathematics lessons while learners use them as learning materials. However, acute shortage of relevant and useful textbooks affect learners to comprehend the teaching of Mathematics. The chapter proceeded to identify the significance of the study and the need for the Department of Education in South Africa to address some challenges bedeviling Mathematics textbooks use in terms of inadequacy, language used, and low quality of the textbooks, to mention but a few. The next chapter deals with literature review and theoretical framework.

CHAPTER TWO

THEORETICAL FRAMEWORK AND REVIEW OF LITERATURE

2.0 INTRODUCTION

In the previous chapter, it was stated that the textbook influences the teacher's decisions regarding the instructional approaches used in the classroom and that several empirical studies have shown that textbooks play a role in teachers' pedagogy. This chapter explains the theoretical framework that underpins this study which is Tetrahedron model of textbooks. The researcher also reviews some existing literature relevant to the use of Mathematics textbook and challenges teachers face while teaching Mathematics in the classroom.

2.1 THEORETICAL FRAMEWORK

This study is informed by the Tetrahedron model of textbooks (Rezart, 2010). This model is based on the fundamental model of didactical system: the tripod relationship that exists between student, teacher, and Mathematics (Rezart, 2010). The Mathematics textbook is useful as an instrument on all three sides of the triangle: teachers use textbooks in the preparation and delivery of their lessons, by using the textbook in the lesson teachers also mediate textbook use to students, and finally students learn from textbooks.

Thus, each triangle of the tetrahedron-model represents an activity system on its own. From an ergonomic perspective, it is argued that artefacts have an impact on these activities; on the one hand, they offer particular ways of utilizing the artefacts and on the other hand the modalities of the artefacts impose constraints on their users (Rabardel, 2002). Thus, the Mathematics textbook seems to have an impact on the activity of learning Mathematics as a whole, and that is represented by the didactical triangle on the bottom of the tetrahedron. The theory is anchored on the tripartite relationship that exists between the teacher, student and the textbook, hence; its adaptation for this study. This theory further informs this study in the sense that, for effective lesson planning, delivery and learning; the use of textbooks is very essential. Mathematics classroom activities are incomplete without the use of textbooks by both

the teachers and students. Figure 2 below shows the relationship between student, teacher and Mathematics textbooks.

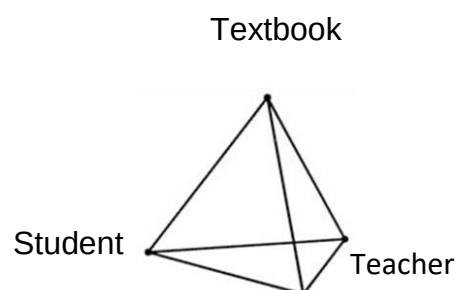


Figure 2: Tetrahedron model of textbook use

Source: Rezart (2010)

This theory is very imperative because the activities that the Mathematics textbook comprise do not only give an insight into student's utilization of Mathematics textbooks, but also give an idea of what learning Mathematics is about for students. Learning Mathematics with the Mathematics textbook comprises activities such as solving tasks and problems, consolidating mathematical knowledge and skills, and acquiring new contents.

A textbook is used as an instrument within the aforementioned activities. Furthermore, learning Mathematics comprises mainly learning rules, applying rules and worked examples to tasks, and developing proficiency in tasks that are similar to teacher mediated tasks. The use of Mathematics textbooks by teachers in the classroom is an important reference for students' utilization of the textbook. For example, the utilization of tasks that are adjacent to teacher mediated tasks for consolidation is dependent on the mediation of tasks from the textbook by the teacher. Therefore, it is important that the teacher uses tasks from the textbook in order to support students' individual learning of Mathematics. Mathematics textbooks provide orientation for students, and it is important that teachers follow the succession of the topics in the book. Johansson (2006) says the structure of Mathematics textbooks advances a distinct pedagogical model and is likely to have an impact on actual classroom instruction. It can be argued that the structure of the book also has an impact on the students' assimilations. This raises the question of

how a textbook must be structured in order to promote desirable learning outcomes.

This theory also shows the relevance of interaction between teachers and students with the textbooks as a medium of communication (Johansson, 2006). The conceptualization of student-textbook- interaction on the basis of this theoretical framework provides interesting insights of acquiring more knowledge and understanding of the subject matter during the teaching and learning of Mathematics. This also provides a better understanding of students' utilization of Mathematics textbooks, and also reflects students' ways of learning Mathematics. Accordingly, a better understanding of students' utilization of Mathematics textbook is a prerequisite for effective implementation of Mathematics textbooks in teaching (Johansson, 2006).

2.2 REVIEW OF LITERATURE

According to McMillan and Schumacher (2014), literature review illuminates the related literature to enable the reader to gain further understanding of the study. Knowledge gained from the literature assists the researcher in stating the statement of the problem, developing a research design and relating the outcome of the results of the study to prior knowledge. For the purpose of this study, literature shall be extensively reviewed under specific sub-headings as informed by objectives of the study.

2.3 TEXTBOOK FOR TEACHING MATHEMATICS AT PRIMARY SCHOOL

In selecting primary school textbooks for teaching Mathematics, the researcher's aim is to include the examination of whether the textbook meets the requirements of society, the education program of the institution, the needs of the students, moreover, the study of how comprehensive, detailed and flexible the textbook is. As for the content, the researcher has to make sure that the textbook satisfies the requirements based on its structure, function and topics, as well as the abilities and skills to be improved. Are the exercises diversified and motivating? Is the explanation logical, precise and understandable? To what extent is the content applicable in practice? Language content is also important in the teaching of Mathematics, although with

emphasis that is different from that in foreign language education (Czeplédy & Kovács, 2008).

The simple, clear, concise and precise wording of definitions, and pictures in any Mathematics textbook are significant in teaching and learning of Mathematics. Skills involve specific aims like the improvement of meaningful, analyzing reading comprehension, counting skills, orientation in space, wish for proving, pursuit of combining argumentation etc. (Czeplédy & Kovács, 2008:17). Appearance is also important as a motivating factor. Adequate figures and illustrations, well-arranged paragraphs and readability all facilitate comprehension and thereby the acquisition of knowledge. Practical considerations include the overview of the supplementary materials (teacher's book, exercise book, test sheets, sample solutions, tools) that belong to the given textbook series. The durability of the book, its size or acceptable price etc. are also factors to consider (Czeplédy & Kovács, 2008:17).

Teachers use Mathematics textbooks daily when teaching and parents obviously respect textbooks. However, the question that comes to mind is what is the real influence of textbooks? This describing the role of textbooks in teaching, scholars use terms such as *textbook control* (Johnsen 2014), *textbook impact* (Sikorová, 2011), *textbook influence* and *textbook-driven instruction*. Do teachers really follow textbooks? Do they accept the concepts, content and methodical strategies imposed upon them by particular textbooks?

Certain researchers measure the influence of textbooks by the extent to which they are used in teaching and planning the lessons. The extent of textbook usage is but one factor which allows teachers to measure how textbooks control teaching. Research focused solely on textbook control deals with ways textbooks control teaching. It seeks to quantify the correspondence between the content and methodology imposed by a particular textbook, and the content and teaching strategies employed by a teacher. Most studies dealing with textbook control show that textbooks influence both the content of lessons and teaching strategies employed (Sikorová, 2011).

DeCesare (2007) researched the sociology of teaching at secondary schools in the U.S.A. with regard to Mathematics textbooks. DeCesare found that high school teachers employed Mathematics textbooks frequently (89 percent) and that the

teachers relied overwhelmingly on standard introductory textbooks to structure their courses. This led to homogeneity of lesson content and teaching. However, widespread reliance on textbooks should not be understood as a sign of teachers' approval of them – some teachers harshly criticized the textbooks.

Research conducted within the Chicago Algebra Project (Sikorová, 2011) concentrated directly on the influence of textbooks on the teaching strategies of high school Mathematics teachers. Researchers compared the teaching methods of 13 teachers employing a “reform”; textbook with the teaching strategies of 13 teachers working with a rather traditional, widely recommended textbook. The teaching strategies of both groups of teachers varied significantly, depending on the strategies of the textbook used. Teachers working with a reform textbook preferred small groups of students and paid more attention to the work with expository texts. Explanation was used less, as was individual student work. Differences in teaching were closely related to the different conceptions of both textbooks. Sikorová concluded that textbooks influenced not only the content of teaching, but also the teaching strategies for Mathematics.

One of the most prominent contributions on Mathematics textbook usage is an extensive study by the Icelandic scholar (Sigurgeirsson, 2012). The research of Sigurgeirsson explored the influence of textbooks on teaching Mathematics in order to measure the extent of teachers' dependence on textbooks. The research was carried out through observations in classrooms and by formal and informal interviews with teachers and school principals. All subjects for 20 classes in 12 lower secondary schools were studied. Sigurgeirsson summarized the most important conclusion of his research as follows: “Although teachers differed considerably in the extent to which they relied on published curriculum materials, such materials provided the basis for learning in the majority of lessons observed, both in what was being taught and how.” (Sigurgeirsson 2012:11). Textbooks to a great extent influenced the teaching. Typical teaching patterns followed the structures of textbooks. Teaching was textbook-oriented. The main task seemed to be covering pages in textbooks by reading them aloud, discussing their content or completing most of the activities presented – “a finished page is the proof that work has been done” (Sigurgeirsson, 2012:163).

Similar results confirming the influence of textbooks on teaching prevailed in studies dealing with textbooks. However, there are studies that have presented different results or that have challenged the validity of statements suggesting the dominant influence of Mathematics textbooks on teaching. For example, Freeman and Porter (2008) concluded that the extent of a teacher's dependence on textbook topics does not necessarily represent the measure of their textbook dependence, but rather represents the measure to which particular teachers are convinced that textbooks can be considered a "legitimate authority" concerning the content. Moreover, the measure of textbook dependence can also suggest that a particular teacher considers certain topics appropriate (or not) for their students (Sigurgeirsson, 2012:163).

Similar results were arrived at by Stodolsky (2002). Based on empirical research, as well as analysis of other studies, Stodolsky concludes that teachers, to a great extent, re-make textbooks, and the influence of textbooks is not as overwhelming and unambiguous as various studies suggest. Stodolsky emphasizes that "... the phrase *teaching by the book* conjures up an image of close adherence to textbook content, order, and suggested activities, and implies that the textbook is the central, if not the only, material used during the Mathematics instruction" (Stodolsky, 2002: 159). However, "teaching by the book" is actually open to many interpretations.

Stodolsky carried out textbook usage research in the 5th Grade of primary school; 12 experienced teachers, six math and six social studies, were observed for 14 teaching days. The Mathematics teachers differed significantly from each other regarding textbook usage. Stodolsky considered their methods to be autonomous. The most significant differences were found between activities suggested by a textbook and activities realized in teaching. The situation in social studies was different. Teachers employed more complementary materials than in Mathematics. Topics suggested by a textbook were covered in class and usually in the suggested order. Unlike the Mathematics teachers, the social studies teachers broadened the scope of topics with ones not suggested by the textbook. Stodolsky concluded that differences in textbook usage were related to a teacher's own beliefs and preferences, the nature of the materials, the school context, the particular students in the class, and the subject matter and Grade level. The central determinant of the role of textbooks in instruction is, according to Stodolsky, the subject matter.

Further research confirming Stodolsky's findings was undertaken by Sosniak and Stodolsky in 2003. Working with teachers of Mathematics, social studies and reading, the researchers worked with four teachers at two schools for a year. Individual teachers differed regarding textbook usage. When designing classes, the teachers selected, modified and complemented the topics covered by the textbook. They paid attention to the topics suggested by a textbook; however, most of them ignored the pedagogical strategies suggested.

Even though Stodolsky showed that textbooks are not as dominant in teaching as the majority of other researchers suggest, her conclusions confirm at least a certain degree of textbook influence on teaching – specifically on the topics presented. Stodolsky's research demonstrated the importance of a particular research approach and the way the research findings are interpreted.

2.3.1 Factors influencing the role of Mathematics textbooks

Three factors were explored in relation to their possible influence on the role of Mathematics textbooks: the school subject, the teacher's experience in teaching and the teacher's qualifications relative to the school subject.

2.3.1.1 Subject

As previous studies have confirmed (Hiebert, 2005; Roth, 2006; Sikorová, 2011), the role of the textbook varies according to subject. In this study, History teachers used textbooks in class comparatively more often and for a longer time than English, Mathematics and Civics teachers. Students and teachers worked with different textbook structural components in different subjects. In History, activities with non-verbal material were more frequent than in other subjects. The same was true for exercises in Mathematics. However, expository texts were used to the same degree in all four subjects. As for types of student textbook-based activities, while the same type— i.e. based on text perception-dominated in all four subjects, other types were applied as well. Students in History lessons searched through texts more often than in Mathematics, and application tasks based on algorithmic rules were used more often in English and Mathematics lessons than other subjects

Textbooks, then, were used for different purposes in different subjects: as a basis for discussion (more in history and civics than in Mathematics and English), and as a task and exercise (more in Mathematics and English). Despite these divergences, teachers across all subjects regarded textbooks as the best source of subject content.

The research identified four basic patterns of textbook use (Sikorova, 2011). These patterns differed from subject to subject. Almost all the teachers who strictly followed textbooks “page by page” were English teachers. Mathematics teachers fell mostly into the pattern of “source of the tasks”. However, teachers who used the textbook as “one of the resources” and who “modified the content”, taught different subjects.

It can be concluded that the role of textbooks is heavily subject dependent, but there are some common aspects. Despite the differences, textbooks served teachers, mostly as a source of information and there were patterns of textbook use applied to many subjects. It would seem that these aspects were related to the teacher’s conception of teaching and learning.

2.3.1.2 Teaching experience

Most investigations have recognized the impact of teaching experience on textbook use and its nature. Many researchers have concluded that novice teachers rely on textbooks more than experienced teachers (Sikorova, 2011). However, this presumption was not supported by this investigation.

The time taken up by textbook use did not vary significantly with a teacher’s teaching experience. The novice teachers (up to 5 years teaching experience) used textbooks less often than the four groups of more experienced teachers. Similarly, the novice teachers did not follow the textbooks more strictly than other groups. On the contrary, most teachers who strictly followed the textbooks page by page belonged to two of the most experienced teacher groups (21-30 years and more than 30 years of teaching experience). In addition, the most experienced teachers used textbooks more often as a source of information than novice teachers. No significant differences relating to the patterns of textbook use came to light amongst the groups. The most interesting finding was related to types of textbook-based activities and the demands

on students" cognitive processes. In the lessons given by novice teachers, simple activities based on perception were observed less frequently than in lessons taught by more experienced teachers.

These findings must be interpreted carefully because of the limited sampling size. However, although further exploration is essential, the findings suggested that experienced teachers relied on textbooks more than novice teachers. The explanation could be that since the 19th century, Czech schooling had been textbook-centered. The Herbartian tradition is strongly entrenched in central Europe. Teachers have been accustomed to teaching "by the book". This inclination was intensified during the communist era (pre-1989) when teachers were expected to strictly follow the textbook. Textbook content was obligatory in order to prevent teachers from transmitting "bad", objectionable material. Nowadays, the average age of Czech teachers is 47. Many started teaching in the 1980s-1970s. The tradition of heavy reliance on textbooks would still persist. However, the younger generation of Czech teachers has been guided, during teacher training, to adopt use of different learning resources. Even if the textbook is still the main resource and pedagogical tool available, they may not regard it as necessary (Sikorova, 2011).

2.3.1.3 Qualifications

The third factor explored was the teacher's qualification for the school subject. The Czech system of secondary teacher education is usually aimed at earning a qualification for teaching two subjects, e.g. Physics and Mathematics or Czech and History. However, in their teaching practice, teachers may teach subjects outside their area of specialization. It was assumed, therefore, that unqualified teachers might have different needs related to subject and pedagogical content knowledge in the subject area. In this study, 38 percent of observed English lessons and 45 percent of Civics lessons were taught by teachers unqualified in the subjects. It was expected of them to use textbooks more often and rely on them as a source for program and content more than qualified teachers. However, this assumption was prove wrong (Sikorova, 2011).

2.4 THE USE OF TEXTBOOKS IN LESSON PLANNING AND DELIVERY

Lesson planning is one of the basic duties of every teacher in the delivery of an instructional lesson in the classroom. According to Spratt, Pulverness, and Williams (2005), lesson plan is a series of course plan which provides direction for a teacher of what kind of materials of study to be taught and how to teach them. Lesson plan is the main prerogative of the teacher depending on the class and learners' needs. In lesson planning, the teaching styles and the learning styles should be compatible (Naimie, 2012). A study of U.S Mathematics lessons reveals that lessons were interrupted by a public announcement 29 percent of the time. However, effective teachers do manage to maximize instruction by their thoughtful and careful use of time through a good lesson plan (Hiebert, & Kamil, 2005). A lesson plan preparation includes instructional materials like; teachers guide, syllabuses, and textbooks (Khomani, 2005). A study observes that the lesson planning process allows teachers to evaluate their own knowledge with regards to the content to be taught (Reed & Michaud, 2010). The use of textbooks in lesson planning by teachers provide ideas and practices which frame classroom activity and also help teachers to achieve goals that they presumably could not or would not accomplish on their own (Brown, 2009).

2.4.1 Conceptualization of the Use of Textbook in Lesson Planning

Studies show that teachers spend a chunk of their time preparing their lessons, interacting with textbooks and various teaching and learning materials to determine Grade-specific texts and effective ways to present their lesson (Nicol & Crespo, 2006). Abadzi (2006) observes that good textbooks for lesson planning should have serious focus on content, with rich and extensive explanation and elaboration of concepts. He further supports his arguments by stating that; a good textbook should have extensive use of pictures, drawings, diagrams and figures that capture the essence of important concepts. A good textbook for lesson planning should provide ample space for practice and elaboration that enables Graded upward progression. Abadzi (2006) also enumerates that, the textbook topics should be efficiently and clearly organized and that, they should be simple to read, with uncluttered layout that foregrounds meaning. Grossman and Thompson (2008) are of the view that a successful and effective use of a textbook by the teacher depends on the relevance of the textbook to the subject

content, and the degree to which it corresponds to learners' competency levels. Textbooks that are carefully written and designed professionally edited and tested, that offer, not merely factual information, but also interactive spaces for children, are important and have several advantages in the classroom (Fredricks, 2005). Fleisch, Taylor, Herholdt and Sapire, (2011) assert that the interaction between teachers and learners in the lesson delivery in the classroom is better improved by the use of textbooks in lesson planning and delivery. Fredricks (2005) argues that textbooks stipulate in detail, the materials to be covered and the design of each lesson. A good textbook provides the teacher with a balanced, chronological presentation of a lesson (Fredricks, 2005). Research indicates that, teachers in most government schools in Hong Kong base their lesson planning and student learning on commercial textbooks which have been designed to prepare students for high stakes examination (Lee, 2005).

According to Stoffels (2005), there is need to integrate in classroom teaching. These textbooks will serve as a guide to the teacher in the pedagogical enactment of the content for the entire year. The use of textbooks by teachers in lesson planning has inherent advantages that make lesson delivery easy. Textbooks provide teachers with interesting and compelling platforms for conveying information since they motivate learners to better understand the concept (Phyllis, 2011). Textbooks are integral aspects of teaching- learning situations, and they do not just to supplement learning but complement its process.

It is therefore imperative for primary school teachers to use textbooks in lesson planning to effectively enhance lesson delivery in the classroom (Kibe, 2011). Harmer (2007) observes that both teachers and students benefit greatly when textbooks are used in the teaching and learning process. To facilitate teaching and learning effectively, teachers need a collection of resources to enhance curriculum delivery (Mohammed & Kumari, 2007). Remillard (2005) argues that teachers frequently make changes in the curriculum intensions and modify them according to the structure and the purpose of the lesson, in doing so, the availability, quality, and flexibility of the textbooks play a critical role in teachers' decisions to select textbooks.

The Mathematics textbook was used and is still very relevant as an important tool in the teaching and learning, not only of Mathematics, but also other subjects. Despite

outstanding new technologies put in place, it is yet to displace the use of textbooks in the classrooms (Rezart, 2010). This implies the continued relevance of textbooks as an aid to instruction. According to Rezart (2010), students incorporate their Mathematics textbook as an instrument into four activities namely; solving tasks and problems, consolidation of class activities, acquiring mathematical knowledge, and activities associated with interest in Mathematics.

Providing solutions to tasks and problems is closely associated with activities where students utilize their Mathematics textbooks in order to get assistance with solving tasks and problems (Burghes, 2012). The content knowledge or the subject matter determines the type of textbooks to be used by the teachers. To deliver a lesson or to plan for a lesson, a teacher must align the content of his or her topics to various examples given in a textbook. Effective delivery of lesson involves a practical use of textbooks by the teacher. For example, in lesson planning, the teacher needs to pick some exercises from the textbook which will allow the students to get the deep knowledge of the concept being taught and to acquire skills of finding solution to, not only mathematical problems in class, but also real life problems.

In as much as the content of a textbook is arranged sequentially based on the school curriculum, the teacher needs to follow the sequence in his or her lesson plan and teach the students accordingly. Teachers use textbooks differently due to external and personal factors. External factors include pressure to prepare students for standardized tests, parent pressure, and pressure from colleagues. Personal factors on the other hand include a teacher's preparation, teaching experience, and understanding of the materials, as well as how the materials align with the teacher's philosophy of Mathematics education (Edenfield, 2010).

The roles of a good Mathematics textbook include helping the learners to discover life-like tasks accompanied by problem solving techniques, as well as popularizing Mathematics among the children. In order to fulfil those tasks, the textbook writers should not only be keen Mathematics scientists, but also be very well informed on pedagogy. They must be aware of the functions of textbooks (Manolescu, 2004; Karlovitz, 2005; Kojanitz, 2005), and of the requirements they have to meet (Karlovitz, 2005), so that the primary school children would have really good Mathematics textbooks to use.

The goal of teaching Mathematics is to help pupils become more independent and critical thinkers who understand the purpose of Mathematics and the ways in which Mathematics can be applied meaningfully in their daily life situation (Michael, 2013). Behm and Lloyds (2009), Cooney (2009) and Remillard (2009) aver that research on teachers' use of specific curriculum programs and differences in materials used at different points in the professional continuum has led many Mathematics educators to call for additional studies to examine teachers' use of materials. Furthermore, Behm and Lloyd (2009), in a study of three elementary school teachers' use of Mathematics curriculum materials, revealed five possible factors influencing how they interacted with the materials: the materials themselves, the degree to which the teacher education course work focused on standards-based ideas and instructional materials, the teachers' content knowledge, the teaching content, and the cooperating teachers' guidance.

Lepik (2015) concluded that textbooks are one of the most powerful influences on school Mathematics in a survey he carried out in Estonia using 164 teachers. The study further revealed that, textbooks serve as a central instructional tool in Estonia during Mathematics classes. Textbooks are equally important resources for both the teachers and the learners. Teachers use it to plan and teach Mathematics lessons while learners use it as learning materials (Mullis, Martin & Foy, 2008). Textbooks are often perceived as reflecting the official and intended curriculum, and it involves control of material selection and sequencing – the teacher becomes an implementer of the learning process which is regulated by textbooks (Lepik, 2015).

The textbook influences the teacher's decisions regarding the instructional approaches used in the classroom. Several empirical studies have shown that "textbooks appear to play a role in teachers' pedagogy by conveying pedagogical messages and providing an encouraging or discouraging curricular environment for them to employ different teaching strategies" (Fan, Zhu & Miao, 2013: 636).

Textbooks are also an integral part of a teachers' daily work and are intimately connected to the instruction. Literature has repeatedly documented the fact that textbooks are used extensively in Mathematics classrooms (Fan, Zhu & Miao, 2013; Pepin, Gueudet & Trouche, 2013). The most important functions of textbooks are summarized by Manolescu (2004) and Karlovitz (2005) as: Motivation, knowledge

transfer, classification, coordination, differentiation, learning coordination, teaching-learning strategies, triggering self-assessment, and values education.

Haggarty and Pepin (Haggarty & Pepin, 2002; Pepin & Haggarty, 2001) described different traditions of textbook use in lower-secondary Mathematics lessons in England, France and Germany. Teachers in all three countries emphasized the use of textbooks for exercises. However, French teachers used the books for explanations, but insisted on providing the rules and the essence of the lesson without the textbook and in a different way to it. German teachers used worked examples that were different to those provided in the textbooks, in order to initiate class discussion about the problems that might be encountered. Mathematics teachers mostly introduced and explained a concept or skill to their students and then gave examples on the board and expected pupils to practice on their own.

Existing research reveals the critical role that teachers play in the use of Mathematics textbooks in classrooms. The research reveals that teachers emphasize the use of textbooks mainly for exercises, and other textbook components are used much less. Thus, the textbooks' potential to provide different learning opportunities for students is not fully used. The ways in which the teacher mediates learning using the textbook are largely unknown also in Estonian Mathematics education. Surprisingly, little effort has been devoted to examining and conceptualizing teachers' approaches to textbook use.

The role of the textbook as a basic tool for teaching lies mainly in its use as a source for student activities. Most teachers set the tasks and exercises and asked questions suggested by the textbook. They used the textbook, especially for practicing in the class and testing their understanding of the subject matter. The textbooks served as a basis for discussion and for student motivation. This again confirms the role of the textbook as a tool for teaching (Haggarty & Pepin, 2002).

What role does the textbook play in students' learning? In the lessons observed, simple textbook-based activities dominated. The students mainly followed the text while the teacher explained the content, or the class read the text aloud in turns. The conclusion that can be drawn from the analysis of textbook-based activities is that the textbook represents a source of information for students. However, it does not affect the students directly, but by means of the teacher's exposition and commentary.

Students' individual interaction with texts occurred very rarely, and they hardly ever used textbooks in homework. The written homework in English and Mathematics was an exception, but on the whole students did not learn from textbooks. If they ever studied at home, they used the written notes in their exercise books as dictated by teachers, and they learned these mostly by rote. The possibilities of textbooks as tools for students' learning seem not to be fully exploited. Nevertheless, three quarters of students regarded textbooks as very useful, but more for teachers who "prepare lessons according to them" (Haggarty & Pepin, 2002: 12) However, the direct impact on students' learning is questionable.

Horsley and Walker (2005) sought to describe the changing roles of textbooks in transmission, constructivist and socio-cultural concepts of teaching and learning. The conclusions drawn from this investigation suggest that the role of textbooks in lower secondary schools in Ostrava corresponds to the transmission concept – whether we like it or not, the textbooks were mainly a source of information and the basis of transmission and to a large degree structured the teaching and learning program. However, it is encouraging that newly appointed teachers seemed to be using textbooks for teaching in a more constructivist way.

2.4.1.1 Textbooks and teachers' lesson preparation

Research shows that teachers use textbooks for lesson preparation (Glasnovic Gracin & Domovic, 2009). They decide what is to be taught mostly according to the textbook content and how and when the textbooks will be used in the classroom. According to Preschool handbook (2008), primary school teachers ought to make provision for all the different learning ability groups in the classroom. Teachers are guided by the use of textbooks to draw a comprehensive lesson plan to achieve this goal. The lesson plan stipulates the time use for introduction and conclusion, while most of the times are left to the learners to do the task at hand. Hutchinson (2004) attests that content for gifted learners should be organized by teachers during lesson planning so that students can discover, experiment, and figure things out on their own. Also, learning experiences should be characterized by abstraction and complexity by the teacher during lesson planning to provide mental challenge for the learners (Hutchinson, 2004).

2.4.1.2 Approaches to Lesson Planning

There are many approaches to lesson planning. These approaches include the forward, backward and central design to the curriculum development. Richards (2013) argues that a forward option may be preferred in circumstances where a mandated curriculum is in place, where teachers have little choice over what and how to teach. Where teachers rely mainly on textbooks and commercial materials rather than teacher-designed resources, where class size is large and where tests and assessments are central rather than by individual teachers. Research shows that when teachers interact with curriculum materials such as textbooks, they do so in an active and constructive ways rather than a straightforward approach (Remillard, 2005).

2.4.1.3 Selecting textbooks for lesson planning

Research shows that choosing an appropriate textbook by primary school teachers for lesson planning and delivery is not very easy. A study conducted by National Science Teachers' Association (NSTA, 2005), observes that choosing the appropriate textbook for use in the science classroom is a very daunting task. Tarr, Barbara, Reys, Baker, and Billstein, (2006) enumerate three key dimensions that provide a general framework for reviewing and selecting Mathematics textbooks. They stressed content emphasis, instructional focus and teacher support. The emphasis on the content includes the alignment with the learning expectations presented in the curriculum, in-depth presentation of topics with increasing sophistication across Grades, and an appropriate balance of skills development and understanding of concepts and processes (Tarr et al., 2006).

Grossman and Thompson (2008) argue that the selection and effective use of a textbook by the teacher greatly depends on the relevance of the textbook to the subject content, and the degree to which it corresponds to the learners' competence levels. According to Brown (2009), the interaction between teachers and textbooks involves a series of processes. In this interaction, teachers first select textbooks based on the needs of the learners. This is followed by the interpretation of the learning materials during lesson planning and delivery with regards to their perception of the materials. Also, teachers reconcile their perceptions of the lesson plan with their own goals and with the limitations of the setting. Brown (2009) further observes that in lesson

planning, teachers accommodate the students' interests, experiences, and limitations. Teachers then modify the setting of their lesson plan according to their own discretion and to their students' capacities. These processes, as proposed by Brown, partly reflect the dynamic and constructive relationship between the teacher's lesson plan and textbooks. Understanding teachers' use of textbooks in lesson planning provides insight into the contribution of effective lesson delivery. Yildirim (2008) is of the view that in the selection of textbooks for lesson planning, teachers ought to match the textbook to the learners' ability levels, and use appropriate teaching methods within the time frames allocated in line with their school context. This forms a very integral aspect of effective planning and lesson delivery.

2.4.1.4 Perception of Teachers on the Use of Textbook in Lesson Planning

Mathematics curriculum material like textbooks are critical resources for students' learning of mathematical content and teachers' mathematical instructional decisions; and teachers are accustomed to using them to guide instruction (Stein & Kim, 2009). The critical point for understanding the curriculum use depends on the process of understanding what teachers do with Mathematics textbook, and why as well as how, their choices influence classroom instruction (Remillard, 2009). Research shows that teachers transform the textbook ideas, lesson plans, and mathematical tasks into real classroom learning. Remillard (2005) further reiterates that understanding the teachers' interactions with textbooks requires an integral analysis of the use of textbooks in the classroom teaching and learning context. Johansson (2006) observes that teachers use the textbooks for assigning exercises and homework to students, and that they also direct student to use a textbook for reviewing class exercises. Johansson (2006) further argues that the textbook content follows, and largely reflects, the requirements and intentions of the intended curriculum. Textbooks are designed as artefacts to be dynamically used in the classrooms and thus, they influence the instruction.

In contrast, a study conducted by Muhamad (2009) to investigate English teachers' perceptions of the English textbooks for lesson planning observed that the English textbooks could not serve teachers' and learners' needs because they lacked content appropriateness. As a matter of fact, scholars assert that the use of textbooks in every subject and Grade level has some limitations (Fredricks, 2005).

To complement the best use of Mathematics textbook, Irujo (2006) suggests that in teaching and learning in the classroom, teachers ought to choose the best material for instruction; to make supplementary materials for the class and to adapt or change the materials in the textbooks having in mind that not all textbooks are useful in the teaching and learning process. I concur with the above, studies show that in practice, the combination of textbooks does not give a true reflection of the outcomes based model, but rather a host of different titles, with no complete materials sets being adequate for any lesson (Stoffels, 2005).

2.5 THE CHALLENGES PRIMARY SCHOOL TEACHERS ENCOUNTER IN THE USE OF TEXTBOOKS

Despite the important uses of textbooks by both the learners and the teachers, major challenges are encountered by the schools in obtaining textbooks: Some schools do place their orders for textbooks late or with errors or may not place orders at all. Placement of orders for textbooks should be the prerogative of the school and not parents. The school knows when exactly the textbooks should arrive and when they are to be used. Therefore, they should place orders for the recommended textbooks early enough to give room for delay from the publishers. At the same time, they should understand the fact that publishers are very busy at the beginning of every session, it is important for the school to place the order before the last term of the current session (SAHRC, 2014:27).

Inaccurate projections on the number of learners which enrol at each level in the following year and inaccurate enrolment figures of learners going to the next class can lead to the delay in obtaining textbooks. Teachers and school management need to be proactive by using the learners' final assessment in the third term, to judge their promotion to the next class, rather than waiting for the last term.

Poor monitoring by schools in terms of materials delivery is another challenge of textbooks availability for the use of students. When schools place an order for textbooks, they always fail to monitor the publishers or sole distributors. They also need a thorough follow up by designated (Fan, Zhu & Miao, 2013).

Non-adherence to budgetary allocation or directives issued to the schools leading to non-delivery of textbooks is also another challenge because every school has a particular yearly budget allocation for textbooks based on the number of students. The budget must be adhered to by the school. Failure to do so can lead to the delay in delivery or non-delivery. Unavailability of certain titles when schools make orders for textbooks is another problem; some orders are out of stock due to greater demand and/or insufficient resources to produce them in large quantities (SAHRC, 2014:27).

Unforeseen circumstances such as heavy rains and service delivery strikes that impede the process of delivery: this can impede smooth delivery because heavy rains can affect the books. Ordering of textbooks not approved in the catalogue: whenever textbooks that are not in a catalogue are ordered, there is definitely going to be a problem because such textbooks have to go through the production circle. (SAHRC, 2014:27).

According to Johnsons (2002), the main aim of an education system is to provide quality teaching and learning to its community. Johnsons (2002:207), as cited in Cooper (2010), asserts that a “culture of learning and teaching” in the context of education in South Africa generally refers to a positive attitude of all role players towards teaching and learning, and the prevalence of quality teaching and learning processes in schools. He further states that, commitment to the teaching and learning process and provision of relevant resources contribute positively towards the achievement of quality education. In schools where quality learning and teaching prevails, teachers in primary schools encounter some challenges in the use of textbook due to several reasons.

Reading is, without doubt, the most important linguistic skill that needs to be developed in learners. To improve reading levels in South Africa, the DoE developed the National Reading Strategy in 2008. The vision of this strategy is to ensure “that every South African learner is a fluent reader who reads to learn, and reads for enjoyment and enrichment” (Department of Education, 2008:4). This is done with the intention of addressing illiteracy which affects learners’ performance in all subjects at all Grades. The Reading strategy argues that if learners’ reading competence is poor, their writing and comprehension competencies will also be poor. This strategy is motivated by the results of the systemic evaluation which was conducted on the Intermediate Phase

learners, which indicated that 14% of learners were outstanding in their language competence, and 23% were satisfactory or partly competent, but the majority (63%) of learners was below the required competence for their age level (Department of Education, 2008:6). These results highlight the need for improving learners' reading levels in schools. Thus, the provision of adequate reading material is crucial for achieving the objectives of this strategy. Schools need good text-rich learning environments to encourage learners to perform well.

2.5.1 The pacing and sequencing of lessons

The CAPS policy clearly indicates the content and skills that learners in the Intermediate Phase, particularly Grade 4, are expected to acquire in each year of study. The policy also outlines the content, methodology and teaching timeframes to be achieved in the learning of English at First Additional Language (FAL) level, (Department of Basic Education, 2011:33). This pacing and sequencing of the lessons also eliminates ad hoc teaching by teachers, as well as haphazard presentation of the learning content. Although the policy does not prescribe any particular order for the teaching of the topics, it should be noted that a listening and speaking lesson should draw from a reading lesson, while a lesson on discussion should precede a writing lesson.

The Norms and Standards for Educators (2000) state that teachers have a role to ensure that learning content is selected, sequenced, and paced in a manner that is sensitive to the differing needs of the subject concerned, and of the learners. By following the prescribed pacing and sequencing of lessons, as indicated in the teaching plan above, teachers can ensure that all the content prescribed for each Grade in each phase is presented in full in a sequence that enables learners to acquire the intended knowledge and skills as an integrated unit. Teachers and learners in the Intermediate Phase should be provided with relevant learning materials for effective delivery of the curriculum. According to Ensor et al. (2002), availability of well-structured textbooks and readers that cover the curriculum and core literacy and language skills assists teachers in their task of preparing and presenting lessons. The effective use of such resources in the classroom creates an all-inclusive and logical teaching and learning process that assists learners to achieve the expected proficiency levels.

The CAPS policy indicates that the following resources should be provided for the effective teaching and learning of English FAL:

- **For the learner:** An approved FAL textbook, a dictionary, readers (for accessing different text types), and media materials (e.g. newspapers, magazines, etc.);
- **For the teacher:** A CAPS policy document, the Language in Education Policy, the FAL textbook (learner's book, and teacher's guide); readers (with recommended text types), dictionaries and reference books (multilingual dictionaries, thesauruses, and encyclopedias); and
- **For the classroom:** Texts for shared reading in Grade 4, other texts to accommodate different reading levels, media, and visual resources (DBE, 2011:14).

For teaching and learning to effectively take place in the classroom, provision of teaching and learning materials is vital. This statement is confirmed by Czerniewicz et al. (2000) who say that access to learning materials is a critical aspect in the promotion of effective teaching and learning. The authors further argue that, while consideration should be given to ensuring that sufficient learning materials are available, such provision must also ensure that the available resources are appropriate, adequate, and in line with technological developments. However, factors exist that could adversely affect the provision of such materials. These factors include, among other things, insufficient funding, poor material selection, and poor school leadership in relation to textbook retention and retrieval systems.

2.5.2 The selection of texts for classroom teaching

The teacher is the most important role player in the selection of texts for lesson presentation. According to Mohammad and Kumari (2007), for teachers to facilitate the teaching and learning process in the classroom, they require a collection of resources that will support curriculum delivery. According to Stoffels (2005), the textbook should be integral in classroom teaching to support the teacher in their pedagogical practice of the content for the entire year. Stoffels (2005) also raises another perspective where inventive teachers would combine both commercially

produced materials and self-developed materials to create optimal balance and good learning opportunities for learners.

Stoffels (2005) found that, in practice, the combination of materials does not give a true reflection of the outcomes- based model, but instead a mixture of different titles, with no complete material sets to suffice for any class. This does not go without challenges as that takes an “ideal teacher” to be innovative in the selection of materials for classroom use. It requires taking learners’ needs into consideration, to achieve curriculum goals. This shows that the teacher is the key role player in stimulating learners’ creativity, by selecting appropriate materials that will enhance learners’ learning processes

Ying and Young (2007) argue that the context in which teachers operate is also vital in the selection of materials. The authors state that school contexts differ, and that this may influence the proper selection of appropriate materials for classroom use. The context may relate to learners’ competence levels, which may not be addressed by the materials selected, where the level of the content presented in the materials may be too high for learners. Opoku-Amankwa (2009) states that in such cases, stronger learners are given an unfair advantage, since the focus is directed at above-average learners, while weaker learners are overlooked

The use of textbooks is expected to provide and make the learning content meaningful for learners. Literature indicates that there is a variety of approaches for disseminating information in class. Remillard (2005) discusses the textbook-bound approach; a teaching style that provides a fixed system of using the textbook. The author explains that in this approach, the teacher follows the textbook as prescribed. This enables the teacher to cover and complete the learning content as expected. Remillard (2005) observes that this approach is mostly used by new teachers who, due to their lack of teaching experience, opt to be overly reliant on the prescribed textbook. Ensor et al. (2002) explain that in this approach, the teacher follows the textbook, using a step-by-step method, adhering to content presentation and sequencing. Ying and Young (2007), in support of the textbook-bound approach, state that it provides a systematic way of engaging with the learning content and covering the curriculum.

Stoffels (2005), in opposition to this approach, argues that teachers who use this approach become rigid and defensive in their teaching. This could be due to teachers’

lack of skills in mediating the curriculum to learners, or because of the inflexible nature of this approach. Ying and Young (2007) report that in the study conducted in a Primary School in Hong Kong, teachers were observed persistently following this approach, even though the teachers were aware that learners in schools were not all on the same learning level. This was possibly due to teachers' inability to use materials for classroom teaching and learning. The above arguments suggest that, although the textbook-bound approach may be beneficial to the teacher in enabling him or her to present the curriculum coherently, it is detrimental to effective learning when it does not address the different learning contexts that apply to learners.

In contrast to the textbook-bound approach is the productive blend of materials approach. According to Remillard (2005), this approach advocates the use of a variety of materials in the presentation of a lesson. The author explains that flexibility relates to when teachers focus on the classroom situation that they engage in every day, that is, the learners with whom they work, the work they are expected to complete. The resources available to them, and the context within which the work must be carried out, against the textbook being used with the learners; to present the best lessons, while ensuring that learners acquire the necessary knowledge and skills.

Ying and Young (2007) raise a concern regarding the selection of textbooks for learners who are not "teacher's pets", as these learners regularly experience barriers to learning. Their learning levels are often ignored by most teachers during the selection of textbooks for classroom teaching. Onuoha-Chidiebere (2011) asserts that the selection of teaching materials should be based on the learning objectives and the unique characteristics of learners. Motloun's (2008) research, investigated textbook use and the issue of Learners with Special Education Needs (LSEN), focusing specifically on material selection processes, suggests that materials are often not selected to meet the needs of learners at different learning levels in the classroom, particularly LSEN, but the needs of average learners, or in some cases, "teacher's pets", who are the strong learners in the class.

2.5.3 Measuring readability

Measuring readability is a complex affair due to the many factors involved. Gray and Leary, cited in DuBay (2004) identify four factors affecting readability, namely: content (including propositions, organization, coherence), style (including semantic and syntactic elements), design (including typography, format, and illustrations), and structure (including chapters, headings and navigation). Other research reported by DuBay (2004) showed that the best predictors of textual difficulty were two aspects of style, namely: semantic content (e.g. of vocabulary) and syntactic structure (e.g. sentence length). Syntactic structure can be determined using readability formulas which are strictly text-based. The view of reading as an interactive process implies the existence of text-based, reader-based, and author-based factors regarding readability. Not all these factors are quantifiable. For example, factors related to communicating meaning such as legibility of print, clarity and relevance of illustrations and conceptual difficulty are non-quantifiable.

Teachers who are familiar with a topic can determine the suitability of written material for their pupils. However, Johnson (2000:2) claims that teachers usually underestimate the difficulty of the text by up to 8 years, and that the more familiar the subject teacher is with the topic, the less likely s/he is to see the problem from the pupils' point of view. It has been noted, for example, by Hugo *et al.* (2008) that if teachers are interested in positively influencing the teaching-learning process in the classroom, they may have to start with production and provision of appropriate and effective instructional materials. According to Hugo (2006), good textbooks for all are one of the cheapest and most effective ways to get quality into the classroom and the home.

However, Fredricks (2005) warns that as good as textbooks may appear on the surface, critics have found that textbooks, in nearly every subject and Grade level in primary schools, have some limitations. For example, they cover too many topics; the writing is superficial and lacks depth and breadth. A study by Sailors (2012) shows that most instructional materials developed in Malawi do not have the basic attributes of good or high-quality textbooks as prescribed by the curriculum. Sailors (2012) observed that most instructional materials that support the new curriculum in Malawi were not properly designed, with information errors and content promoting gender bias.

Similarly, Muhamad (2009) conducted a research with Mathematics teachers to investigate their perceptions on Mathematics textbooks. The findings revealed that teachers felt textbooks could not serve teachers' and learners' needs because they lacked content appropriateness. Another major problem in less developed countries was shortage of textbooks in countries like Zambia and Malawi. Chimombo (2005), Nsapato (2005), Lowe (2008) and Kadzamira (2006) also found that Malawi had the lowest percentage of textbook availability for both teachers and pupils in the sub-Saharan region, and that the primary school system in Malawi lacked teaching and learning materials, especially in the rural primary schools, which affected the successful implementation of the primary school curriculum.

2.5.4 Language proficiency

Literature validates the notion that the teacher is the most critical participant in an educational reform, particularly in one that touches on what goes on in the classrooms (Mundy, 2008). However, their training and innovative skills in textbook use is a necessary but not sufficient condition for effective learning. There are other prevailing conditions which pose a challenge to the teacher and impede learning.

Teachers face numerous challenges like of primary school learners' lack of language proficiency. Core among them is the limited language opportunity for the learners to practice at home. In primary schools from rural areas, the learners' only opportunity to use English language is limited to the daily 35-min English lesson (KIE, 2002). Furthermore, these learners are not given ample opportunities to practice the English language in the classroom when learning other subjects because of switching from one language to the other. Teachers of other subjects keep changing the language of instruction from English to the mother tongue, either because they are incompetent in English language or have the learners understand the subject matter. This situation results in minimal exposure to the language (Abdi & Hardman, 2007). Given that language learning requires a lot of exposure as postulated by Cummins (2006), the teacher who offers English is left with the sole burden of helping learners develop competence in English within a 35-min lesson, because the language outside the classroom and at home is largely the local languages.

In lower primary, there is a mismatch between language policy and the actual practice. Ideally, mother tongue ought to be used to reinforce instruction as recommended by the policy (Ministry of Education, 2006). However, the reality is that there is continued use of English, which is an unfamiliar language, as a medium of instruction. This creates anxiety and stalls effective classroom participation (Kodero et al., 2011). These observations corroborate those of Ngwanu (2010), in a study done in Zimbabwe, which point out that using an unfamiliar language as a medium of instruction is a major impediment to learning. This is because learners are not afforded the chance to learn from their own familiar home language, a curriculum and pedagogy that recognizes their cultural setting. For instance, there are some comprehension passages which use illustrations that learners cannot relate to. A case in point is the comprehension passage in the class three English text books which has used the English expressions, “as white as snow.” This expression is difficult for learners to relate to since there is no experience of snow in some areas. Therefore, the use of such English expression is a typical disregard of learners’ sociocultural experiences, which often inhibits learning.

The learners’ negative attitude toward English poses a great barrier for effective teaching. This negative attitude emanates from the fact that learners have limited competence in the language, thereby preventing them from actively participating in classroom activities (Uso Juan, 2006). Given that English is either a second or third language to some learners, most learners have difficulties in comprehending its structure. A more recent research conducted by Tella et al. (2010) reveal that English lessons have minimal learner participation because learners do not have the necessary competence as not much was developed during their formative years. This minimal learner participation can be linked to the learners’ negative attitude toward the subject, which eventually leads to significant levels of underperformance in Mathematics due to lack of comprehension of the contents of the textbook. The primary school teacher struggles to help learners to achieve the expected proficiency level of learners and to choose a suitable textbook to use.

2.6 TEACHERS' BELIEFS ABOUT MATHEMATICS EDUCATION AND TEXTBOOK USE

As stated by Philipp (2007: 259), “beliefs, unlike knowledge, may be held with varying degrees of conviction and are not consensual.” The coexistence of contradictory beliefs within a belief system has important methodological implications. Leatham (2006) indicates how seemingly contradictory beliefs might appear, but the individual holding such beliefs is often able to solve the conflict and assimilate the beliefs into the system. To the observer, this may seem illogical or unreasonable, but within the individual’s system, the beliefs may still appear with some internal consistency. In Leatham’s (2006: 95) words, “our incredulity does not diminish another’s coherence.” As for the connection between beliefs and knowledge, this is widely discussed in the literature. Furinghetti and Pehkonen (2002: 43) distinguish between two different kinds of knowledge: “objective (official) knowledge that is accepted by a community and subjective (personal) knowledge that is not necessarily subject to an outsider’s evaluation”. They argue that beliefs should be considered as belonging to the subjective knowledge.

Literature on teacher’s belief suggests that a teacher’s beliefs about Mathematics education are a primary factor influencing their decisions to use student textbooks. Specifically, the beliefs a teacher holds about Mathematics education potentially influence both how frequently textbooks are used, and the manner in which they are used (Manouchehri & Goodman 2000; Stipek, Givven, Salmon, & MacGyvers, 2001). Teachers who hold beliefs about Mathematics education consistent with a traditional approach to teaching and learning are more likely to use student textbooks, and they tend to follow the pedagogy and sequences embedded within the student textbook and the accompanying teacher’s guide (Stipek et al., 2001). On the other hand, teachers whose beliefs correlate with a constructivist approach to Mathematics are more likely to either teach without, or modify the activities within student textbooks (Stipek et al., 2001).

However, this relationship between the beliefs about Mathematics education a teacher holds, and their use of student textbooks in Mathematics, is not consistent, and there are inconsistencies between teachers’ professed beliefs and their classroom practices (Handal, 2003; Speer, 2005). The foundation for such

inconsistencies is likely to be complexity of the belief construct itself and the fact that a teacher's overarching beliefs about Mathematics education and their subsequent classroom practices are mediated by a number of internal and external factors. The decisions teachers make about the implementation of student textbooks in Mathematics are influenced by their beliefs regarding their own level of confidence and competence to teach Mathematics, perceived pressure from external forces such as administrators, parents, and fellow teachers, as well as by their judgements about the educational quality and value of student textbooks (Handal, 2003; McNaught, 2005; Pehkonen, 2004; Stipek et al., 2001).

Since the integration of technological tools (computers, calculators, mobile devices, etc.), how such technological tools are used in the Mathematics classroom, to a large extent, depend on teachers (Thomas & Palmer, 2014). It is known that one of the factors influencing teachers' use of digital technologies is their pedagogical beliefs (Goos, 2014); for example, teachers' beliefs about the efficacy of computer use in Mathematics (Forgasz, 2002), and their beliefs about the nature of teaching and learning of Mathematics (Thomas & Palmer, 2014; Walen, Williams & Garner, 2003).

Numerous studies in Mathematics (Fricke, Horak, & Meyer 2008; Le Roux 2008; Themane, Monyeki, Nthangeni, Kemper & Twisk, 2003) have been conducted in South Africa, but the focus has always been on secondary schools. Often the investigations concentrated on classroom variables such as teaching resources and text books that could influence performance but not on teacher attributes that could impact negatively on successful learning. The observation is that the cumulative effect of this oversight can lead into serious Mathematics learning problems at higher Grades, and needs to be addressed early in the child's schooling. It is also important to pay attention to specific difficulties experienced in teaching or learning Mathematics in the 21st century, where everyone is computer literate and is accessible to gadgets that do not need too much reading like in the 20th century. Nowadays, there are applications that are used to propose effective solutions to mathematical problems. During the 2012 and 2013 Department of Basic Education (DBE) Annual National Assessments (ANA) in literacy and numeracy skills in Grades 1-6 and in Grade 9, it was established that South African learners experienced serious challenges in these areas (DBE, Republic of South Africa, 2013). As a result, intervention programmes were put in place by the DBE in primary schools. For example, in Gauteng Province, the Gauteng Programme

for Language and Mathematics Strategy (GPLMS) was initiated to support the implementation of the CAPS.

The focus of the GPLMS was on providing clear time allocations to complete the curriculum, weekly routines, revision weeks and marking guidance (Gauteng Province Department of Education, 2012). The findings of this study indicate that this prescriptive approach called for intervention strategies by teachers, and being flexible in using the resources that were more advanced from the ones they were using before the study (Msibi & Mchunu, 2013:19-23). The minister of education introduced more remedial approaches, to the teaching and learning Mathematics and one of them was the use of technology in the subjects' offering.

A study that was conducted in Australia by the University of Queensland revealed that Australian teachers are dependent on a wide variety of these commercially produced curriculum resources, particularly the student textbook, for delivering the curriculum (Watt, 2002). However, teachers' heavy dependence on the Mathematics textbook as a means of improving the educational outcomes of students is problematic, as the value of textbooks to student learning is presently ill-defined (Zevenbergen, Dole, & Wright, 2004). Taking into account the lack of conclusive evidence supporting the efficacy of textbooks, the reasons for Australian teachers' commitment to utilizing student textbooks in Mathematics classrooms is unclear.

This ambiguity is further pronounced when one considers the widely held belief amongst educators that teaching is enhanced when underpinned and informed by research and theory (Knobel & Lankshear, 1999). Throughout history, Mathematics textbooks have been synonymous with Mathematics education. In many instances, historical Mathematics textbooks are often all that remains as a record of Mathematics programs of the past (Love et al., 1996). One of the earliest documented Mathematics textbooks written with a scholarly approach to Mathematics is Robert Record's "The Ground of Arts", published in 1543 (Watt, 2002:12). Written entirely in dialogue form between Master and Scholar, the purpose of "The Ground of Arts" was to instruct readers (scholars) in the basics of elementary arithmetic: numeration, addition, subtraction, multiplication and division.

Record's Mathematics textbook was widely successful and was reissued a number of times both during his lifetime and after his death. This book's immense success

became a catalyst for the authoring and publishing of numerous versions of Mathematics textbooks, a trend which continues to the present day. In most South African schools, where the use of technology in schools is dependent on beliefs, gender, age of teachers, and school infrastructure remains unchanged as most of the schools remain resistant to change due to lack of skills in the use of the technology. Few whose beliefs are to augment their teaching resources with technology are also faced with poor service delivery and lack of funding in converting them into the 21st century classroom designs. The teaching of Mathematics relies on textbooks more than any other subject area (Johansson, 2006). Used in up to 90% of Mathematics lessons, the Mathematics textbook is often the teacher's source of content, sequencing and instructional activities, and ideas for lessons (Johansson, 2006; Reys, Reys, & Chaves-Lopez, 2004).

The results pertaining to the educational value of student textbooks in Mathematics were indicative of previous research which suggests that teachers have strong positive beliefs about the educational value of student textbooks. When interviewed, these teachers exhibited positive beliefs about the educational value of student textbooks in Mathematics. The results indicated strong beliefs held by teachers in this study regarding the value of the textbook as a source of opportunities for students to practice mathematical skills. The pedagogy of contemporary Mathematics textbooks is described in the literature as being focused on skill acquisition through a heavy emphasis on procedural practice (Chavez-Lopez, 2003). Results from this study indicate that teachers place positive value on textbook pedagogy, with half of the teachers surveyed reporting that they believed Mathematics education should include the use of a textbook to allow students to practice mathematical skills. Interestingly, 38% of the teachers were undecided as to the value of student textbooks in providing students with opportunities to practice mathematical skills. In fact, despite the overriding positive beliefs regarding the textbook's educational value, there was a significant portion of the teachers' sample who were undecided for each of the items relating to the educational value of student textbooks. The question was therefore: 'Why do significant numbers of teachers (30% in this study) 'Usually' or 'Always' use textbooks in Mathematics lessons if they are undecided about the value of the textbook to student learning?' This question can be a foundation for future research investigations.

Overall, the teachers surveyed believed the student textbook is a valuable teaching and learning aid in the Mathematics classroom, particularly as a resource to provide students with opportunities to practice various mathematical skills. For the other set of teachers who believed in technology, the following segment reports their beliefs in mathematical education.

2.6.1 Teachers' beliefs about the use of technology in Mathematics education

There is research evidence showing a connection between teachers' beliefs about the teaching and learning of Mathematics and the adoption and use of technological tools for its teaching. For instance, in a study involving thirty calculus teachers with different levels of experience (pre-service teachers, teacher trainees, and experienced teachers), Erens and Eichler (2015) identified two general teachers' beliefs systems, which they called "the old school" and "technology supporter". They related such belief systems to teachers' ways of integrating graphing and computer- algebra technology in their calculus teaching. Teachers who themselves claimed to belong to "the old school" expressed serious doubts and resistance towards the use of technology in their Mathematics teaching. The researchers attributed these doubts and resistance to be deeply-rooted objections in the teachers' beliefs system, such as the conviction that students need to fully understand mathematical ideas before making use of technology. On the other hand, teachers classified as "technology supporters" used technology to foster a problem-oriented approach to teaching calculus.

Teachers perceived several benefits of using technology, such as making the class more dynamic and effective - compared to a chalk and blackboard approach - and favoring the visualization and multiple representations of mathematical concepts. According to the Professional Standards for Teaching Mathematics, as noted by Van de Walle (2004: 5), teachers must make a shift from a teacher centered to a child centered approach in Mathematics education.

The analysis of these study findings on Mathematics education provides insight on the diversity of teachers' beliefs about Mathematics and technology use, as well as the model presented based on Beswick (2005; 2012), which can be instrumental in teacher education and in-service training of teachers. Acknowledging and understanding this diversity in beliefs across different teachers is the first step towards

an open and professional discussion of the best approaches in Mathematics education, apart from suggesting the importance of such. The educational importance of facilitating this discussion seems obvious, since there is research evidence indicating that the beliefs teachers hold about Mathematics shape their students' beliefs about the subject. This suggests that the beliefs that teachers hold on the use of technological tools, and the way they organize the use of these tools in the classroom also influence students' beliefs about the role of these tools, and how they should be used in the classroom. For instance, there are research results showing that a student may feel guilty for using a calculator during a problem-solving process, if the student repeatedly hears from the teacher that calculators should only be used as a last resort when solving a mathematical problem (Erens & Eichler, 2015). This potential influence of teachers' beliefs about the use of textbook is valuable.

2.7 OTHER MATHEMATICS ARTIFACTS USE IN SCHOOLS

Textbooks are one of the most important artefacts in Mathematics education. "The textbook should arouse students' interest in learning Mathematics, help students to study Mathematics actively, develop students' potential in creativity through the process of learning basic knowledge, improve students' mathematical thinking when trying to understand the essence of Mathematics knowledge, and raise students' awareness to apply Mathematics knowledge in everyday lives" (Li, Zhang & Ma, 2009: 743). This very important role of textbooks is also reflected in the body of literature, where the main focus of research has been on the textbook itself; the analysis and understanding of the potential effect of the different features of the text-book on mathematical learning (Fan, Zhu & Miao, 2013; Mikk, 2000; Pepin & Hag-garty, 2001; Remillard, 2005). These investigations reveal nuanced insights into what is made available in textbooks and how it is made available. Such analyses certainly serve as an effective basis for the on-going development of new and better textbook versions.

Textbooks are essential materials in the aspect of teaching and learning, especially in Mathematics. Studies have shown that the role of the Mathematics textbook as an instrument for teaching and learning has not gained much attention (Johansson, 2006). In general, researchers have observed that Mathematics textbooks, which serve as a major conveyor of the curriculum, play a significant role in different schools

(Fan, Zhu & Miao, 2013). Pesic, (2009) is of the view that Mathematics textbooks should have a role of summarizing, generalizing and making points. The function of the task is more demanding than in the expository strategy, since they convey teaching content and keep the learning process intact (Pesic, 2009).

Another important direction in text-book research is the role of the textbook in the teachers' planning and preparing for instruction. Textbooks are often perceived as reflecting the officially intended curriculum. Research has documented a strong influence of textbooks on the Mathematics content that is taught and learned. Thus, textbooks control material selection and sequencing—the teacher becomes an implementer of the learning process, which is regulated by textbooks (Pepin & Haggarty, 2001). The topics presented in the textbook are likely to be introduced in the classroom. However, topics not included in the textbook are most likely not to be presented by the teacher (Johansson, 2006). Most of the examples presented by teachers, and the exercises that the students work with, either during lessons or at home, come mainly from textbooks, as well (Viholainen, Partanen, Piironen, Asikainen & Hirvonen, 2015). Since textbooks usually reflect national goals set down in the (intended) curriculum, and at the same time, they strongly shape the instruction given in classrooms (implemented curriculum), thus, in the framework for the Third International Mathematics and Science Study (TIMSS), the textbooks were treated as the *potentially implemented curriculum* (Viholainen et al., 2015).

From previous research, it was discovered that the textbook influences the teacher's decisions regarding the instructional approaches used in the classroom. Several empirical studies have shown that “textbooks appear play a role in teachers' pedagogy by conveying pedagogical messages and providing an encouraging or discouraging curricular environment for them to employ different teaching strategies” (Fan, Zhu & Miao, 2013: 636). In many Mathematics classes, student assignments, the questions the teacher asks, the ways in which students are grouped, the forms of assessment, and much more originate in curriculum materials. Thus, pedagogical approaches reflected in the textbook will, in all probability, be translated into practice in the classroom, and textbooks in many ways, serve as the models of instruction (Johansson, 2006; Lloyd, 2002).

2.8 STUDIES ON THE USE OF TEXTBOOKS

Textbooks are also an integral part of a teachers' daily work and are intimately connected to the enactment of instruction. Literature has repeatedly documented the fact that textbooks are used extensively in Mathematics classrooms (Fan, Zhu & Miao, 2013; Pepin, Gueudet & Trouche, 2013; Reys, Reys, Lapan, Holliday & Wasman, 2003). However, the question of *how textbooks are employed* remains relatively unanswered. There is insufficient information available regarding the nature and quality of textbook use – *the way in which textbooks are actually used in Mathematics classrooms*. It is the teacher who determines and guides the students' use of textbook materials during the lesson. Teachers may or may not, use the textbook in the lessons. They may simply use it as a source of exercises or they may utilize the full potential of the materials presented in the textbook. For example, in their study based on teachers' logs, Gueudet and Trouche, (2013) analyzed the way in which four fourth-Grade Mathematics teachers in the US were using the same textbook. They detected striking differences in the practices of these teachers in the use of textbooks. Thompson and Senk (2014) studied how 12 teachers from nine different states in the US applied the same Mathematics textbook in their teaching of congruence. They found differences among the teachers, both in the selection of topics and in instructional strategies. It has also been observed by Senk (2014), that the use of similar textbooks does not guarantee equal learning opportunities for all students, because the teacher has the key role in affecting how the resources provided in the textbook are utilized in practice. Studies have also documented cultural differences in the way teachers employ textbooks in their lessons.

The contextualization of the teaching and learning of the Mathematics textbook should thrive in situations that refer students to the appropriate use of the resources in the process of acquiring mathematical knowledge. Vlahovic (2009) argues that some of the features of textbooks that suggest a contextual approach to teaching and learning include the process of acquiring knowledge, learning with the use of Mathematics textbooks and textbook solutions, students are placed in front of the tasks that presuppose activation of previously acquired knowledge and experience and their inclusion into new knowledge. The Mathematics textbook is equipped with features that require periodic repetitions, checking and systematization of previously received knowledge, and other outcomes.

The mathematical requirements in Croatian textbook exercises are given in the analysis by Glasnovic Gracin (2011). There is an emphasis on procedures, reproduction and intra-mathematical requirements in Croatian textbooks. Brown (2009) observes that teachers constantly engage in a dynamic interplay between curriculum resources and the teacher's personal resources. Fan et al. (2013) argue that textbooks are seen as intermediate variables which are affected by other factors and which affect other factors. His research emphasizes the fundamental issue of how textbooks affect other factors such as teaching. Mathematics curriculum material such as textbook is seen as a critical resource for students' learning of mathematical content and teachers' mathematical instructional decisions; and teachers are accustomed to using them to guide instruction (Stein & Kim, 2009). Textbooks provide ideas and practices which frame classroom activity through text and diagrammatic representations, and help teachers in achieving goals that they presumably would not accomplish on their own (Brown, 2009). In their studies on Mathematics textbook analysis in terms of offering support to contextualized teaching, Milinkovic, Curcic and Dumitraskovic (2017) observe that the basic role of the Mathematics textbook is to ensure that, all the parameters necessary for the developmental and cognitive character of the students are met.

According to Milinkovic et al. (2017), the basic parameters of Mathematics textbook is to ensure:

- a) the quality of the content of the Mathematics textbook which must meet the personal needs and interest of the students.
- b) the quality of the didactic design of the Mathematics textbook, which is the manifestation of effective learning in which the priority is thinking and not memorable and formative role in the development of students.
- c) the quality of language and media characteristics of the textbook.

Milinkovic et al. (2017) note that the role of the Mathematics textbooks is basically to create conditions for students to construct, independently and in accordance with their capabilities, relevant mathematical knowledge; and to develop skills, beliefs, habits and so on.

Fan (2013) further enumerates the fundamental issue of “how textbooks affect other factors” such as teaching. Glasnovic Gracin (2011) conducted a large-scale study in order to determine teachers’ attitudes about the use of Mathematics textbooks in Croatia. The study observed that Mathematics textbooks played a very significant role in Mathematics education in Grades five to Grade eight in Croatia especially in teachers’ lesson preparations, practice exercises for students, and homework. Research shows that teachers use textbooks for lesson preparation. They decide what is to be taught according to the textbook content and how and when the textbooks will be used in lesson delivery (Glasnovic Gracin & Domovic, 2009). Tarr, Barbara, Reys, Baker, and Billstein, (2006) enumerate three key dimensions that provide a general framework for reviewing and selecting Mathematics textbooks. They stress content emphasis, instructional focus and teacher support. The emphasis on the content includes the alignment with the learning expectations presented in the curriculum, in-depth presentation of topics with increasing sophistication across Grades, and an appropriate balance of skills development and understanding of concepts and processes (Tarr et al., 2006). According to Brown (2009), the understanding of teachers’ use of Mathematics textbooks and other relevant curriculum materials provides direction to Mathematics learning in the classroom. This shows that Mathematics textbooks are very crucial to Mathematics teachers, and how they apply them to Mathematics teaching and learning.

2.8.1 Developmental and formative role of Mathematics textbook

According to Pesikan and Antic (2007), the developmental and formative role of Mathematics textbook is observed in their design and practical use. The findings from their studies were that, the Mathematics textbook must link to the daily life of students with academic knowledge and specific educational goals. Through this, the material becomes meaningful to learners, because the school knowledge becomes closer to their life and thus students become motivated to learning (Pesikan & Antic, 2007). Mavugara-Shava (2005) added that the task teachers give to students should not be too far above learners’ current level of competence because the result is that the learners will be off task and no learning will take place. Tasks should have a link between these two extremes as it is the learning zone in which learners can operate, only with some form of help.

Dejic (2008) is of the view that, the Mathematics textbook should be structured in order to develop interest in students. This should include mathematical practical tasks, problem-solving tasks, and tasks which stimulate intellectual curiosity.

2.9 APPROACHES TO TEACHING MATHEMATICS

Mathematics curriculum materials, such as textbooks, are seen as a critical resource for students' learning of mathematical content and teachers' mathematical instructional decisions; and teachers are accustomed to using them to guide instruction (Stein & Kim, 2009). The critical point for understanding the curriculum contents depends on the process of understanding what teachers do with Mathematics textbooks, and why as well as how, their choices influence classroom environments (Remillard, 2009). Research shows that teachers transform the textbook ideas, lesson plans, and mathematical tasks into real classroom activities. Remillard (2005) further reiterates that understanding the teachers' interactions with textbooks requires an integral analysis of their use of textbooks in the classroom teaching and learning context. Textbooks provide ideas and practices which frame classroom activity through text and diagrammatic representations, and help teachers in achieving goals that they presumably would not accomplish on their own (Brown, 2009). Johansson (2006) observes that teachers use the textbooks for assigning exercises and homework to students, and that they also direct students to use a textbook for reviewing of their termly works. Johansson (2006) further argues that the textbook content follows and largely reflects the requirements and intentions of the intended curriculum. Textbooks are designed as artefacts to be dynamically used in the classrooms and thus, they influence the instruction.

In contrast, a study conducted by Muhamad (2009) to investigate English teachers' perceptions of the English textbooks for lesson planning observed that the English textbooks could not serve teachers' and learners' needs because they lacked content appropriateness. As a matter of fact, scholars noted that the use of textbooks in every subject and Grade level had some limitations. Textbooks covered too many topics and the writing was superficial and lacking in-depth and breadth (Fredricks, 2005).

Irujo (2006) suggests that in teaching and learning in the classroom, teachers ought to choose the best material for instruction; to make supplementary materials for the

class, and to adapt or change the materials in the textbooks, keeping in mind that not all textbooks are useful in the teaching and learning process. Studies show that in practice, the combination of textbooks does not give a true reflection of the outcomes based model, but rather a host of different titles, with no complete materials sets to be adequate for any lesson (Stoffels, 2005).

In the planning of any curriculum, decisions are made concerning the philosophy of Mathematics, the Mathematics knowledge appropriate to the phase, the approach to teaching Mathematics, and the subsequent assessment. The explicit expression of the underpinning philosophy, the mathematical knowledge, and the related teaching directives vary from country to country. The degree of control exerted centrally by the national education departments also varies. For example, in some education systems, such as that of the Netherlands (Thijs & Van den Akker 2009), broad statements and objectives are provided at the *mega* level for both socio-political and educational purposes, but, at the *micro* level, the details and interpretation of these statements for school purposes and the classroom work scheme are left to the teachers and textbook writers (Thijs & Van den Akker 2009). The approach adopted by CAPS in the Intermediate Phase of the South African education system (RSA DBE 2011) is to prescribe the detail, even with regard to the day-to-day, minute-by-minute teaching of a particular topic. Here, the curriculum product is located at the *micro* level. The *National Curriculum Statement* (RSA DoE 2003), the forerunner to the current CAPS, was objectives-based, with the interpretation occurring at the textbook and individual school level. The rationale for the change is that our teachers are deemed not capable of interpreting an objectives-based curriculum, or of transforming these objectives into instructional units (Dada, Dipholo, Hoadley, Khembo, Muller, & Volmink, 2009).

This argument for prescribing the detail at the curriculum level is not warranted, as the textbook writers generally provide the detail for the teachers. It was noted here that the process of engaging with the demands of the curriculum and the textbook or workbook, and transforming these demands into instructional units, is necessary for good teaching. The teacher needs relative autonomy to interpret the learning requirements for the specific classroom. The view of Mathematics, the principles informing the proposed learning experiences and the design of assessment tasks

are not always made explicit within the current broad framework provided by the Department of Basic Education (Dada et al., 2009).

A national curriculum may be underpinned by the assumption that Mathematics knowledge may be separated into distinct topics, and that behaviors, for example, *knowing*, *applying* and *reasoning*, are distinct and may be attributed a priori to a test item without regard for a learner's cognitive level or without the necessary attention to previous educational experience (Dada et al., 2009). The CAPS document may be characterized as prescribing a topics approach, evident in the week-by-week and hour-by-hour prescriptions, though it must be noted that this approach may be read somewhat differently in the 'General Aims', which propose attention to critical thinking (RSA DBE 2011:4-5).

A second approach to Mathematics knowledge is the process approach, in which problem-solving approaches and higher order thinking skills are identified. This approach is somewhat aligned to problem-solving. Some elements of Curriculum 2005 drew on a problem-solving approach. The assessment aligned with such an approach may draw on interviews and observations to identify actions and processes, and to make thought processes explicit, rather than the routine paper-and-pencil tests.

The third approach may be described as a conceptual fields approach. A conceptual field is generated by specific structural criteria; for example, the multiplicative conceptual field is identified by common multiplicative structures. The key elements of the field include problem situations and operations of thought and symbolic representations, but in addition, this field approach considers the interrelationships "between problems and situations and [the] student's thinking in addressing them" (Webb, 2002:667). The assumption underlying conceptual fields is that different problem situations may be described mathematically by a limited number of statements and symbols. The strength of this approach is that it can be used "to map what a student knows within a knowledge domain and to track the maturation of concepts within that domain" (ibid). In this approach, extensive work is required to specify the elements from both a mathematical perspective and a cognitive perspective; for example, by specifying the increasing complexity of multiplicative structures (Greer, 2004). This third conception is evident in the New Zealand Primary School curriculum (NZ MoE, 2009).

2.10 SUMMARY

In this chapter the research study was placed within the context of recent literature on the use of textbooks in lesson planning and delivery, the selections of textbooks for teaching Mathematics at primary school, the challenges inherent in the using of textbooks, approaches used for teaching Mathematics. The theoretical Framework of this study; the tetrahedron model of textbooks is based on the fundamental model of didactical system: the tripod relationship that exists between student, teacher, and textbooks. The Mathematics textbook is useful as an instrument on all three sides of the triangle: teachers use textbooks in the preparation and delivery of their lessons, by using the textbook in the lesson teachers also mediate textbook use to students, and students learn from textbooks.

The next chapter explains the research methodology of how the research paradigm and design were carried out in order to collect the data, implementation of the research design and the methodology applied to determine the sample and how the instruments on the use of Mathematics textbooks by primary school teachers was validated.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The last section contextualized and conceptualized literature on the use of textbook for lesson planning and delivery, it also explains tetrahedron model of textbook usage for effective teaching and learning. This section describes the methods and procedures that were used to collect data. The researcher described the research paradigm, research approach, research design, population, sample and the sampling techniques. Data collecting methods and data analysis using thematic approach and ethical considerations made were outlined. Creswell (2014) confirms methodology as describing research approaches and paradigms while Okeke, Adu, Drake and Duku (2014) define research methodology as the activity of choosing, reflecting, evaluating and justifying the way in which the researcher intends to conduct a particular research study. For this study the research sought permission and conducted interview with class observation to corroborate the responses of the participants during the field work.

3.2 RESEARCH PARADIGM

A research paradigm is a perspective about research held by a community of researchers that is based on a set of shared assumptions, concepts, values, and practices (Johnson & Christensen, 2008:33). It is an approach to thinking about, and doing research. A paradigm according to Kuhn (2009), is the prevailing framework of theories, concepts and principles that accounts for a universally accepted way of thinking and doing within the world view in which it exists. This is also referred to as a philosophy of living life. Babbie (2001:42) defines paradigm as the fundamental model or frame of references used by researchers to recognize their observations and reasoning.

Lichtman (2013:10) talks about traditional research paradigms as ways of seeing the world and making certain assumptions about the world. They assume that there is an objective reality that researchers should try to uncover as they conduct their research. Maree (2013:47-48) defines a paradigm as a set of assumptions or beliefs about

fundamental aspects of reality which gives rise to a particular worldview. The author further points out that a paradigm serves as lens or organizing principles by which reality is interpreted. Maree (2013:48) notes that paradigms represent what we think about the world (but cannot prove). Our actions in the world, including the actions we take as inquiries, cannot occur without reference to those paradigms: “as we think, so do we act”. Thus, paradigms are to do with knowledge claims. There are a number of paradigms or knowledge claims that have taken root in today’s research; some of which are positivism, interpretivism, post-positivism, critical theory and pragmatism (Maree, 2013:47). Below is a summary of the three major paradigms showing their respective ontological, epistemological, axiological, and methodological assumptions.

Table 3.1: Major research paradigms and their philosophical assumptions

Descriptive	Positivism	Post-Positivism	Interpretivism	Critical Theory	Pragmatism
Synonym	Verify	Predict	Understand / Interpret	Emancipate	Dialectic
Ontology What is real?	Objectivist, findings are the whole truth, which is realism	Modified objectivist, findings are probably true, and there is transcendental realism	Local, relative, co-constructed realities. There is subjective, objectivity and realism	Historical / virtual realism shaped by outside forces, material subjectivity	Constructed based on the world we live in and explanations that produce the best desired outcomes
Epistemology What is true?	The only knowledge is scientific knowledge- which is truth, reality is apprehensible	Findings approximate truth, reality is never fully apprehended	Co-created multiple realities and truths	Findings are based on values and local examples of truth	Objective and subjective points of view

Axiology What is the role of values?	Value-free, propositional knowing about the world is an end in itself, is intrinsically valuable.	Propositional knowing about the world as an end in itself, is intrinsically valuable.	Value-laden, and biased. Propositional, Transactional knowing is Instrumentally valuable	Propositional, transactional knowing is instrumentally valuable as a means to social emancipation,	Multiple stances, e.g. researchers include both biased and unbiased perspectives.
Methodology How do I examine what is real?	Quantitative-Primarily Experimental, Quasi-Experimental	Usually Quantitative-Experimental with threats to validity. Qual-a case study	Means to social emancipation. Often Qualitative and/or Quantitative	Which is an end in itself, is intrinsically valuable? Usually Qualitative, but also Quantitative	Quantitative & Qualitative Together (Mixed Methods Approach)

Source: (Aliyu, Muhammad, Rozilah& David, 2014: 80; Milman, 2012: 103)

3.2.1. Positivism

It was during the 19th century when the famous movement known as positivism started with Auguste Comte (Johnson & Christensen, 2008:391). Positivism is the idea that only what we can empirically observe is important, and that science is the only source of knowledge. Lichtman (2013:10) says that positivism deals only with observable entities and objective reality; or traditional research paradigms (which are ways of seeing the world and making assumptions about it). According to Maree (2013:53), in positivism, only objective, observable facts can be the basis for science. He further explains the view of Comte, the Vienna Circle, and logical positivism, that theological (the supernatural) or metaphysical (the abstract) claims must yield to the positive – that which can be explained in scientific laws.

Gray (2004:18) refers to positivism as the belief that what reality consists of, it is what is available to the senses. Within positivism, the knower and the known are independent (Tashakori & Teddlie, 2009:85). Ryan (2006) asserts that within positivism, the relationship between the self and the knowledge has been largely denied. For a statement to be true, it has to be tested and proven. Furthermore, Kim (2003:8) contends that blind faith in the positivist approach can potentially jeopardize

the soundness of research in the social sciences because influential contextual factors in organizations can be ignored by methods which seek to draw causal inferences through examining only the phenomena that are readily observed.

3.2.2 Interpretivism

Interpretivism has its roots in hermeneutics, which is the study of the theory and practice of interpretation (Maree, 2013:58). Schleiermacher and Dilthey, in Maree (2013:59) considered understanding to be a process of psychological reconstruction, whereby the reader reconstructs the original intention of the author. Maree (2013:59) says that the interpretivist perspective is based on the assumption that human life can only be understood from within. Interpretivism focuses on people's subjective experiences, on how people construct the social world by sharing meanings, and how they interact with, or relate to each other. Social life is a distinctively human product. By placing people in their social contexts, there is a greater opportunity to understand the perceptions they have of their own activities. The uniqueness of a particular situation (the context) is important to understand and interpret the meanings constructed.

The human mind is the purposive source or origin of meaning. Through uncovering how meanings are constructed, we can gain insights into the meanings imparted on our mind and improve our comprehension of the whole. Human behavior is affected by knowledge of the social world. As our knowledge and understanding of the social world and the realities being constructed increase, it enriches our theoretical and conceptual framework.

The social world does not exist independently of human knowledge. As researchers, our own knowledge and understanding of phenomena constantly influence us in terms of the types of questions we ask and in the way we conduct our research. Lichtman (2013:24) defines interpretivism as a doctrine that emphasizes analyzing the meaning people confer on their own actions. Interpretivism has, as its greatest strength, the richness and depth of exploration and descriptions it yields through the qualitative approach to research. However, it is criticized for its subjectivity and failure to generalize its findings beyond the situation being studied (Maree, 2007:60).

The research focused on the interpretive paradigm. According to Creswell (2014), an interpretive paradigm is based on the idea that people socially and symbolically construct their own organizational realities. The researcher has chosen to use the interpretivist theoretical paradigm for her research. Interpretivism as a paradigmatic theory, sees social constructions such as language, consciousness and shared meanings as central to the paradigm (Myers, 2013). The issue here is that, reality from an interpretivist view is socially constructed. This implies the need for interpretative analysis of data by the researcher, which can only gain meaning if the researcher understands the subject's language, along with all its attendant nuances (Taylor & Medina, 2013). This paradigm is suitable for this study because it is consistent with the assumption that the use of quality textbooks will enhance lesson planning and good delivery of subject matter in the classroom. The day-to-day experience of the teachers in exercising their teaching profession will be established (Litchman, 2013).

3.2.3 Post-Positivism

Post-positivism is a modification of positivism. According to Tashakori and Teddlie (2009:5), post-positivism is the intellectual heir to positivism, which came about as a reaction to widely discredited axioms of positivity. Lichtman (2013:292) says that a post-positivist view would accept that reality can only be reached in an imperfect manner, but nevertheless, would anticipate a researcher striving to reach it.

Post-positivist approaches assume that reality is multiple, subjective and mentally constructed by individuals (Maree, 2013:65). Maree says, for the post-positivist researcher, reality is not a fixed entity and it is to a certain degree accepted that reality is a creation of the individuals involved in the research. Post-positivist thinkers focus on establishing and searching for evidence valid and reliable in terms of the existence of phenomena, rather than generalization.

Critics of post-positivism direct their criticism towards the interactive and participatory nature of qualitative and quantitative methods used in research. They argue that post-positivists use methods that are merely an assemblage of anecdotes and personal impressions which are highly suspicious in terms of research subjectivity and research bias (Maree, 2013:65). Each school of thought discussed above has its own strengths and weaknesses. Many of the criticisms made of one knowledge claim could equally

be applied to the other. For practical research purposes, no paradigm is preferable to another. The choice depends in part, on the purpose of the study and the research question.

3.2.4 Pragmatism

According to pragmatists, reality is external and multiple, constructed by humans in an ongoing process of action, not in a posited structure of relations (Romm, 2014). They hold that without action, any structure of relations between people is meaningless, but to perform changes in desired ways, action must be guided by purpose and knowledge. The world is thus, changed through reason and action and there is an inseparable link between human knowing and human action (Goldkuhl, 2012). Pragmatists avoid arguing about metaphysical terms such as truth and reality. Instead, they argue that the value of evaluation is not based on whether they discover the truth, but on the demonstration that the results work with respect to the problem that is being studied (Mertens & Wilson, 2012). From this argument, it then follows that pragmatism is typically characterized by a positive attitude toward integrating practice and rejecting traditional dualisms. It prefers empirical over idealistic or rationalistic approaches, as well as agreeing that knowledge and thinking should be seen as forms of activity, as experimental inquiry (Hall, 2013). In terms of their ontological stance, pragmatists believe in an external world independent of the mind, as well as what is lodged in the mind. They expect researchers to stop asking questions about reality and the laws of nature, and direct them towards multiple methods, different worldviews, different assumptions, as well as different forms of data collection and analysis (Greene, 2012, Mertens & Wilson, 2012).

Literature notes that pragmatism emerged through the writings of Peirce, James, Dewey, and Mead, among others (Goldkuhl, 2012; Mertens & Wilson, 2012). In etymological terms, pragmatism is identified as a practical (action-oriented) paradigm to finding solutions for existing problems and issues (Kalolo, 2015). Pragmatism signifies practicality, compromise, prudence and a clear goal orientation in dealing with problems. From another perspective, pragmatism is believed to be a broad research paradigm covering many different areas which include knowledge, language and ethics (Goldkuhl, 2012). These authors (Goldkuhl, 2012; Mertens & Wilson, 2012) note that pragmatism is associated with action, intervention and

constructive knowledge; drawing heavily on the inductive and deductive reasoning (Ihuah & Eaton, 2013). As a paradigm, it is characterized by its ability to accept all well-constructed paradigms of scientific inquiry as valid, when they are appropriate (Kalolo, 2015).

The paradigm therefore, provides for the use of both qualitative and quantitative research methodologies to collect information and make inquiry into complex phenomenon of social and natural contexts (Creswell, 2009; Teddlie & Tashakkori, 2010). Pragmatists assert that what works is what is useful and should be used, regardless of any philosophical or paradigmatic assumptions (Zandvanian & Daryapoor, 2013) and can be described as a better process to answering “what”, “why” and “how” research questions (Saunders, Lewis & Thornhill, 2009). It is acknowledged that pragmatism offers an alternative worldview to that of positivism and interpretivism and focuses on the problem to be researched and the consequences of the research (Creswell & Plano-Clark, 2011). The authors go on to argue that pragmatism allows the researcher to be free of mental and practical constraints imposed by the “forced choice dichotomy between positivism and constructivism, and researchers do not have to be prisoners of a particular approach or technique” (p. 27).

The pragmatic research philosophy provides for the adoption of mixed methods as the data collection method which opens the opportunity to be objective and subjective in analyzing the points of view of the participants (Creswell, 2009; Saunders et al., 2009). It focuses on the problem and tries to find practical solutions through the use of mixed methods (Ihuah & Eaton, 2013). By doing so, the pragmatic approach allows areas to be studied that are of interest, embracing methods that are appropriate and using findings in a positive manner in harmony with a recognized value system (Creswell, 2009). It therefore, follows that pragmatic research is multi-purpose in nature, making it a good approach that allows questions to be addressed that do not fit comfortably within a wholly quantitative or qualitative approach, research design and methodology (Ihuah & Eaton, 2013).

Pragmatic philosophy is concerned with choosing between one position (ontology, epistemology or axiology) and the other but is somewhat unrealistic in practice. Instead, it argues that the most important determinant of which position to adopt is

the research questions (Creswell & Plano Clark, 2011). However, this paradigm has its own ontological, epistemological, axiological and methodological positions in research. The essence of pragmatist ontology is actions and changes, holding the argument that humans are acting in a world which is in a constant state of becoming (Goldkuhl, 2012).

3.3. RESEARCH APPROACH: QUALITATIVE

The reason for any research is to generate knowledge. Research approach refers to the system of acquiring knowledge and the activity of considering, reflecting upon and justifying the best methods. Approach is the specific technique for obtaining the data that will provide the evidence base for the construction of that knowledge. Thus, approach is concerned with the theoretical and overall process to a research project rather than with the characteristics and practical application of particular method (Wellington, Bathmaker, Hunt, McCulloch & Sikes, 2005: 97). This study used a qualitative approach. According to McMillan and Schumacher (2006:315), research approach involves the process in which one collects and analyzes data. It is systematic and purposeful in nature. McMillan and Schumacher (2006:395) say that the researcher chooses qualitative methods because of their flexibility. Qualitative research is an inquiry in which the researchers interact with selected persons in their settings.

Qualitative research is a general term that describes in-depth research about human behavior (Lichtman, 2013:17). It is about humans. The purpose of qualitative research is to describe, understand, and interpret human phenomena, human interaction, or human discourse. Qualitative researchers often conduct interviews in which participants tell their stories. Lichtman (2013:18) speaks about interviewees, informants, or conversational partners rather than subjects or sample. He suggests that in qualitative interviewing “you can understand experiences in which you did not participate.”

Peter (2003:41) argues that qualitative research is interested in both intended and unintended consequences. Qualitative research shows determination to identify the phenomenon. It is also characterized by an understanding that contextual

considerations should not be assumed to operate as distractive variables consistently or independently across a range of sites.

3.3.1 Strengths and weaknesses of the qualitative method

Qualitative research uses '*wide and deep angle lens method*' when examining behavior as it occurs naturally, in all its detail (Johnson & Christensen, 2008:36). According to Johnson and Christensen (2008:442), the strengths of qualitative research method are:

1. Data is based on the participants' own categories of meaning.
2. It is useful for studying a limited number of cases in depth.
3. It provides individual case information.
4. It provides understanding and description of people's personal experiences of phenomena (that is, the emic or insider's viewpoint).
5. It can describe, in rich detail, phenomena as they are situated and embedded in local contexts.
6. Qualitative researchers are especially responsive to changes that occur during the conduct of a study and may shift the focus of their studies as a result.

In the same vein, the weaknesses of qualitative method are identified thus;

1. Knowledge produced might not generalize to other people or other settings (that is, findings might be unique to the relatively few people included in the research study).
2. It is difficult to make quantitative predictions.
3. It has lower credibility with some administrators and commissioners of programs.
4. It generally takes more time to collect the data when compared to quantitative research.
5. The results are more easily influenced by the researcher's biases and idiosyncrasies.

The research approach used in this study was the qualitative approach. Qualitative approach was appropriate for this study as it provided the researcher with the responses to the questions in this study. The researcher sought to gain a clear

understanding of the situations which teachers deal with when selecting of textbooks for lesson planning and delivery. Litchman, (2013) emphasizes that qualitative research is concerned with conditions or relationships that exist, beliefs and attitudes that are held, effects that are being felt and trends that are developed. The research approach requires the researcher to gain the trust of the subjects in order to avoid any personal biases, and in this way be able to gather data fundamental to the process of the study.

3.4 Research Design: Phenomenological

Research design is a plan that describes the conditions and procedures for collecting and analyzing data. Maree (2013:70) says that a research design is a plan or strategy which moves from understanding philosophical assumptions, to specifying the selection of respondents, to choosing the data gathering technique to be used and, finally, to data analysis. He further states that the choice of research design is based on the researcher's assumptions, skills and research practices; and it influences the way in which she or he collects data.

A research design relates directly to the answering of a research question and the purpose of research design is to ensure high internal validity (Bless et al., 2013:130). In qualitative research, internal validity is sometimes referred to as credibility, and is concerned with whether the researcher's method of data collection and analysis addresses the research question adequately.

Kurma (2005:84) identifies two main functions of a research design. First, it is to develop and to identify procedures and the logistical arrangements to undertake during a study, second, it is to emphasize the importance of quality in these procedures to ensure their validity, objectivity and accuracy. In this study, emphasis is laid on quality of the instrument to enhance in-depth knowledge about the phenomenon under study which is the use of Mathematics textbook for lesson planning and delivery.

Suter (2012:365) defines qualitative research design as the logic that links data to be collected (and the conclusion to be drawn) to the initial questions of the study. Because the goal of much qualitative research is a deeper understanding of a phenomenon or process, documentation of the rigor leading to a meaningful conclusion and understanding becomes, especially important (Suter, 2012:365).

Research design is a plan outlining how the researcher will explore the topic. This study adopted phenomenological research design. The focus of phenomenological inquiry is what people experience with regard to some phenomenon and how they interpret those experiences. Litchman (2013) posits that a research design is the blueprint, a detailed plan, a map of the various elements of research, and how they relate to each other. This study views the research design as the framework that details how a researcher intends conducting his/her investigation (Litchman, 2013). The study adopted phenomenological research design because it is a study that attempts to understand people's (learners and teachers) perceptions, perspectives and understandings of the use of textbook in teaching Mathematics.

3.5 POPULATION

A population is a group of elements or cases, individuals, objects or events that conform to specific criteria, and to which one intends to generate results of the research (McMillan & Schumacher, 2001). McMillan and Schumacher (2006) said a population is a group of elements or events that conform to specific criteria and to which one intends to generalize results of the research.

Johnson and Christensen (2008:224) define population (sometimes called a target population) as the set of all elements. It is the large group to which a researcher wants to generalize his or her sample size. According to Barbie & Mouton (2005), the population of a study is a group of people about whom we want to draw conclusions.

The target population used for this study was teachers of three primary schools in East London Education District. This population was chosen since it is very close to the researcher location and the researcher is familiar with the terrain. It was easy for her to reach the schools and deal with the staff members. The researcher believes that the population chosen was relevant and suitable for the study since the teachers are faced with the problem of using textbooks to plan and deliver lessons.

3.6. OVER VIEW OF SAMPLING PROCEDURE

This section explains the sampling procedure for selecting the participants and the sample size.

3.6.1 Sampling Procedure

Maree (2013:79) says that sampling refers to the process used to select a portion of the population for study. The quality research, whether quantitative or qualitative, is directly related to the sampling procedures, the adequacy of the technique chosen, the professionalism of its implementation, and the appropriateness of the sample size. The purpose of sampling is to provide varied information of a qualitative or quantitative nature about a population by examining a few selected units.

Qualitative researchers must first decide who or what to study. Johnson and Christensen (2008:243) say that this initial task is based on consideration of which populations or phenomena are relevant to the research focus being proposed or developed. The researcher typically defines a set of criteria or attributes that the people to be studied must possess and uses these criteria to distinguish the people of potential interest from those people who should be excluded from consideration. Once these inclusion boundaries are set, the researcher knows whom he or she wishes to study and can then attempt to locate and obtain the sample (Johnson & Christensen, 2008).

Sampling refers to the process used to select a portion of the population for study (Maree, 2013:79). Qualitative research is generally based on non-probability and purposive sampling rather than probability or random sampling approaches. Qualitative research usually involves smaller sample sizes than quantitative research studies (Maree, 2013:79). Sampling means selecting a group of people (subjects or participants) from a defined population (McMillan & Schumacher, 2006:400). White (2005:114) defines sampling as making a selection from the population in order to identify the people or issues to include in the research.

3.6.2 Sample

White (2005:114) defines a sample as a group of subjects or situation representing a large group. Johnson and Christensen (2008:223) talking about sample say; a good sample is one that is representative of the population it came from. A representative sample resembles the population that it came from in all characteristics (the proportions of males and females, teachers and non-teachers, young and old people, and so forth). Johnson and Christensen (2008) note that a sample is a set of elements taken from a larger population according to certain rules.

Bless et al (2013:163) mention some advantages of sampling which are:

- Gathering data on a sample is less time consuming.
- Gathering data on a sample is less costly since the costs of research are proportional to the research.
- Sometimes, sampling may be the only practical method of data collection.
- Sampling is a practical way of collecting data when the population is infinite or extremely large, rendering a study of all its elements impossible.

In this research the researcher used non-probability sampling. This type of sampling does not require a list of a large population. Participants for this study were purposively selected from three primary schools. The samples of six teachers and three heads of department were purposively selected to provide information through interview on the use, selection and challenges of using Mathematics textbooks to plan and deliver lesson at Grade four levels

3.6.2.1 Criteria for selecting the sample

Williams (2003:73) suggests the criteria for selecting a sample. The selected area should contain appropriate people (target population). The schools in which the data were collected were three different primary schools. The processes, people, programs, interactions, and/or structures that are part of research question/s will be available to the investigator. In this research, all these were available.

An individual or individuals can only conduct the research effectively during data collection phase of the study. The researcher was the only one who undertook fieldwork. The duration of interviewing was two weeks.

3.7 DATA GATHERING INSTRUMENTS

The researcher chose to conduct interviews with the participants since interviews can probe for more specific answers and can follow up a question when the response indicates that the respondent misunderstood the question. There are three probing strategies that can be used to obtain the maximum amount of data and to verify that what you have heard is actually what the person meant (Maree, 2013:88). These are detailed-oriented probes, elaboration probes and clarification probes.

Detailed-oriented probes are probes that aim at ensuring that you understand the “who”, “where”, “what” of the answer given by the participant; Elaboration probes are designed to get the full picture, and normally involve asking the participant to tell you more about a certain example or answer given; Clarification probes are used to check if your understanding of what has been said is accurate. Paraphrasing (giving the gist of what you think you heard) can be useful to confirm what has been said (Saunders, Lewis & Thornhill, 2009). Clarification probes were used by the researcher as to make sure if she had accurately understood what the respondent had said; The instrument used for collecting the data was an open-ended questionnaire and semi-structured interviews for the heads of department and teachers respectively; **(See appendices G & H).**

Observation of Mathematics class was also used **(See Appendix I)**. The aim of the qualitative approach during the interviews is to ascertain the teachers’ perceptions on the use of textbooks in the teaching of Mathematics. Opportunity was provided for teachers to voice their own perceptions during the interview schedule. A semi-structured interview, also known as the non-standardized or qualitative interview (Saunders, Lewis & Thornhill, 2009), is a hybrid type of interview which lies in between a structured interview and an in-depth interview. The semi-structured interview was ideal for this study since it enabled the production of in-depth data to get first-hand information, in this case, on the use of Mathematics textbooks for teaching (Litchman, 2013).

3.7.1 Interviews

An interview is a one-on-one verbal interaction between the interviewer and the interviewee with the aim of gathering information (Willis, 2007:146). Gray (2004:13) regards an interview as a conversation. In the conversation, there are two parties, one who is an interviewer and the other who is an interviewee. The interviewee can say as much as he or she wants.

Maree (2013:87) defines an interview as a two-way conversation in which the interviewer asks the participant questions to collect data and to learn about the ideas, beliefs, views, opinions and behaviors of the participants. The aim of qualitative interviews is to see the world through the eyes of a participant. Interviews can be a valuable source of information, provided they are used correctly.

According to Gray (2004:215) interviews may be divided into five categories namely; structured interviews; semi-structured interviews; informal conversational interviews; non-directive interviews; focused interviews

The researcher avoided using structured interviews since the research was of a qualitative nature and there was need to probe information which would not have been possible with the structured interview.

Qualitative interviews consist of open-ended questions, and provide qualitative data (Johnson & Christensen, 2008:207). Qualitative interviews are also called depth interviews since they can be used to obtain in-depth information about participants' thoughts, beliefs, knowledge, reasoning, motivations, and feelings about the topic.

Respondents may not understand the question and may be unable to answer it, or the respondents may not have received sufficient information to answer the question. Probing would then assist the respondents to provide the information that is needed.

Semi-structured interview questions were used to give the participants the chance to express themselves freely without strict limitations. However, the main aim of the researcher was to design interview questions that would probe deeper information from the participants to cover the main research objectives.

O'Leary (2010:194) defines interviewing as an art of asking and the art of listening. Further, interviews can range from formal to informal, structured to unstructured; and

can be one – to – one or involve a group (O’Leary, 2010:195). The researcher or the interviewer often uses open questions. Open questions are the kind of questions where the interviewee is not restricted in answering. Basically interviews aim at collecting rich descriptive data that helps the researcher to understand the participant’s construction of knowledge and social reality. According to Gray (2004:213) in an interview, the most important skill is listening, not only to verbal responses but also noting elements such as body language of the interviewee. He continues by saying that a well conducted interview is a powerful tool for eliciting rich data on people’s views attitudes and the meanings that underpin their lives and behaviors.

Since an interview is a person to person interaction between two or more individuals with a specific purpose. Interviews are flexible since the interviewer has a freedom to formulate questions as they come to mind around the issue being researched. The researcher must not respond negatively or positively when answers are given, as this will create some biases (O’Leary, 2010)

In this study, Mathematics teachers and heads of Departments were interviewed. The purpose of the interview was to get “one-on-one” information on the teachers’ use of Mathematics textbook for lesson planning and delivery. The researcher used face-to-face interviews where semi-structured questions for interviews were prepared for data collection.

3.7.2 Advantages of the interview

In Robson’s view (2007:77)

Interviews are a research version of something you do all the time.

No special equipment is needed apart from a good tape-recorder and microphone.

The purpose of conducting an interview is to gather information from your participants about the topic you are studying (Lichtman, 2013:190). The researcher used interview method to probe information about the respondents’ attitudes and their opinion which she could have not managed to get using any other method. Another advantage of the interview was its flexibility. The interviewer was able to adjust questions to get valid information. The atmosphere allowed the respondents to be open and honest unlike

in the questionnaires where the respondent can just complete the questions just to let it go.

3.7.3 Face to face interviews

A personal interview, also called a face-to-face interview, is utilized when specific target population is involved. These interviews are used to probe the answer of the respondents, and at the same time, to observe behavior of the respondents either individually or as a group. The personal interview method is preferred by researchers for couples of advantages.

One benefit of conducting face-to-face interviews is that, it enables the researcher to gain participants' cooperation by establishing a relationship with them, which therefore, facilitates a high response rate (Leedy & Omrod, 2001: Maree, 2013:296). The interviewer audiotaped all interviews and used handwritten notes to support the recordings. This assisted the researcher with the transcriptions for analysis purposes. Observations were noted during the interviews, especially with regard to non-verbal cues (Maree, 2013:297).

Advantages of face-to-face interviews are:

High Response Rate: One of the main reasons why researchers achieve good response rates through this method is the face-to-face nature of the personal interview. Unlike administering questionnaire, people are more likely to readily answer live questions about the subject.

Tolerate Longer Interviews: If a researcher wishes to probe the answers of the respondents, she may do so by using a personal interview approach. Open-ended questions are more tolerated through interviews due to the fact that it is convenient for respondents to express their long answers orally than in writing.

Better Observation of Behavior: The researcher can benefit from personal interviews because they present a better opportunity to observe the attitude and behavior of the respondents.

3.7.4. Semi-structured interviews

Gray (2004:215) notes that, although the researcher has a list of issues and questions he or she wishes to cover, they may not all be dealt with in each interview. This is so because the probability of changing the order of issues or questions is high. These questions are usually determined by the direction of the interview. Additional questions may be asked, some of which were not anticipated at the start of the interview. In semi-structured interviews, the participant is required to answer a set of predetermined questions that define the line of inquiry (Maree, 2007:87).

The strengths of semi-structured interviews are that it allows for opinions to be sought (Gray, 2004:216). In addition, there is a room to explain or rephrase the questions if respondents are ambiguous. The semi-structured interview has its shortfalls. One of the shortfalls is that inexperienced interviewers may not be able to ask probing questions. It is easy to be side-tracked by trivial aspects that are not related to the study (Maree, 2008).

Maree (2008:88) suggests that if there is a need to guide the participants back to the focus of the interview, the researcher can use the semi-structure interview. Good interviewers are good listeners who do not dominate the interview, and understand that they are there to listen.

3.8 OBSERVATIONS

Observation is the systematic process of recording the behavioral patterns of participants, objects and occurrences without necessarily questioning or communicating with them (Maree, 2013:83-84). It is an everyday activity whereby we use our senses (seeing, hearing, touching, smelling, and tasting) and our intuition to gather bits of data (Maree, 2013:84). In this study, it was used to enable the researcher to gain a deeper understanding of the use and selection of textbooks for lesson planning and delivery.

The researcher chose to use observations because they suited the nature of the study, as was mentioned that the study was going to be phenomenological in the natural setting of the school. The researcher wanted to observe the teacher's practices in the use of textbook when teaching Mathematics in the class.

Observation has its specific limitations. The researcher always remember her primary role as a researcher and remain detached enough to collect and analyze data relevant to the problem under investigation. Lichtman (2013:222), talking about different roles observers take, says; if you are part of the group you observe, or if you become part of the group, you are called a participant observer. Observation usually occurs in settings that already exist, like home, educational or work settings, not in a contrived setting (Lichtman, 2013:222).

3.9 DATA COLLECTION PROCEDURE

The researcher asked (in writing) from the Department of Education and the principals of the schools in which research was going to be conducted, for permission for access schools to conduct research. Permission was granted to the researcher by the Department of Education and school managers to collect data from schools. After that, the researcher arranged times with school principals to visit the selected schools (**See appendix B**). The researcher then went to the schools to conduct interviews with the head of department and Mathematics teachers. Interviews were organized as per arrangement with school principals. The researcher explained the purpose of the study that it was about the use of textbooks by primary school teachers in teaching Mathematics. Participants were given informed consent forms to sign before the interviews started. Participation was voluntary and the participants were told that they have the right to withdraw anytime they wish to and that their identity will be protected. The researcher used voice-recording devices to record their responses during the one-to-one interview section and diaries for noting during observation.

3.10 DATA ANALYSIS

Qualitative analysis is a systematic process of selecting, categorizing, comparing, synthesizing and interpreting data to provide a description of the phenomena of interest (Litchman, 2013). In this study, the researcher used transcribing, coding, categorizing and themes to analyze data collected from teachers and heads of department who were selected by the researcher. This was done to give meaning to the information collected and to make it easily accessible to the readers.

Bless, Dessemontet and Morin (2014:342) said that a core component of qualitative analysis is the process of coding. This is where the text is broken into fragments which share common characteristics. Thus, codes can be in different categories, and the process of coding involves breaking up the original transcripts and classifying all the fragments into these various categories.

Qualitative data analysis tries to establish how participants make meaning of a specific phenomenon by analyzing their perceptions, attitudes, understanding, knowledge, values, feelings and experiences in an attempt to approximate construction of the phenomenon (Johnson & Christensen, 2008:530).

Maree (2013:99) says qualitative data analysis is an ongoing and iterative (non-linear) process, implying that data collection, processing, analysis, and reporting are intertwined, and not merely a number of successive steps. Lichtman (2013:248) suggests that making meaning to data, the researcher codes words, phrases, segments, or other portions of text. He continues to say that the researcher begins with a large amount of material, for example, the text of an interview. That material is dissected and categorized into codes. The codes are reviewed to look for ones that overlap or are redundant (organize and categorize). Verbatim conversations are used and the raw data is organized into logical, meaningful categories in order to examine them. Coding techniques are used to categorize the responses according to individual point of view. The researcher placed the raw data into meaningful categories in order to examine them in a holistic fashion.

3.11 RELIABILITY

Reliability plays a second fiddle to validity since reliability is of little consequence if the measure is not a valid one (Suter, 2012:267). Suter sees it as a necessary condition for validity in the sense that reliability must be present for validity to exist. Reliability tells how well an instrument is measuring whatever it is measuring.

Maree (2007:147) says reliability has to do with the consistency or repeatability of a measure or instrument and high reliability is obtained when the measure or instrument gives the same results if the research is repeated on the same sample. Delport (2005) defines reliability as referring to the stability or consistency of measurement. It is

concerned with accuracy and precision (Cohen, Manion & Morrison, 2000). The lower the degree of error in the instrument, the higher is reliability.

In this study, trustworthiness and reliability of the study were confirmed if the responses from the participants are more or less the same, that is, if, when coding data, there were similar themes and conclusions. Reliability in qualitative research is viewed as the relationship between the recorded data and what has actually occurred in the setting being studied (De Vos, 2000). In order to enhance reliability, all collected data were analyzed and interpreted in a uniform manner in this research.

3.11.1. Trustworthiness

Trustworthiness does not absolve the qualitative researcher of the need to evaluate the quality of research, but in qualitative research this is done in terms of how much trust of the reality under study, or, in other words that they make sense (Bless et al, 2013:236). Suter (2012:276) says that qualitative researchers use different terms to communicate the worth of their measurements and conclusions based on them. Perhaps the most common is trustworthy, a concept used to refer to both reliability and validity in qualitative research. The researcher pilot tested the instrument and checked for the quality with the responses gathered. The researcher did some amendment in the content of the interview schedules before final administration to the selected samples.

Maree (2013:113) describes trustworthiness as the most important element in qualitative research. Assessing trustworthiness is the acid test of data analysis. Maree (ibid) mentions some few points that can be used to enhance the trustworthiness of the study, which are:

- Using multiple data sources: Using data from different sources can help check findings;
- Verifying raw data: During subsequent interviews you may ask participants to verify the data gathered in earlier interviews or during informal conversations with participants. You may sound out your initial understandings with them to verify whether your interpretation of what they have shared with you is correct.

- Maintaining confidentiality and anonymity: Researchers think that, as long as they do not mention names or positions of persons, they have achieved confidentiality and anonymity.

Suter (2012:276) says that qualitative researchers use different terms to communicate the worth of their measurements and conclusions based on them. He observes that trustworthiness, as the most common one, is a concept used to refer to both reliability and validity in qualitative research.

Bless et al. (2013:238) suggest some tools for increasing research trustworthiness as follows:

- Adequate description of context; which is, detailed descriptions of the researcher, the participants, their relationship, and the context in which they find themselves are essential because qualitative research emphasizes the context in which the study takes place.
- Concurrent data collection and analysis; meaning, by analysing data as it is being collected might highlight a particular aspect of the investigation that the researcher was not previously aware of. This might mean, for example, adding a question to an interview.
- Triangulation; method most frequently used to verify and increase the trustworthiness of qualitative research. The purpose of doing this is to show that the results obtained are independent of the methodology used.
- Methodological verification; this is the process of having other experienced researchers verifying the logic and implementation of each step of the methodology.
- Ensuring data saturation; the researcher must be able to show that enough data has been collected to reflect the full range and the depth of the topic.
- Respondent validation; sometimes called member checking or informant feedback is a process whereby the researcher presents the results of a study to the people who provided the original data and asks for their feedback.
- Use of sufficient verbatim responses; by including many direct quotations from the original data in research reports, the researcher will allow the reader to hear exactly what respondents will say and how the researcher will interpret

information. This is another important characteristic of rigorous qualitative research.

Suter (2012:362) says that many qualitative researchers agree that data trustworthiness, whether collected from direct observations, focus groups, or interviews; is evidenced by the following.

- *Transferability*; which refers to evidence supporting the generalization of findings to other contexts – across different participants, groups, situations, and so forth.
- *Dependability* in which qualitative researcher gathers evidence to support the claim that similar would be obtained if the study was repeated.
- *Confirmability* refers to objectivity (neutrality) and the control of researcher bias. Bias in qualitative research is an ever-present concern. Confirmability is also enhanced by consistency with quantitative research findings that reach similar conclusions.
- *Credibility* refers to the believability of the findings and is enhanced by evidence such as confirming evaluation of conclusions by research participants, convergence of multiple sources of evidence, control of unwanted influences, and theoretical fit.

3.12. ETHICAL CONSIDERATIONS

Ethics refers to principles or rules of behavior that act to dictate what is actually acceptable or allowed (O'Leary, 2005:72). Ethical issues were important since the study involved human subjects. Walter-Adams (2006) writes that, any research which involves other people in some way has ethical implications. Ethics has to do with the applications of moral principles to prevent harming or wronging others, to promote the good, to be respectful and to be fair. Ethical considerations, issues, concerns and questions apply to each stage and aspect of research process, regardless of the methodologies adopted and the specific methods used (Wellington et al., 2005:104).

McNamee and Bridges (2002:8) say that ethics is an immediate relation between the individual person and moral values, without the mediation of social group as a source of either understanding or motivation. A code of ethics is concerned with the right, not the good (McNamee & Bridges, 2002:101). Bless et al. (2013:31), talking about the

respect for participants' rights and dignity say that, no research project should in any way, violate participants' legal and human rights when participants are recruited. An important part of protecting people's dignity is understanding and respecting their culture. Ethical behavior represents a set of moral principles, rules, or standards governing a person or a profession. To be ethical is to do well and avoid evil (Lichtman, 2013:51). Johnson and Christensen (2008:101) define ethics as the principles and guidelines that help us uphold the things that we value.

There are three basic approaches that people tend to adopt when considering ethical issues namely; deontology, ethical skepticism and utilitarianism (Johnson & Christensen, 2008:101).

The deontological approach takes the position that ethical issues must be judged on the basis of some universal code, (The root of the word is the Greek word "deon", which means "duty" or "obligation"). Certain actions are inherently unethical and should never be performed regardless of the circumstances.

A person using ethical skepticism would argue that concrete and inviolate moral codes such as those used by the deontologists cannot be formulated. According to this approach, an ethical decision must be a matter of the individual conscience, and the researcher should do what he or she thinks is right, and refrain from doing what he or she thinks is wrong.

The third approach to assessing ethical issues is that of utilitarianism. This position maintains that judgements regarding the ethics of a particular research study depend on the consequences of that study for both the individual research participant and the larger benefit that may arise from the study results.

Bless et al. (2013:28) mention that research ethics places an emphasis on the humane and sensitive treatment of research participants, who may be placed at varying degrees of risk by research procedures. It is the researcher's responsibility to ensure that his or her research is ethically conducted. In fact, before a single participant is contacted, the researcher must ensure that the research plan can pass an ethical evaluation.

The participants were properly informed about the purpose of the research, the type of interview questions which they would be subjected to, and the need for the voluntary

participation. The researcher was responsible for protecting the rights and welfare of the participants in the study.

3.12.1. Permission

Permission to visit schools was sought from, and granted by, the Department of Education. The researcher used the ethic clearance certificate collected from the university to process the approval from the department to conduct research in schools, together with the application form that was filled and written letter by the researcher **(See appendix C)**.

The researcher again wrote to the principals of the schools where the research is to be conducted, asking for permission to conduct research in their respective schools . Individual Principals of the selected schools was approached and they authorized the conduct of the study in their schools. Permission was granted by school managers in writing, for the researcher to conduct research in their schools. It was only after granting of explicit and written permission that the researcher proceeded with data collection in identified schools **(See appendix B)**.

Bless et al. (2013:35) call the asking of permission: obtaining access to research participants by means of gatekeepers. This means that it is necessary for a researcher first to approach a gatekeeper like school or educational authorities before approaching participants directly to participate in a study.

McNamee and Bridges (2002:23) refer to gatekeepers as those who give access to a research field. Their role may be in allowing investigators into a given physical space, or it may go further in granting permission for research to be conducted in a particular way.

3.12.2. Informed consent

Informed consent means agreeing to participate in a study after being informed of its purpose, procedures, risks, benefits, alternative procedures, and limits of confidentiality (Johnson & Christensen, 2008:109). Before a person can participate in a research study, the researcher must give the prospective participant a description of

all features of the study that might reasonably influence his or her willingness to participate (**See appendix F**). An informed consent form was given to each participant to fill and sign before the commencement of the interview.

One of the most important principles in the codes of ethics is informed consent. It is one of the critical issues in research, and it requires that respondents to be fully aware of the consequences that result from research (Konza, 2001:1).

Participants in research need to be told what they are getting themselves into before they make a decision to participate. Individuals participating in a research study should be informed of the nature of the study, so that they choose whether or not to participate (Lichtman, 2013:53), and they will not be coerced into participation. There are situations in which informed consent may not be possible. It becomes more difficult to obtain consent from minors or individuals who do not have a clear understanding of written English, or those who are mentally disabled or emotionally fragile (Lichtman, 2013:53).

Minors are presumed to be incompetent to make decisions and cannot give consent. Consent has to be obtained from parents (or minor's legal guardian) after they have been informed of all features of the study that could affect their willingness to allow their children to participate. Once consent has been obtained from minor's parent or guardian, assent must be obtained from the minor (Johnson & Christensen, 2008:112). This means that the minor has to agree to participate in the research after being informed of all the features that could affect his or her willingness to participate. Informed consent is one of the critical issues to make sure that participants are informed, to the extent possible, about nature of the study (Lichtman, 2013:54).

Obtaining informed consent implies that adequate information is given about the goal of the investigation and procedures to be followed during the investigation. The possible advantages, disadvantages and dangers, to which the respondents may be exposed, as well as credibility of the researcher, are to be communicated to potential subjects or their legal representatives (Babbie, 2006:205). The researcher sought informed consent from participants in the study. A consent form was designed and participants were asked to complete it after the purpose of the study and conditions of participation were explained to them.

The researcher explained that the study was for academic purposes, and that the findings were important for the improvement of curriculum planning and development. All participants signed the consent form and were told that they could withdraw from the study at any time, since participation was voluntary.

Johnson and Christensen (2008:114-117) identifies some forms of consent, namely, informed consent and minors as research participants (already mentioned in the above information), passive and active consent, additional consent and also something on deception.

Passive versus Active Consent

Active consent involves consenting to participate in a research study by signing a consent form. The parent of the minor would read the consent; either gives or refuses consent, and returns the consent form to the researcher. Passive consent is a process whereby consent is given by not returning the consent form. Parents or legal guardians return the consent form only if they do not want their child to participate in the research.

Additional consent

Additional research studies that are conducted within the confines of a school system require cooperation of a variety of individuals such as teacher and head of department must give their approval to the study which means that informed consent must also be received from them.

Deception and Debriefing

Under the principle of informed consent, research participants are supposed to receive information about the purpose and the nature of the study. Sometimes, providing full disclosure of the nature and purpose of the study will alter the outcome and invalidate the study. In such instances, it is necessary to mislead or withhold information from the research participants. In other words, it is necessary to engage in deception to conduct a valid study (Johnson & Christensen, 2008:116).

The American Education Research Association (AERA) Guiding Standards explicitly states that deception is discouraged unless it is necessary for the integrity of the study. If deception is used, the reason for deception should be explained to the participants

in the debriefing session held after the study has been completed (Johnson & Christensen, 2008:116).

Bless et al. (2013:34) agree with AERA and state that deception causes many ethical problems, and if used, safeguards must be employed. The most common safeguards are:

- The researcher needs to ensure that the deception poses no serious or long-term risks.
- The researcher needs to explain the true nature of the deception to the participants in a debriefing, which occurs once all the data has been gathered.

The debriefing should counter any lingering misconceptions, possible discomfort or risk that may have been generated by the deception.

Debriefing should be done with care to ensure that participants are not left with bad feeling or doubts about themselves based on their performance in their study. Debriefing refers to a post-study interview, in which all aspects of the study are revealed, any reasons for deception are explained, and any questions the participant has about the study are answered. Johnson and Christensen (2008:117) has pointed out that debriefing should meet the two goals of dehoaxing and desensitizing.

Dehoaxing refers to informing the participants about any deception that was used in the study and explaining the reasons for its use. Desensitizing refers to helping the participants during the debriefing interview, deal with and eliminate any stress or other undesirable feeling that the study created, as might exist if you are studying cheating behavior or failure. One of the tactics used by experimenters is to point out that the participant's behavior or feeling was normal and expected. In this study, there was no deception made and the consent forms were signed by the participants.

3.12.3. Rights of participants

The AERA ethical standards explicitly state that research participants have the right to withdraw from a study at any time, unless otherwise constrained by their official capacity (Johnson & Christensen, 2008:117). Special consideration should be given to the minors and their freedom to dissent. The Ethical Standards for Research in Child Development states that the child's freedom to choose not to participate should be

respected. No research project should in any way violate participants' legal and human rights when participants are recruited. An important part of protecting people's dignity is in understanding and respecting their culture (Bless et al, 2013:31). Participants have a right to take part or to withdraw anytime they want to do so. Participants in the study were provided with an explanation that they had the opportunity to terminate their participation at any time with no penalty.

3.12.4. Confidentiality and anonymity

Information obtained from the participants has to be held confidential. No one should have access to individual data or the names of participants except the researcher. A system to link names to data, if used, should be destroyed. The researcher met with participants in order to brief them on the purpose of the study, reasons and benefits for their participation and the right to participate or not.

Any individual, group or organization participating in the research study has a reasonable expectation that its identity will not be revealed (Lichtman, 2013:53). Identifying information should be removed from researcher's records. Permission from the participants to make public information that might reveal who they are or who the organization is should be sought from the participants. Caution must be used in publishing long verbatim quotes.

The AERA ethical standards state that, the research participants have the right to remain anonymous; and the confidentiality of both the participants and the data must be protected (Johnson & Christensen, 2008:118). Johnson and Christensen (2008:119) define privacy as controlling other people's access to information about a person. Respecting the privacy of research participants is at the heart of the conduct of ethical research. Anonymity, according to Johnson and Christensen (2008:119) is an excellent way of protecting privacy because anonymity means that the identity of the participants is not known to the researcher. Confidentiality is the other means researchers use to protect the privacy of the research participants. Confidentiality refers to an agreement with the research investigators about what may be done with the information obtained about a research participant (Johnson & Christensen, 2008:119).

The participant is entitled to expect that information provided to the researcher will not be given to anyone else and will be treated in a confidential manner (Lichtman, 2013:53). The researcher needs to be sensitive to information obtained from minors and others who may be in a vulnerable condition.

3.12.5. Harm to participants

The most important and fundamental issue confronting the researcher is the treatment of the research participants (Johnson & Christensen, 2008:105). Qualitative research is an ongoing and evolving process. With the data collection process it is more like a friendship connection between the participant and the researcher.

Lichtman (2013:52) says that there should be a reasonable expectation by those participating in a research study that they will not be involved in any situation in which they might be harmed. It is best to safeguard against doing anything that will harm the participants in a study.

Bless et al. (2013:29) talk about non-maleficence which they say is the most basic principle of research which the participants suggest that participants must not be harmed by participating in the research. They further say that it is important to note that harm may occur intentionally or unintentionally during the course of research. If a particular research procedure produces unpleasant effects for participants, the researcher should have the firmest scientific grounds for conducting it.

3.12.6 Rapport and Friendship

Once participants agree to be part of a study; the researcher develops rapport in order to attract them to disclose information (Lichtman, 2013:54). Lichtman says that, researchers should make sure that they provide an environment that is trustworthy; at the same time, they need to be sensitive to the power that they hold over participants. Researchers need to avoid setting up a situation in which participants think that they are friends with a researcher which can affect objective responses from them

3.12.7 Intrusiveness

Intrusiveness can mean intruding on participant's time, intruding on their space, and intruding on their personal lives (Lichtman, 2013:54). As a researcher designs a research study, he or she ought to be able to make a reasonable estimate of the amount of time participation will take. As it was the case with this study, the researcher had to indicate time to be spent with each participant in the letter seeking permission to conduct a research from the Department of Education, and also time for visit per school. So the researcher had to arrange for relevant time with the principals of the schools to consult the heads of department and teachers.

3.12.8 Data Interpretation

Misleading statements should be avoided. Researcher should be aware of admonitions to interpret data conservatively and go beyond what numbers or facts show (Lichtman, 2013:55). A researcher is expected to analyze data in a manner that avoids misstatements, misinterpretations or fraudulent analysis and that a researcher has a responsibility to interpret his or her data and present evidence so that others can decide to what extent the interpretation is believable. Bless et al. (2013:35) when referring to ethics in analysis and reporting, say that researchers are not allowed to change their data or observations. The fabrication or falsification of data is a very serious ethical transgression. In this study, the researcher transcribed the participants' responses verbatim and did member checking for possible omission and addition before final draft was submitted.

3.12. 9 Reporting back to participants

The researcher must present the results of every study to the research participants in a form that is easily understandable. Factors such as participant's home language, culture and education level must be considered (Bless et al, 2013:35). Bless et al., 2013:35) also suggest the following principles of ethical research:

- Non- maleficence: The most basic principle of research is that participants must not be harmed by participating in the research. It is important to note that harm

may occur intentionally or unintentionally during the course of a research study. If a particular research procedure produces unpleasant effects for participants, the researcher should have the firmest scientific grounds for conducting it.

- **Beneficence:** The principle of beneficence requires social and behavioral researchers to conduct research that is effective and significant in promoting the welfare of people.
- **Autonomy:** The principle of autonomy incorporates the freedom of individual's actions and choices to decide whether or not to participate in research. The principle of informed consent is of paramount importance. The principle of autonomy can, however, affect the generalizability of the results in the sense that people who agree to participate in research may differ from the many others who do not volunteer. This is known as volunteer effect.
- **Justice:** The principle of justice is based on the belief that all people should be treated equally. People should not be discriminated against in research on the basis of race, gender, disability, income level or any other characteristic.
- **Fidelity:** The principle of fidelity implies faithfulness and keeping promises or agreements, specifically between the researcher and the participant. Thus, engaging in deception or breaching confidentiality is an ethical violation that infringes on a participant's rights. Respect for participants' rights and dignity is necessary to ensure that the dignity and self-respect of participants is always preserved. An important part of protecting people's dignity is privacy and respect of their rights.

3.13 CHAPTER SUMMARY

In this chapter, the researcher discussed and justified the research methodology which was used in the current study. The researcher discussed the interpretivism research paradigm, the qualitative approach, and phenomenological design. The data gathering instruments like interview, open-ended questionnaire and observations were also discussed.

The reliability of the instruments and data analysis method was highlighted. The researcher made a detailed exposition of different ethical measures in research. The following chapter involves data analysis, findings and interpretation.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 INTRODUCTION

In the previous chapter, the researcher discussed and justified the research methodology which was used in the current study. The study also discussed the interpretivist research paradigm, the qualitative approach, phenomenological design used in the study. The data gathering instruments like interview, open-ended questionnaire and observation were also discussed. The reliability of the instruments and data analysis method was also highlighted. The study made a thorough analysis of different ethical measures in research and those that were considered in the present study. The purpose of this chapter is to analyze and present data collected on the use of textbooks by teachers in teaching Mathematics.

The methods of collecting data that were used were interviews and observations. The sample consisted of three schools, 6 teachers and 3 heads of department. Participants are identified as follows: Teachers: TrA 1 and 2 (Teachers in school A), TrB 1 and 2 (Teachers in school B), TrC 1 and 2 (Teachers in school C); Head of Department: HoDA (Head of Department in school A), HoDB (Head of Department in school B), and HoDC (Head of Department in school C), and Observation: ObsA (Observation in school A), ObsB (Observation in school B) and ObsC (Observation in school C), the data collected is analyzed using some themes and sub-themes from the responses given by the participants to bring out the main issues on the use of Mathematics textbooks.

This chapter presents biographical information of the participants. The biographical data is used to aid the researcher in finding the basic information regarding participants in the study, which in turn, shows the type of participants that participated. All the participants gave detailed information to the best of their knowledge having been told that the research was purely for academic purpose.

4.2 RESEARCH SITES

The following are the descriptions of the schools used. Please note that this information is supplied by the head of department of each school, besides the researcher saw them during the field work.

School A has twenty-eight (28) staff (both teaching and non-teaching staff). It is ten years old. It has limited space for the needed infrastructure to be built on. However, the classrooms are standard and well ventilated with air-conditions and fans fitted. It has a small playground. The medium of instruction is English, but the additional language of study is Afrikaans. The resources available are school computers and the library.

School B has twenty-five (25) staff (both teaching and non-teaching staff) it is four years old. It has limited space also, and the school is using a rented building. The school does use facilities of another nearby schools such as playing ground for sport activities. The medium of instruction is English. The school also has computers and small library.

School C has three branches in East London. The school is using a rented building. The school also uses facilities of another nearby schools and stadium facilities in East London. The medium of instruction is English. The school has computers laboratory and small library in all the branches.

4.3 PERSONAL INFORMATION OF PARTICIPANTS

Table 4.1 shows the demographic characteristics of the participants across three schools selected within East London in the Eastern Cape Province. Participants' personal information was presented per school and is coded TrA 1-2, TrB1-2, and TrC1-2, HoDA, HoDB, and HoDC.

4.3.1 DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Table 4.1 displays the distribution of participants according to age, marital status, qualification and teaching experience.

Table 4.1: Demographic characteristics of participants

Teacher	Age Range	Marital status	Gender	Teaching experience	Qualification
A1	30-35	Married	Female	13years	Bachelor of Education (B.Ed.) Honours
A2	30-35	Married	Male	12years	Bachelor of Education (B.Ed.) Honours
HoDA	36-40	Single	Male	15 years	Bachelor of Education in Science (B.Ed. Sc.) Honours
B1	30-35	Married	Male	13 year	Diploma in Education
B2	30-35	Single	Male	5 Years	Post Graduate Certificate in Education (PGCE)
HoDB	40-45	Single	Male	14 years	Master in Education
C1	30-35	Married	Male	8 years	Bachelor of Accounting
C2	30-35	Single	Male	6 years	Diploma in Education
HoDC	35-40	Married	Female	13 years	Bachelor of Education (B.Ed.) Honours

From Table 4.1, the age range of all the teachers are between 30 and 35, while the heads of Department's age ranges are a little above that. Similarly, the majority of the participants are male and more than half of them are married. The qualifications of the participants indicated that they are all professional teachers qualified to teach, except for one with an accounting background. Participants' qualifications help the researcher to ascertain their knowledge in the use and selection of Mathematics textbooks. The participants could, by virtue of their qualifications, be expected to interact meaningfully with the textbooks and be able to engage properly with the questions that the researcher asked them.

4.4 THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS

The aim of this study was to investigate the use of textbooks in teaching Mathematics in selected primary schools, especially for lesson planning and delivery. The following sub-research questions were raised and they constitute the themes of analysis from which sub-themes will emerge, for the purpose of data analysis.

1. How do the teachers select textbooks for teaching Mathematics?
2. How do the teachers use textbooks in lesson planning?
3. How do the teachers use textbooks in lesson delivery?
4. What challenges do teacher encounter in the use of textbooks?

Question 1: How do the teachers select textbooks for teaching Mathematics?

The followings are the theme and sub-themes from the first sub-research question

Table 4.2: Themes and sub-themes concerning the selection of textbooks for teaching Mathematics

Theme	Sub-theme	Issues raised
The selection of textbooks for teaching Mathematics	Prescribed textbook	The respondents indicated that they selected textbooks from the prescribed textbooks, and they did not have influence on this. They followed the recommendation by the Department
	Easy language	The respondents said that they liked to use the textbooks that were not complicated; textbooks with easy language that they would understand and be able to translate when code-switching in class, since they are teaching Grade 4
	Clarity and comprehensiveness	The respondents indicated that the textbook must be very clear and avoid confusion and ambiguity. They liked detailed textbooks that meet the needs of the learners.

4.4.1 Prescribed textbook

In selecting primary school textbooks for teaching Mathematics, the participants said that teachers were guided by the prescribed textbook by the Department in the CAPS document. Whether the books were of good quality or not, they could not influence the changes. Obviously, this includes the examination of whether the textbook: met the requirements of society; aligned with the education program of the institution; addressed the needs of the learners; was comprehensive, detailed and flexible. The following were teachers' responses:

TrA1: *On behalf of myself I use different textbooks from the prescribed ones by the curriculum and the department.*

The other teacher (TRA2) corroborated this by saying that textbooks are prescribed only by the department;

TrB1: *We teachers come into agreement since we have more than one teacher in Grade four. We all used prescribed textbook, which is Platinum.*

On the contrary to what the above teachers said, TrB2 has this to say,

TrB2: *We are not the ones who select textbooks, but the school tells us which textbook to use.*

The other teacher from school C had this to say,

TrC2: *We have so many Mathematics textbooks. We have Oxford, Platinum, Day to Day, Harvest, and Spot on. But we do select the one that has detailed information that suits the*

learners. We select the one that suits the level of the learners. We based our selection on CAPS.

4.4.2 Easy language

Another teacher (TrA1) further said that he did not go beyond the prescribed textbook in his selection; but he based his selection on the language used to write the textbook. This was in line with what TrA2 said above:

TrA2: *I only consider the language used in the textbook, whether it will be easy for me to translate into mother tongue. If the English used in writing the book is not complicated; I make decision based on it, and the clarity of the textbook.*

The opinion of other teachers in school B differed. One of them said:

TrB2: *I consider the contents, because some books have few questions, whereas we need to give learners more questions. The right book does affect my decision making. I am comfortable with the textbook because everything that is in the policy documents is inside the book*

TrC1 below supported what the teacher in school A said about language used in the textbook.

TrC1: *It is obvious that language used in writing the textbook is an essential factor to be considered since at Grade four; there is need for code-switching.*

TrC2 alluded to what TrC1 said about the language used in writing textbook as a factor she considered when selecting the textbooks.

4.4.3 Clarity and comprehensiveness

On the aspect of clarity, one of the respondents alluded to the fact that what he is interested in is detailed textbooks. Those allowed her to make a right choice.

TrB1: *I select a very clear textbook that enhances my learners' success at all times. I also check if the textbook flows in thought and gives more than one example on each item of the lesson*

TrB2: *The platinum textbooks we are using are very clear and detailed. This textbook works well because we consider the clarity before we use it.*

TrC2: I use a textbook that has more diagrams and better illustrations that suit my learners' need.

4.4.3.1 Summary of findings on selection of textbook for teaching Mathematics

The respondents indicated that they selected textbooks from the prescribed textbooks by the department, which were written clearly according to the Curriculum and Assessment Policy Statement (CAPS). They did not have any choice of selecting outside the prescribed textbooks, and they did not have influence on this. They followed the recommendation by the Department. However, they said that they liked to use the textbooks that were not complicated, textbooks with easy language that they will understand and be able to translate when code-switching in class since they are teaching Grade four. They also indicated that the textbook must be very clear and avoid confusion and ambiguity. They like detailed textbooks that met the needs of the learners.

4.4.3.2 Discussion on selection of textbook for teaching Mathematics

The above is in accordance with Czeglédy and Kovács's (2008) idea that, in selecting primary school textbooks for teaching Mathematics, the following among others must

be considered whether the textbook meets the requirements of society, the education program of the institution, the needs of the students, and the need for being comprehensive, detailed and flexible.

Similarly, a textbook must be simple, clear, concise and precise wording of definitions, theorems, proofs or other rules are significant in Mathematics. Likewise a good textbook must allow the learners to acquire some skills with specific aims like the improvement of meaning, analyzing reading comprehension, counting skills, orientation in space, wish for proving, pursuit of combinatorial argumentation etc. (Czeplédy & Kovács, 2008:17). Appearance of the textbook is also essentially important as a motivating factor. The textbook can also have adequate figures and illustrations, well-arranged paragraphs, and readability all facilitate comprehension and the acquisition of knowledge. Practical considerations include the overview of the supplementary materials (teacher's book, exercise book, test sheets, sample solutions, tools) that belong to the given series of textbook, and overview of the textbook itself. The durability of the book, its size or acceptable price etc. are also factors to consider (Czeplédy & Kovács, 2008:17).

Question 2: How do the teachers use Mathematics textbook for lesson planning?

The followings are the theme and sub-themes from the above sub-research question

Table 4.3: Themes and sub-themes concerning the use of Mathematics textbooks for lesson planning

Theme	Sub-theme	Issues raised
The use of Mathematics textbooks for lesson planning	The contents of curriculum	The sequential order of the contents of the curriculum allows them to use it for lesson planning.
	Supplement with other resources	They do use other resources like computer assisted programs, games, workbooks and other textbooks as supplement to the Mathematics textbook

	Link between the textbook and plan book	The contents of the textbook help them to plan for the lesson because there is a link between their plan books and the textbook. This linkage helps their focus.
	Wide range of activities covered	They used the exact activities in the textbook to plan for their learners. They also used it as classwork and assignment for them.

4.4.4 The contents of curriculum

Lesson planning is one of the basic duties of every teacher in the delivery of an instructional lesson in the classroom. Lesson planning is a series of course plans which provide direction for a teacher of what kind of materials of study to be taught and how to teach them. The teachers had this to say;

TrA1: *Each and every teacher should have a lesson plan. The content of curriculum does affect how I use the textbook. For example, the content of CAPS is different from that of OBE; the textbook selected is useful for me in my lesson activities, because it aligns with the curriculum contents.*

Even though the schools visited do not use the same textbooks, the textbooks are chosen from prescribed books. Notwithstanding, this teacher said that

TrB1: *The contents of the Platinum textbook that we are using in our school are in line with the contents of the curriculum. This works well for my learners because it has got examples that are very clear.*

TrB2 was of the view that the content of the curriculum had different divisions which teachers must follow in terms of duration and exercises, with examples to cover at specific times. The teacher's view is captured below.

TrB2: *We start by checking CAPS and amount of time/hours and how many topics to cover before we use that to plan, or else you will end up teaching more and more what you are not supposed to teach. I plan in advance before preparing my lesson. I plan weekly.*

Similarly, another teacher said:

TrC2: *I plan according to the topic that has been selected. I prepare the lesson according to CAPS instruction. The textbooks help me to plan very well*

4.4.5 Supplement with other resources

Virtually, all the teachers have supplementary resources to support the Mathematics textbook. Their views are stated below:

TrA1: *The best way to achieve the objective of each lesson is to add other resources with textbook; the resources I do use are computer games, workbooks, other textbooks etc. We hold discussion group when necessary as well as visiting library.*

TrB1: *I supplement the textbook with other related books, especially if I do not find all what I wanted in a particular textbook.*

TrB2: *I supplement the Mathematics textbook when I am teaching; I will bring other materials and use them very well. Even with the platinum textbook that is detailed, I still use posters and chats to make my teaching hitch free and smooth.*

TrC2: *We have so many supplementary resources that have been prescribed by CAPS like workbooks. We also compare the resources so as to teach the learners from simple to complex, known to unknown.*

4.4.6 Link between textbook and plan book

The participants also believed that there should be a link between the textbook and the plan book. The plan book must not be different from what is inside the textbook.

TrA1: *What comes from Mathematics textbooks is linked to my preparation for lesson and nothing more. The content of the textbook is what I use to write my plan book at all times. I don't organize my different activities. I use the activities that are specified by the department.*

TrB1: *The contents of the textbook help me to plan for my lesson. The link between my plan book and the textbook is according to the guidelines. It gives me what I must connect with and the area I must focus on.*

TrB2: *My plan book is linked because I am taking what I have in the plan book from the textbook. I always quote the exercise and page numbers that are written in the textbook in my plan book before using it in class. I always use the terms already mentioned in the textbook to start my lesson. I write the activities that are in the textbook on the board.*

TrC2: *The lesson plan and the textbook go hand in hand. If I am absent from school, another teacher can use my lesson plan to teach by using the activities stated in the lesson plan. In a nutshell, textbooks assist in making lesson plan easy and simple to prepare.*

4.4.7 Wide range of activities

Most of the participants noted that the wide range of activities in the textbook assisted them to plan. Two of them have this to say:

TrA1: I use the exact activities in the textbook to plan for my learners; I also use them as classwork and assignment for them.

TrB1: The activities written in the textbook make my work simple and less cumbersome.

4.4.7.1 Summary of findings on the use of Mathematics textbook for lesson planning

According to the respondents, for Mathematics textbook to be useful for lesson planning, such textbooks must be written in sequential order of the contents, so as to align properly with the curriculum (CAPS), because the lesson plan is the main right of the teacher, depending on the class and learners' needs. The participants also indicated that they used other resources like computer assisted programs, games, workbooks and other textbooks as supplements to the Mathematics textbook when they were planning for their lesson.

4.4.7.2 Discussion on the use of Mathematics textbook for lesson planning

In lesson planning, the teaching styles and the learning styles should be compatible (Naimie, 2012). The above excerpt is consistent with Khomani's (2005) idea that lesson plan preparation includes instructional materials like teachers' guide, syllabuses and textbooks. The teachers also said the contents of the textbook helped them to plan for the lesson because there was a link between their plan books and the textbook. This link assisted them to be more focused. In the same vein, Abadzi (2006) observes that good textbooks for lesson planning should have serious focus on content, with rich and extensive explanation and elaboration of concepts. It also allows them to achieve the daily learning outcome. This is corroborated by Brown, (2009) who says that the use of textbooks in lesson planning by teachers provides ideas and practices which frame classroom activity and also help teachers in achieving goals

that they presumably could not, or would not accomplish on their own. Reed and Michaud (2010) reiterated that they used the exact activities in the textbook, to plan for their learners from which they gave classwork and assignments.

Question 3: How do the teachers select Mathematics textbooks for lesson delivery?

The followings are the theme and sub-themes from the above sub-research question

Table 4.4: Themes and sub-themes concerning the use of Mathematics textbooks for lesson delivery

Theme	Sub-theme	Issues raised
the use of Mathematics textbooks for lesson delivery	Teaching method	Teachers agreed that they used Mathematics textbooks for teaching in class. The textbook assisted them in giving learners homework by telling them to open the pages. This did not take time.
	Quality of the textbook	The type of textbook they wanted for lesson delivery was supposed to be detailed, well structured, and the language used was supposed to be simple
	Suitability of textbook for homework	The textbook assisted them in giving the learners homework and assignments by telling them the pages to open to.
	Content coverage	The textbooks they were using helped them to cover much work from the CAPS document. The CAPS document contained what to cover and when to cover it, so the textbook assisted a lot.
	Introduction and conclusion of a lesson	The activities and the diagrams in the textbook served as the basis for introducing and concluding the lesson from known to unknown. They pointed the attention of the learners to activities and diagrams to study before begin the lesson.

4.4.8 Teaching method

Effective delivery of lesson involved practical use of textbooks by the teacher. For example, in lesson planning, the teacher needed to pick some exercises from the textbook which allowed the students to get the deep knowledge of the concept being taught, and to acquire skills of finding solutions to, not only mathematical problems in class, but also real life problems. Below are the responses of the teachers on how they used Mathematics textbooks for lesson delivery.

TrA1: *I am using textbooks as a guideline for my students. I don't write on the chalk board these days. I only refer my students to some pages. I use Mathematics textbooks as a method of teaching in class. The textbook assists me in giving learners home work by telling them to open the pages.*

TrA2: *The textbook I use is very straight to the point. It has an outline on how you can explain something to the learners. So, the illustrations assist me to use it as a teaching method.*

TrB2: *The textbook serves as my teaching method, because the diagrams and some chats in the textbook help me a lot, especially when the learners see it, they will remember on time.*

TrC2: *The textbook serves as a method because inside the textbook, there are questions and examples to guide you as a teacher. It guides you to practice and know more about the topic you are going to teach the learner.*

On the contrary, TrB1 did not see the textbook serving as a method, but rather as a guide.

TrB1: *For me, I may have a textbook, but at the end of the lesson, I still have to write on the board. I will end up writing on the board because I know what I wanted to see. So, the textbook to me is a guide not a method.*

The observation shows that the teachers used lesson plans together with the textbook and other instructional materials like counting sticks, etc. for the topic Addition and subtraction.

4.4.9 Quality of textbook

Each teacher specified the type of qualities needed from the textbook, but the common ones were; easy language, well-detailed and structured textbook, textbook with many activities. Below are their responses:

TrA1: *I always like to use a textbook that is very simple in terms of language used and not a complicated book. For instance, in Grade four, there is no need for using first additional language. I just use home language. I do translate the English into mother tongue so that my learners will understand.*

TrA2: *I need a textbook that has detailed outlines and examples that can speak for themselves and assist learners to have more understanding. We cannot run away from the fact that there is nothing we can keep in mind than what is seen in the textbook. The things that learners see allow them to remember what they are taught. This makes teaching very easy for both learners and teachers.*

TrB1: *I would like to see my textbook having daily exercises with every activity, and the workbook should be available and structured very well. Different quality from the same book to me is good.*

TrB2: *The textbook must have all the explanations that are detailed. Sometimes, I use internet to search for something that is not in the textbook.*

TrC2: *The quality I want is that the questions in the textbook should come with many examples to assist the learners and make the teaching more effective. For example, if the textbook fails to give me the method to use in solving the questions given, then I will struggle a lot especially with the Grade four that I am teaching.*

4.4.10 Suitability of Textbook for homework

All respondents agreed that textbooks helped them to give quick homework and sometimes assignments to the learners, and to discharge their work effectively. Below are their responses.

TrA1: *The textbook assists me in giving learners homework by telling them to open the page numbers.*

TrA2: *The textbook fully assists me. All my homework is from the textbook, coupled with the conduciveness of the environment.*

TrB1: *The book assisted me by explaining the concept before giving my learners homework. You cannot give homework on something you have not taught the learners. For example, exercise 1.1 is different from exercise 1.2. You can only give them homework on exercise 1.1 if you have taught them. So to me, the textbook is not an end itself but a means to an end.*

TrB2: *The textbook assists a lot with homework. I always refer my learners to the page numbers where the homework is written rather than stressing myself in writing them on the board, which takes too much time.*

TrC2: *The textbook helps us because there are so many activities inside it. It helps us to save time and give the learners the homework. I will just tell them to go home and do activities 20.1 on pages 1 & 2 and learners will just go home and do it.*

The above was corroborated by the observation made where the teachers assigned learners to open a certain page to look at the examples. The learners were asked to work on their own in their rough books.

4.4.11 Content coverage

Under this sub-theme, the researcher wanted to find out whether the textbook enabled teachers to cover all the specified topics in the CAPS based on the duration stipulated. They had this to say;

TrA1: *The textbooks assist me in covering the curriculum because it makes everything to be easy. I can cover a chapter of four days in two days.*

TrA2: *The textbook I am using is strictly on point with the content of the curriculum, although I manage my time to make sure I give the number of exercises prescribed in the content of the curriculum. I make sure the content of the textbook is aligned with the curriculum.*

TrB1: *You will find out that you use only the CAPS because it tells you the amount of work or content to have been covered. At the same time, you must know that at least before the mid-term you must have covered a lot. So, textbook serves a guide. But if the learners do not understand easily, you have to take more time. However, it is easier to use the textbook to cover more content.*

TrB2: *The textbook assists us to cover all what the department asks us to cover, because the textbook contents have details of all that is to be taught in class.*

TrC2: *Textbooks help us a lot, because the textbook selected is based on the CAPS document and CAPS has stated what to do weekly, so with the help of textbook we are able to cover a lot. I use the activities in the textbook as classwork and homework. This helps me to cover the content I am supposed to cover*

The teachers observed used the content of the textbook to teach. For example, they used rounding off of numbers to estimate the answers to the exercises in the textbook using the inverse relationship of addition and subtraction, to check answers and to find the missing numbers. The examples given were from the textbook. The teachers gave some examples while the learners listened, and to show that the information provided was understood, and learners actively participated during the course of the teaching.

4.4.12 Introduction and conclusion of a lesson

The intention of the researcher here was to establish whether the respondents used the textbook throughout the lesson activities, especially at the introduction and conclusion. The observation recorded buttressed some of the teachers' responses below:

TrA1: *I use the telling method with what is in the textbook, to start the lesson, and this helps the learners. I also use verbal communication. I always ask my learners if they have problems; to know their weaknesses and strengths. The best way I introduce my lesson is to make examples and draw some diagrams from the textbook. Before I conclude, I will combine my learners' idea with what is written in the textbook.*

TrA2: *I usually check the method outlined in the textbook and align myself to it. If I find out that it is complex, I use my knowledge to break it down before, during and after the lesson. I do have a brief discussion with the learners at the beginning of the lesson and align my teaching to what they said and to fill the gap they created. I also create a real life problem using the textbook at the beginning of my lesson, and my conclusion is mostly based on my learners' ideas.*

TrB1: *I use prior knowledge; I also give different examples on the chalkboard before, during and in concluding the lesson.*

TrC1: *Sometimes I ask the learner to look at the picture before the beginning of the class, and in concluding I will refer them back to the same picture to ascertain their level of understanding.*

TrC2: *For introducing the lesson, I need to go back to Relevant Previous Knowledge (RPK) of the learners, so as to take it from simple to complex, what they know will bring them back to the lesson for the day and it will catch their attention. They already have the idea of what to teach and this will allow you to go further to what they do not know.*

The observation revealed that the teachers introduced the lesson by asking the learners the prior topic and they asked them to open the textbook to the page to be taught. Learners were told to count the number of things they found in the picture, and they were asked to count the number of things they can see in the classroom. They were then referred to the example given in the textbook. The teachers concluded their lessons by asking the learners to copy the correction in their exercise books and gave them home work from the textbooks.

4.4.12.1 Summary of findings and discussion on the use of Mathematics textbook for lesson delivery

Teachers agreed that they used Mathematics textbooks as a method of teaching in class. The textbook assisted them in giving learners homework by telling them to open the pages. This did not take time. Fan, Zhu & Miao (2013: 636) observes that “textbooks appear to play a role in teachers’ teaching by conveying didactic messages and providing an encouraging or discouraging curricular environment for them to employ different teaching strategies” The type of textbook they wanted for lesson delivery must be detailed, well structured; and the language used must be simple. The textbook assisted them in giving the learners homework and assignments and theirs was just telling them to open to the pages. This echoes with Johansson’s (2006) observation that, in many Mathematics classes, student assignments, the questions the teacher asks, the ways in which students are grouped, the forms of assessment, and much more; originate in curriculum materials.

Thus, instructional approaches reflected in the textbook in all probability will be translated into practice in the classroom, and textbooks in many ways served as the models of instruction. The textbooks they were using helped them to cover much work from the CAPS document. The CAPS document had what to cover and when to cover it, then textbook assist a lot. Textbooks are also an integral part of a teachers’ daily work and are intimately connected to instruction. Literature has repeatedly documented the fact that textbooks are used extensively in Mathematics classrooms (Fan, Zhu & Miao, 2013; Pepin, Gueudet & Trouche, 2013).

Question 4: what are the challenges teacher encounters in the use of Mathematics textbooks?

The followings are the theme and sub-themes from the above sub-research question

Table 4.5: Themes and sub-themes concerning the Challenges teachers encounter in the use of textbooks

Theme	Sub-theme	Issues raised
Challenges teachers encounter in the use of textbooks	Poor quality of prescribed textbooks	The language used in the textbooks is too complicated. Some answers given to examples and exercises were not correct due to printing errors.
	overloaded textbook	Some textbooks are full of irrelevant things that are above or below the Grade level you are teaching.
	Acquisition of the textbook	Late ordering of books and delivery of the books to schools on time is another challenge.
	Shortage of textbooks	Some learners share textbooks due to inadequate textbooks. Some learners misplaced theirs and had to share and this affected smooth lesson delivery.
	Aligning the contents of textbook with curriculum	Sometimes there was a mismatch between the contents of the textbook and CAPS document (curriculum). It may be as a result of typographic errors or oversight.

4.4.13 Poor quality of prescribed textbook

Below are the responses of the teachers on the challenges they faced in using Mathematics textbooks for lesson planning and delivery.

TrA1: *The challenge I face is the language they use, too much complicated language. My learners do have difficulties because of this and I have to repeat what I said always.*

TrA2 supported what her colleague said, which was also buttressed by TrB1 and others, thus;

TrB1: *The biggest challenge is the way they are written, which makes it difficult for learners to comprehend. Also, the learners' attitude is not encouraging when they are not familiar with the contents of the textbook.*

TrB2: *The platinum textbook we are using gives more examples because the Grade four learners are coming from another phase, hence; they need quality textbook for good foundation of another phase. But when the textbook lacks this, there is need for some complementary resources.*

TrC1: *The explanation is not detailed, hence; I use my money to buy internet to search for what I am going to use in class.*

TrC2: *At times, the examples in the textbook are not clear, the answers in teachers' guide are wrong. If you based your answer on teacher's guide and there are errors, you need to work it out and compare.*

4.4.14 Too loaded textbook

Here, the researcher tried to find out if the content of the textbook was at par with the level it was meant for. Below are the responses of two participants.

TrA1: *Another challenge of a textbook is that the contents prescribed for each term are too much for example what to be covered in term two is now covered in term three. This makes me to have too much workload.*

TrC2: *Some textbooks are full of irrelevant things which are not necessary for the Grade level you are teaching. This derails the learners and teachers.*

4.4.15 Acquisition of textbook

In response to the sub research question above, the respondents generally observed that the issue of ordering and procurement of textbooks pose a challenge. The following are their responses

TrA2: *The delay in the acquisition of textbooks as a result of the fact that schools have their own prescribed textbooks which might be very scarce or the publisher might have limited copies of such textbooks in stock*

TrC1: *The delay in getting the textbooks, due to many reasons like late procurement and delay from publishers, is a challenge.*

TrC2: *Our school ordered textbooks during the 3rd term but yet it was brought in batches and delayed due to distance from the source to the school.*

4.4.16 Shortage of the textbooks

Shortage of textbooks is another challenge according to the respondents' view; the numbers of learners are more than the textbooks that are available.

TrA2: *Some learners share textbooks due to inadequate textbooks. Some learners misplaced theirs and have to share while some steal from each other, hence; the effect on smooth teaching and learning*

TrB1: *Learners who do not have textbooks are a challenge here. The learners without textbook are at a disadvantage.*

TrB2: *Shortage of textbooks is another challenge, and it is even worse when learners determine who they will share with. Hence, you will be forced to write on the chalkboard now; and that takes time. Without textbooks, what you are teaching becomes abstract.*

TrC2: *Shortage of textbooks at the beginning of the term or section can pose problems. Some learners do not*

get the textbook at the right time; hence, it poses a challenge.

4.4.17 Aligning the contents of the textbook with the curriculum

The researcher wanted to know if the content of the Mathematics textbook was aligned with the CAPS document. Below are the responses of the teachers:

TrA2: *Everything that has advantage must have disadvantage. Relevance of information is very crucial here. Some textbooks prescribed are not aligning properly with the content of the curriculum. I could not see all the information needed in some of these textbooks. Since we have learners of different calibre, interest, attribute etc. there is need for us to have variety of textbooks.*

TrB2: *Sometimes when you like some topics, you will see that they do not align properly with the contents of the textbook because it is your favorite topic, and this poses a threat and challenge to the effective teaching and learning.*

TrC2: *The platinum textbook we are using goes well with all the content of CAP. But at times, printing error creates the gap between the contents of the textbook and the curriculum.*

4.4.17.1 Summary of findings on the challenges teacher encounter in the use of Mathematics textbooks

Despite the important uses of textbooks by both the learners and the teachers, the challenges encountered by the schools in obtaining textbooks cannot be overemphasized. For instance, some schools placed their orders for textbooks late or with errors or did not place orders at all. Placement of orders for textbooks should be the prerogative of the school and not parents. Inaccurate projections on the

number of learners which enrol at each level in the following year led to the delay in obtaining textbooks. Other challenges included, poor monitoring by schools in terms of materials delivery; non-adherence to budgetary allocation or directives issued to the schools leading to non-delivery of textbooks; poor language use and wrong content, printing errors, incorrect answers given to exercises and examples in the textbook, and so on.

4.4.17.2 Discussion on the challenges teacher encounter in the use of Mathematics textbooks

Teachers faced other numerous challenges like the language proficiency of primary school learners. More serious was the limited opportunity for the learners to practice the target language at home. In rural primary schools, the learners' only opportunity to use English language was limited to the daily 35-min English lesson (KIE, 2002). In lower primary, there was a mismatch between language policy and the actual practice. Ideally, mother tongue ought to be used to reinforce instruction as recommended by the policy (Ministry of Education, 2006). However, the reality is that there is continued use of English, which is an unfamiliar language, as a medium of instruction. This creates anxiety, and stalls effective classroom participation (Kodero et al., 2011).

Ying and Young (2007) raise a concern regarding the selection of textbooks for learners who are not "teacher's pets", as these learners regularly experience barriers to learning. Their learning levels are often ignored during the selection of textbooks by most teachers. Onuoha-Chidiebere (2011) asserts that the selection of teaching materials should be based on the learning objectives and the unique characteristics of learners.

4.5 HODS' VIEWS ON THE SELECTION OF TEXTBOOKS

In this section, the researcher explores the views and the perceptions of three heads of department on how their teachers selected and used Mathematics textbooks for lesson planning, delivery and the challenges they encountered. This section is broken down into themes and sub-themes as stated below.

Question 1: How do the teachers select textbooks for teaching Mathematics?

The followings are the theme and sub-themes from the above sub-research question

Table 4.6: Themes and sub-themes concerning the selection of textbooks for teaching Mathematics

Theme	Sub-theme	Issues raised
The selection of textbooks for teaching Mathematics	Involvement in selection of textbook	All the heads of department involved in the selection of the textbook in consultation with their teachers and other school.
	CAPS Compliance	They all selected textbooks from CAPS documents
	Time of selection	All of them concurred that their teachers selected textbooks at the end of the section which is the 4 th term before the beginning of another section.
	Assistance given to support the teacher in selection	The heads of department worked hand in hand with their teachers in selecting the textbook. They had meetings and consultations before making final decisions. Each teacher had input in selection of textbook.

4.5.1 Involvement in the selection of the textbook

All the heads of department reiterated noted that they were involved in the selection of Mathematics textbook in their different schools in consultation with their teachers.

HoDA: *When it comes to selection, the teachers come together. Before that, we have samples and pick the one that is CAPS compliance. Also whether the work given covers what needs to be covered, and whether there are enough exercises in the book. The teachers select the textbook according to CAPS, which is Platinum. I assist my teachers by consulting them since they have great knowledge about teaching Mathematics, so we come together and pick. I also asked them to consider what other schools nearby used.*

HoDB: *We make sure those textbooks are according to CAPS. Teachers select textbooks according to learners' ability. We have different approved textbooks by the CAPS. We consider the one that is detailed and stands out.*

HoDC: *According to CAPS, we followed the process of CAPS, and in this school we are using Focus textbook. Our procedure here is that the SMT will present the textbook that we have selected, to SGB and they are the ones to recommend the one to be used.*

4.5.2 CAPS Compliance

Here, the researcher asked about whether the Mathematics textbook was CAPS compliant. All the HoDs indicated that they chose books from CAPS prescribed books.

HoDA: *The teachers select the textbook according to CAPS, which is Platinum. I consult my teachers before we decided which textbook to pick*

HoDB: *Our teachers select textbook prescribed according to CAPS as against NCS. Once in a while, we meet together and select the textbook and we make sure they are following the time frame written in the CAPS.*

HoDC: *I do have meetings with my teachers and we agree on textbooks to use. The textbook must be in compliance with CAPS document and the contents of the CAPS documents, and this makes them to choose the right textbook.*

4.5.3 Time of selection

Time of selection is another sub-theme that emanated from the HoDs' responses. They all agreed that the earlier they selected the textbooks, the better it was for them. They had this to say.

HoDA: *Every last term of the year, I send information to the teachers concerning textbooks to be used. We ensure that due diligence is taken into consideration.*

HoDB: *We select textbooks by the end of the section, which is term four; so that when the learners resume, they will get the textbook. We meet occasionally to finalize the selection.*

HoDC: *We plan strategically for the following year at the end of the year. Each HoD presents to the SMT. We prepare towards the end of the year because we must have completed the syllabus, to know whether to shift to another textbook or not.*

4.5.4 Assistance given to teachers in selection of textbook

The heads of department unanimously agreed that they did not impose the textbook to use on their teachers, but they worked in consultation. They also noted that the teachers' input counted a lot in decision making. Below is what they said.

HoDA: *I assist my teachers by consulting them since they have great knowledge about teaching Mathematics, so we come together and pick, I also ask them to consider what other schools nearby used.*

HoDB: *We meet occasionally to check their workbooks and see if they are aligning with the CAPS. When a teacher has been teaching the same Grade for many years, they assume they know all the topics and they do select some topics and not cover all. We support each other by exposing problems to one another.*

HoDC: *I do have meetings with my teachers and we agree on textbooks to use, the textbook must be in compliance with CAPS document and the contents of the CAPS documents and this make them to choose the right textbook.*

4.5.4.1 Summary of findings on the views of heads of department in the selection of Mathematics textbooks

All the heads of department indicated that they were involved in the selection of the textbook in consultation with their teachers and other schools. They selected textbooks from CAPS documents and they made sure that the textbooks were selected before the end of the section, precisely at the end of the 4th term before the beginning of another year. They said that they worked hand in hand with their teachers in selecting the textbook. They had regular meetings and consultations before making final decisions. In a nutshell, each teacher had input in selection of textbooks.

4.5.4.2 Discussion on the views of heads of department in the selection of Mathematics textbooks

The teacher is the most important role player in the selection of texts for lesson presentation. According to Mohammad and Kumari (2007), for teachers to facilitate the teaching and learning process in the classroom, they require a collection of resources that will support curriculum delivery. Drawing on Stoffels' (2005) idea, there was a notion of a textbook which would be integral in classroom teaching. This textbook would support the teacher in the pedagogical instruction for the entire year. Stoffels (2005) also raised another perspective where inventive teachers would combine both commercially produced materials and self-developed materials to create optimal balance and sound learning opportunities for learners.

Question 2: How do the teachers use Mathematics textbooks in lesson planning?

The followings are the theme and sub-themes from the above sub-research question

Table 4.7: Themes and sub-themes concerning the use of Mathematics textbooks for lesson planning

Theme	Sub-theme	Issues raised
The use of Mathematics textbooks for lesson planning	Textbook as a guide	The textbook serves as a guide for lesson planning which must be in line with CAPS documents.
	Alignment of lesson plan with the content of the textbook	The heads of the department said they always made sure that what was inside the lesson plan of the teachers was in alignment with the contents of the textbook.
	Method of teaching	They used no specific method of teaching but their teachers followed methods written in the textbook and their teachers were flexible about this.
	Time of planning	They all said that their teachers planned a week ahead of teaching and submitted to them before a new week began.

	Knowledge of the teacher	They concurred that the knowledge of the teacher in lesson planning was very important; that teachers must be proactive and professional in dealing with their planning.
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4.5.5 Textbook as a guide

All the Heads of department agreed that the textbook served as a guide to them when teaching Mathematics. One of them (HoDA) added that;

The purpose of using textbook is to guide you, especially in line with CAPS laid down rules.

4.5.6 Alignment of lesson plan with the content of the textbook

The three heads of department believed that there was alignment between the lesson plan and the content of the textbook. They noted that they made sure that their teachers cited the page numbers and exercises they took from textbooks, in their lesson plans.

HoDA: *In the entire lesson plan, every topic you have to teach must be written in the lesson plan; then the teacher must cite the number and pages where they got the topic. The teacher must indicate the page number on the lesson plan.*

HoDB: *Teachers plan weekly in alignment with the contents of the textbook being used, and made sure they had necessary materials. They involved their learners in what they were doing.*

HoDC: *The purpose of using the textbook is to complement the lesson plan of the teacher. So textbook helps teacher to plan. Hence, textbook contents must be well-aligned with what the teacher has in his or her lesson plan*

4.5.7 Method of teaching

The intention of the researcher was to ascertain if textbooks served as teaching method apart from being a resource or teaching aid. This is what the heads of department said.

HoDA: *My teacher uses flexible method of teaching to plan effectively since we have qualified teachers. We also look at the features of lesson plans to guide us on the method to use.*

HoDB: *The textbook helps and aids the knowledge of the teacher in giving classwork, homework and assignments. So, it becomes method of teaching and it helps the teacher to be focused.*

4.5.8: Time of planning

The three heads of department said that their teachers planned ahead for their lessons.

HoDA: *We plan ahead of term. For example, by the end of any academic year, teachers have to send their lesson plans ahead of time before using them.*

HoDB: *The textbook facilitates lesson plans. It aids preparation because every teacher goes to the classroom with a lesson plan. The teacher submits lesson plans to me of Friday before the teacher uses them the following Monday.*

HoDC: *Textbooks make the job of the teacher easier. The teacher plans ahead of time and their lesson plans must be in compliance with the CAPS document of daily and weekly activities.*

4.5.9: Knowledge of the teacher

All heads of department concurred that the knowledge of the teacher in lesson planning was very important. They also noted that the teacher must be proactive and professional in dealing with his or her planning.

4.5.9.1 Summary of findings on the views of heads of department on the use of Mathematics textbook for lesson planning

The heads of department concurred with their teachers that the textbook serves as a guide for lesson planning and was supposed to be in line with CAPS documents. They always made sure that what was in the lesson plan of the teachers was in alignment with the contents of the textbook. They prescribed no specific method of teaching but their teachers followed methods written in the textbook; and that their teachers were flexible about this. They all said that their teachers planned a week ahead of teaching and submitted plans to them before a new week began.

4.5.9.2 Discussion on the views of heads of department on the use of Mathematics textbook for lesson planning

The critical point for understanding the curriculum use depends on the process of understanding what teachers do with Mathematics textbook and why as well as how, their choices influence the classroom environment (Remillard, 2009). Research shows that teachers transform the textbook ideas, lesson plans, and mathematical tasks into real classroom.

Question 3: How do the teachers use Mathematics textbooks in lesson delivery?

The followings are the theme and sub-themes from the above sub-research question

Table 4.8: Themes and sub-themes concerning the use of Mathematics textbooks for lesson delivery

Theme	Sub-theme	Issues raised
the use of Mathematics textbooks for lesson delivery	The contents of textbook	Teachers used the activities written inside the textbook to deliver in class as classwork, homework and assignment
	Textbook as teaching method	The textbook is used as a resource in order to mediate the tasks for each term because the textbook has various activities. It also guides them to achieve specified contents to be covered at particular period.
	Evaluation of the use of textbook	They evaluated the teachers' lesson plan and activities so as to be sure they are aligned with the textbook and CAPS.
	Follow up with teachers	They followed up with their teachers to check whether the learners understood what the teacher was teaching. They also examined step by step, topic by topic use by the teacher in their lesson plan and they observe teachers teaching.
	Engagement of learners	The HoD said they checked the learners' exercise books to see if the teachers used exercises in the textbook by quoting the number of exercise or page number. They also checked whether the teacher wrote it the correct exercises down in their lesson plan.

4.5.10 The contents of the textbook

The heads of department had this to say in response to the above sub-research question

HoDA: *My teachers use the contents of the textbook to deliver their lesson by using the examples and activities that are already in the textbook during their teaching*

HoDB: *The teachers have the guide and they know what they must do and how to go about it. The guideline in the textbook guides them to deliver their lesson appropriately. They use the textbook in teaching and help them to deliver the lesson.*

HoDC: *Since the textbook is approved by the department, the content will automatically help the teacher in their daily lesson activities in the classroom.*

4.5.11 Textbook as a teaching method during lesson delivery

HoDA: *All exercises are given in the textbook; the teacher uses his discretion to have more. When we are dealing with peer assessment or group work, the textbook assists us a lot to impart more knowledge.*

HoDB: *There are resources to be used that are stated in the curriculum, hence; the textbook helps the teachers to go according to what is expected of them. Likewise, the activities and diagrams inside the textbook also serve as a method.*

HoDC: *The textbook helps teachers on how to deliver and how to teach. It serves as a resource as well as method of teaching since the teacher uses it for homework and assignments.*

4.5.12 Evaluation of the use of textbook

HoDA: *A teacher must use a textbook at all cost, even if you know all the contents but there will be one or two things you as a teacher may forget,*

HoDB: *We evaluate the teacher by checking what the learners have achieved through the checking of the learners' books randomly.*

HoDC: *We use the textbook to evaluate the teacher and learners' response to particular topics, by looking at learners' homework; if they are in alignment with the solution inside the textbook.*

4.5.13 Follow up with teachers

HoDA: *We closely monitor the teacher to see whether what they are teaching are closely related to what they have in the textbook.*

HoDB: *We follow closely the activities of the teachers; the end result will show by assessing the learners' notebook, also to check whether the learners get the understanding of what the teacher is teaching. We also examine step by step, topic by topic, textbook use by the teacher.*

HoDC: *I make sure the teacher submits to my table their notebook, then I will check if there is alignment with the textbook. Please note that teachers are free to rely on other resources, but they must be aligned with the contents of CAPS.*

4.5.14 Engaging the learners

HoDA: *We visit the class and check the books of the learners to ascertain if the teachers engage the learners with the contents of the textbook.*

HoDB: *Mathematics comes with counting and calculation. We make use that learners' books respond to the teacher's book; and a teacher must involve learners by giving them various examples.*

HoDC: *The teachers do engage the learners with the contents of the textbook, not only every day but throughout the year, because both learners and teacher have access to the same textbook. I make sure that what they are teaching daily and weekly is inside the textbook as a follow up. Though it is not easy to monitor the teachers closely, but the teachers do submit their lesson plans for marking, even though one is not sure if they follow the steps in class.*

The above is in line with what the researcher observed where the teachers engaged the learners by asking them to come out one after the other and work the problem given on the board. The exercise was given from the textbook and this enabled those who did not understand the topic before to understand it. The teachers also checked the understanding of learners by asking them to work out their own problems and find solutions to them. They were referred to exercises in the textbooks under the topic. Learners were asked to work out exercises under the examples, while working it out,

teachers were moving round the class to mark their work, one after the other and the corrections were given on the chalkboard to give them feedback of their mistakes.

4.5.14.1 Summary of findings on the views of heads of department on the use of Mathematics textbook for lesson delivery

From the findings of the study, the heads of department said that their teachers used the activities written in the textbook to deliver their lesson in class. They also used it for homework and assignment. The textbook was used as a resource in order to accompany the tasks of each school term, because the textbook had various activities. It also guided them to achieve specified contents to be covered at particular periods. They also said that they evaluated the teachers' lesson plan and activities so as to be sure they were in agreement with the textbook and CAPS documents. Similarly, they did follow up with their teachers to check whether the learners understood what they were teaching. They also examined step by step, topic by topic textbook use by the teacher in their lesson plan. They checked the learners' exercise books to see if the teachers used sequential exercises in the textbook by quoting the number of exercise or page numbers and seeing whether they were the same on their lesson plan.

4.5.14.2 Discussion on the views of heads of department on the use of Mathematics textbook for lesson delivery

The role of the textbook as a basic tool for teaching was mainly in its use as a source for student activities. Most teachers set the tasks and exercises and asked questions suggested by the textbook. They used the textbook, especially for practicing and testing. In a lesser measure, the textbooks served as a basis for discussion and for student motivation. This again confirms the role of the textbook as a tool for teaching (Haggarty & Pepin, 2002). Mathematics teachers mostly introduced and explained a concept or skill to their students and then gave examples on the board and expected pupils to practice on their own (Manolescu, 2004 & Karlovitz, 2005).

Question 4: what are the challenges encounter in the use of Mathematics textbooks?

The followings are the theme and sub-themes from the above sub-research question

Table 4.9: Themes and sub-themes concerning the Challenges encounter in the use of textbooks

Theme	Sub-theme	Issues raised
Challenges teachers encountered in the use of textbooks	New edition of the textbook	The introduction of the new edition or revised version posed a problem because of page number distortions.
	Language used to write the textbook	Some language used was not clear enough to allow the teacher to explain and teach effectively. Grade four learners were familiar with mother tongue from Grade R-3; and it has become a challenge for teacher to change to English suddenly.
	Acquisition of the textbook	The delay in ordering of the textbook which led to the delay in acquiring it.
	Shortage of textbook	Not all learners possessed the textbook, and teacher then wrote on the chalkboard
	Changes in curriculum	Before the introduction of CAPS, teachers were familiar with textbooks based on NCS and when CAPS was introduced, adaptation became a problem and a challenge.

All the challenges mentioned by the heads of the department had already been identified by their teachers such as listed in the sub-themes above.

4.5.15 New edition of the textbook

HoDA: *One of the challenges faced is when the textbook has new edition which makes the page numbers and exercises numbers change and some learners are with old edition, so learners who use the old edition and new edition are not on the same page in class.*

4.5.16 Language used to write the textbook

HoDA: *Language problem is another challenge that teachers face because at Grade four there is transition of using English to teach, and learners are not used to it from Grade R to 3. So, teachers have to be prepared for this using code-switching.*

HoDB: *The language used to write some of the textbooks is too high for the intended level. This makes teaching complicated for the teachers.*

HoDC: *Sometime the content of the textbook is faulty; at times they are difficult for the learners. That is, the breaking down of the textbook is a challenge.*

4.5.17 Acquisition of the textbook

HoDC: *One of the challenges is the delay in the ordering of the books. If we did not order on time, there will be problem.*

4.5.18 Shortage of textbook

HoDA: *Teachers face this type of problem; sometime we have to make photocopy of the old edition. When we have group work and the edition of the book varies, it poses problems for the teacher.*

HoDC: *Insufficient textbooks is another problem, when all the learners do not possess the textbook, to take them on board takes time*

4.5.19: Changes in curriculum

HoDB: *Difficulties occur when the teachers have not familiarized themselves with the new textbook because of the frequent changes in curriculum.*

4.5.19.1 Summary of findings on the views of heads of department on the challenges encounter by teachers when using Mathematics textbook

The heads of department indicated the challenges their teachers had already alluded to. They said that the introduction of the new edition or revised version posed a problem because of page number distortions. In fact, some learners did not have access to this new version on time. So, one would be teaching a class using two different textbooks. Some aspects of the language used were not clear enough to allow the teacher to explain and teach effectively. The language sometimes did not enable the teacher to translate into mother tongue, knowing fully well that Grade four learners were only familiar with mother tongue from Grade R-3. Hence, it had become a challenge for teachers to change to English suddenly even if code-switching was allowed. Heads of department also corroborated their teachers' findings on the delay in ordering of the textbooks which led to the delay in acquiring them due to poor monitoring. Shortage of textbooks as result of this, was also seen as challenge, teacher then has no other choice than to write on the chalkboard. Finally, they raised

the issue of curriculum changes. Before the introduction of CAPS, teachers were familiar with textbooks on NCS and when CAPS was introduced, adaptation became a problem and challenge.

4.5.19.2 Discussion on the views of heads of department on the challenges encounter by teachers when using Mathematics textbook

Some of these challenges were in line with SHRC (2014) reports that some schools placed their orders for textbooks late or with errors or did not place orders at all. Placement of orders for textbooks should be the prerogative of the school and not parents. The school knows when exactly the textbooks should arrive and when they are to be used. Therefore, they should place orders for the recommended textbooks early enough to give room for delays from the publishers. At the same time, they should understand the fact that publishers are very busy at the beginning of every session. It is important for the school to place the order before the last term of the current session (SHRC, 2014:27). Unavailability of certain titles when schools made orders for textbooks and some orders being out of stock due to greater demand are posing problems, also insufficient resources to produce them in large quantities (SHRC, 2014:27) were challenges. Poor monitoring by schools in terms of materials delivery was another challenge. When schools placed orders for textbooks, they always failed to monitor the publishers or sole distributors. They also needed a thorough follow up by designated staff for this (Fan, Zhu & Miao, 2013).

4.6 SUMMARY

This chapter focused on the presentation and analysis of data by highlighting the views of teachers and heads of department on the use of Mathematics textbooks for lesson planning and delivery in three selected primary schools in East London Education District. Therefore, the outcomes of the study led the researcher to draw conclusions for the study and to make recommendations for further considerations by all education stakeholders. This study explored the views of the respondents on how they selected textbook for Mathematics, how they used them for lesson planning and lesson delivery. The challenges they encountered were discussed. Employing the qualitative interviews and observation as primary research instruments, themes

and sub-themes were developed and discussed appropriately. The next chapter discusses the summary of findings, conclusions and recommendations of the study. Furthermore, areas to be considered for further research are highlighted in the next chapter.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

The previous chapter presented the data, analyzed and interpreted it using different themes and sub-themes that emerged from the study. This chapter focuses on the summary of the findings, the conclusions which were drawn from the findings, recommendations and suggestions for further studies. The chapter begins by restating the research objectives and questions.

5.2 RESTATING THE SUB-RESEARCH QUESTIONS

The main research question guiding this study was: How do teachers use textbooks in teaching Mathematics in three selected primary schools in East London Education District in the Eastern Cape Province? The study was also guided by the following sub-questions:

- a) How do the teachers select textbooks for teaching Mathematics?
- b) How do the teachers use textbooks in lesson planning?
- c) How do the teachers use textbooks in lesson delivery?
- d) What challenges do teachers encounter in the use of textbooks?

5.3 SUMMARY OF FINDINGS

This section of the chapter outlines the summary of the findings with respect to the teachers' and heads of department's views on the use of Mathematics textbooks for lesson planning and delivery. The outcomes of the study are summarized in the following subsections.

5.3.1 The selection of textbook for teaching Mathematics

The respondents indicated that they selected textbooks from the prescribed textbooks by the department. These textbooks are written clearly on the Curriculum and Assessment Policy Statement (CAPS) document. Teachers did not have any choice of selecting textbooks outside the prescribed ones and they did not have much influence on the selection. They followed the recommendation by the Department. However, they said that they liked to use the textbooks that are not complicated, with easy language that they could understand and translate when code-switching in class for Grade 4 classes. They also indicated that the textbook must be very clear and avoid confusion and ambiguity. They liked detailed textbooks that met the needs of the learners.

5.3.1.1 Heads of department views towards the selection of textbook for teaching Mathematics

All the heads of department involved in the selection of the textbook in consultation with their teachers and other schools noted that they all selected textbooks from CAPS documents, and that their teachers also selected textbooks in the CAPS document. The heads of department worked hand in hand with their teachers in selecting the textbooks. They held meetings and consultations before making final decisions. Each teacher had an input in the selection of textbooks.

5.4 The use of Mathematics textbook for lesson planning

According to the respondents, for Mathematics textbook to be useful for lesson planning, the textbook must be written in sequential order of the contents so as to align properly with the curriculum (CAPS) because lesson plan is the main prerogative of the teacher, in accordance with the class and learners' needs. They also indicated that they used other resources like computer assisted programs, games, workbooks and other textbooks as supplementary materials to the Mathematics textbook, when they were planning their lessons. They also said the contents of the textbook helped them to plan for the lesson because there was a link between their plan books and the textbook which allowed them to achieve the daily learning outcomes.

5.4.1 Heads of department views towards the use of textbook for lesson planning

The textbook serves as a guide for lesson planning in line with CAPS documents. The heads of department said they always made sure that what was inside the lesson plan of the teachers was in alignment with the contents of the textbook. They said their teachers followed methods written in the textbook but they were flexible about this. They all said that their teachers planned a week ahead of teaching and submitted plans to them before the new week began. They concurred that the teachers' knowledge of lesson planning was very important. They observed that the teacher must be proactive and professional in dealing with his or her planning.

5.5 The use of Mathematics the textbook for lesson delivery

Teachers confirmed that they used Mathematics textbooks for teaching in class. The textbook assisted them by giving learners homework, and theirs was simply telling them to open the pages. This did not take time. The type of textbook they wanted for lesson delivery was one which was detailed, well structured, with simple language used. The textbooks they were using helped them to cover much work from the CAPS document. The CAPS document had what was supposed to be covered, and when to cover it.

5.5.1 Heads of department's views towards the use of textbook for lesson delivery

Heads of department said their teachers used the activities written inside the textbook as classwork, homework and for assignments. The textbook was used as a resource in order to accompany the tasks for each term, because the textbook had various activities. It also guided them to cover prescribed content at a particular period. They said that they evaluated the teachers' lesson plan and activities so as to be sure they are aligned with the textbook and the CAPS document. They followed up with their teachers to check whether the learners got the understanding of what the teacher was teaching. They also examined step by step, topic by topic, the use of textbooks by the teacher in their lesson plan. They also observed teachers teaching. The HoDs said they checked the learners' exercise books to see if the teacher used exercises in the textbook by identifying the number of exercises or page number. They also checked whether teachers wrote the exercise and page numbers down in their lesson plan.

5.6 The challenges teachers encountered in the use of Mathematics textbooks

The language used in the textbook was too complicated, some answers given to examples and exercises were not correct due to printing errors, some textbooks were full of irrelevant things that were above or below the Grade level being taught, there was late ordering and late delivery of the books to schools, some learners shared textbooks due to inadequate textbooks. Sometimes there was a mismatch between the contents of the textbook and CAPS document (curriculum) for example topics written on the CAPS document are different from the one written in the textbook.

5.6.1 Heads of department views on the challenges teachers encounter in the use of Mathematics textbook

The introduction of the new edition or revised version posed a problem because of page number distortions. In some instances, the language used was not clear enough to allow the teacher to explain and teach effectively. Grade four learners were only familiar with their mother tongue from Grade R-3. Hence, it had become a challenge for teachers to change to English suddenly. The delay in ordering of the textbook which led to the delay in getting them. When all learners did not possess the textbook, the teacher then wrote on the chalkboard. Before the introduction of CAPS, teachers were familiar with textbooks on NCS list and when CAPS was introduced, adaptation became a problem and challenge.

5.7 CONCLUSIONS

The study sought to explore the teachers' and heads of department's views on the use of Mathematics textbook by the teachers in three selected primary schools in East London Education District. The study also examined the use of Mathematics textbook for lesson planning and delivery,. Finally, the study looked at the challenges teachers faced when selecting and using Mathematics textbook. The conclusions which were drawn from the findings are presented with respect to the main themes which emerged during the discussions with the participants.

5.7.1 The selection of Mathematics textbook by the teachers

The findings of the study demonstrated that the participants selected textbooks from the ones prescribed by the department that were written in the CAPS documents. They had no influence or decision on the selection. They all said they considered the language used and the types of illustrations, diagrams and activities among the prescribed textbooks to influence their final decision on the textbook to use. Finally, they said textbooks were selected by the end of the section before they started another section in the following year.

5.7.1.1 The heads of department's views towards the selection of Mathematics textbook

The heads of department also corroborated the above assertion by their teachers, that they met together to consider the above mentioned factors before they selected a textbook. They also gave the opportunity for their teachers to make their choices from the prescribed textbooks since they were the ones who used them. Only one of the heads of department said that, they submitted their recommendation to the School Management Team (SMT), which later took it to the School Governing Board (SGB) for approval. South African schools were run in a "Top-down approach. The SGB is the government of the school and SMT is responsible for school management. The SMT is accountable to the SGB, even though the SMT is responsible for the running of the day-to-day activities of the school, some decisions can only be taken by SGB, therefore, the SGB are consulted in many issues especially the one related to finance and budgeting for their approval because SGB manages the finances of the school.

5.7.2 The use of Mathematics textbook for lesson planning

All the teachers believed that lesson plans are very important and needed to be very detailed and comprehensive, and well-aligned to the CAPS document and the textbook. The textbook and CAPS documents gave them guidelines for preparing their lesson plans. In fact, the content of the curriculum had different divisions to follow in terms of duration and activities to cover. The teachers noted that they planned according to the topics that had been selected. The wide range of activities in the textbook helped them with their lesson plan. From these activities, they gave their learners classwork and assignment. These enabled them to cover all the specific topics per term. They also prepared the lesson plan according to CAPS instruction using the aid of textbooks and some supplementary resources like workbook, computer, games, library books, posters, among others.

5.7.2.1 The heads of department's views on the use of Mathematics textbook for lesson planning

All the heads of department agreed that textbook served as a guide to them when planning for the teaching of Mathematics. They also supported their teachers and noted that there was alignment of lesson plan with the content of the textbook. They make sure that their teachers cited the page numbers and exercises they took from textbooks on their lesson plan. They even saw the textbooks as, not only an aid to lesson plan, but a method of teaching. They concurred that they and their teachers, planned ahead of their lessons. They said that the knowledge of teacher in lesson planning is very important, and that the teacher must be proactive and professional in dealing with his or her planning.

5.7.3 The use of Mathematics textbook for lesson delivery

Effective delivery of lessons involves a practical use of textbooks by the teacher. For example, in lesson planning, the teacher needs to pick some exercises from the textbook which will allow the students to get the deep knowledge of the concept being taught and to acquire skills of finding solution to, not only mathematical problems in class, but also real life problems. Each teacher specified the type of textbook needed, but the common attributes were easy language, well-detailed and structured textbook, and one with many activities. They observed that textbooks helped them to give quick homework and assignments to the learners, and discharge their work effectively. Textbook enabled them to cover all the specified topics in the CAPS document based on the duration stipulated. They also alluded to the fact that they used textbooks throughout the lesson activities, especially at the introduction and conclusion. In fact, the observations recorded buttressed some of their responses. The teachers observed used textbooks adequately to deliver their lesson by giving class exercises and taken examples from the textbooks. They even draw their conclusion from the guidelines written on the textbooks.

5.7.3.1 The head of department views on the use of Mathematics textbook for lesson delivery

The heads of department indicated that their teachers used the contents of the textbook to deliver their lesson because they were using universal strategy where all learners had the textbook, and examples and activities were already in the textbook. The teachers had the guide and they knew what they must do and how to go about it. The guidelines in the textbook guided them to deliver their lesson appropriately. Since the textbook was approved by the department, the content would automatically help the teacher in their daily lesson activities in the classroom.

There are resources to be used that are stated in the curriculum, and the textbook helps the teacher to go according to what is expected of them. Likewise, the activities and diagrams inside the textbook also served as a method. A teacher must use a textbook at all cost, even if they know all the content. There will be one or two things you as a teacher may forget, hence there is need for the teacher to use textbooks. They also said that they evaluated their teachers' work by checking what the learners had achieved and by checking the learners' books randomly. They closely monitored their teachers to see whether what they were teaching was closely related to what they had in the textbook. They examined step by step, topic by topic, textbook use by the teacher. They made sure their teachers submitted to them their notebooks, which they checked to see if there was alignment with the textbook. They also visited the class and checked the books of the learners to ascertain if the teachers engaged the learners with the contents of the textbook. Learners' books were supposed to respond to the teacher's book. The teacher must involve learners by giving them various examples, and both learners and teacher must have access to the same textbook. .

5.7.4 Challenges encountered by teachers in the use of Mathematics textbooks

There are many challenges faced by the teachers when selecting and using Mathematics textbooks for lesson planning and delivery. Some schools placed their orders for textbooks late or with errors or did not place orders at all. Placement of orders for textbooks was the prerogative of the school and not parents. Inaccurate

projections on the number of learners which enrolled at each level in the following year, inaccurate enrolment figures of learners going to next class led to the delay in obtaining textbooks. Poor monitoring by schools in terms of materials delivery and non-adherence to budgetary allocation or directives issued to the schools led to non-delivery of textbooks. Poor language use and wrong contents, and having some textbook overloaded with irrelevant things which did not correlate with the level of the learners etc. were identified as challenges by the teachers in their responses.

5.7.4.1 The heads of department views on the challenges encounter by teachers in the use of Mathematics textbook

The heads of department concurred with their teachers on the challenges stated. The only addition made was that the constant revision of the textbooks when the learners are still having the old edition did not allow all the learners to be at the same level. Also, the constant changes in the curriculum in South Africa led to problem of ineffective teaching by the teachers and poor assimilation by the learners, because they were not prepared or informed earlier. They also noticed that there were mismatches between the textbook and teacher workbook, answers given to some exercises in the textbook were not correct. Teachers had to work it out in order not to confuse the learners. So this gave teachers more tasks to do.

5.8 CONTRIBUTION OF THE STUDY

Even though this study was carried out on a relatively small scale, it was able to provide great insights into the teachers' and heads of department's views on the use of Mathematics textbooks for effective teaching and learning in the selected primary schools. This study brought into the limelight some hidden factors that are responsible for selection of Mathematics textbook such as the numbers of activities and examples given, teachers are expected many working exercises for each topic discussed in the textbook. Some textbooks give very scanty examples to various exercises. This information will help the education stakeholders and the publishers of Mathematics textbook to improve the contents of the textbooks published. The

feedbacks from the teachers are very useful for upgrading the textbook by having new editions

The inherent challenges, apart from what the literature says, were illuminated in this study. These included the printing errors and wrong answers given to activities written inside the textbook. The mismatch between the teacher's workbook and textbook was also discussed. The study also revealed the effect of curriculum changes, especially the sudden change from NCS to CAPS which created some gaps because some books for NCS were still in stock while new books for CAPS are very scarce as at the time CAPS should be implemented. This aspect also assists the policy makers to re-strategize.

Finally, the study contributed to the body of knowledge at primary education level, on the use of the textbook whose language is very clear, textbooks that have explicit exercises and examples with practical workbooks that were in line with learners' environment. It also helped educational planners in the department of education in East London particularly and other provinces in South Africa in general with the use of Mathematics textbooks appropriately. Furthermore, researchers, teachers, the school governing board, communities and learners have something to gain from the findings of this study such as the importance of textbooks in learning effectively and cover the contents specified for them per term. It will also enhance their knowledge of Mathematics when good textbooks with numerous exercises and examples were used by their teachers. The findings have pointed to the need for further research on other areas of effective textbooks usability by teachers in the teaching of Mathematics in high schools in Eastern Cape Province.

5.9 RECOMMENDATIONS

Based on the findings of this study, the followings are recommended to different categories of the stakeholders within the education sector.

5.9.1 Parents

Parents should endeavor to assist the government on the aspect of ensuring that their children have the prescribed textbooks before the beginning of the new section. They should have a good relationship with the school leadership and teachers so that they can agree on time on which books prescribed by CAPS to be used. There is also need for partnership of parent with the government on this because government cannot be solely responsible for their children education. They need to supplement where necessary. Some parents are influential and well connected. They should see to the timely procurement of the books and delivery from the publishers by assisting the school to contact the right publisher at the right time and make valuable contribution during the parent-teacher association meetings. Everything should not be left in the hands of the school.

5.9.2 Teachers

On one hand, teachers too should endeavor to be professional as noted by one of the heads of department. Over-reliance on textbooks might be dangerous and make teacher to be lazy and not innovative. They should plan far ahead and check the exercises in the textbook and match them with their workbook to quickly discover if there are errors, rather than discovering the errors during the class activities. One of the heads of department noticed that some teachers were indifferent to the textbooks the majority selected because of one reason or the other. These indifferences should be handled professionally so as not to affect the learners.

5.9.3 Head of department

The head of department should not be too loaded with class work in order to perform their duties as expected. They should endeavor to do thorough monitoring regularly, like one of them said; she meets with her teachers occasionally. Their meeting should be done as being laid down by the policy with specific agenda. Checking teachers' lesson plan is not enough; they should visit their classes when they are teaching for observation. Only one of the heads of department interviewed is doing this. Learners'

notebook should be regularly and randomly picked for assessment in line with teacher's lesson plan.

5.9.4 The school authority

The school authority must ensure that they order the textbook on time. They should allocate the sufficient fund for acquisition of textbook and monitor the delivery of the books from publishers to the school. They should also determine the enrolment figure of their learners to know the quantities to be requested for.

5.9.5 Department/Policy makers

It is amazing that the three schools visited are using different textbooks even though they are prescribed. They all have reasons for their choices, but for me, since the learners will do the same control test, they should use the same textbooks, especially for the same Grade level. Although the government is marketing the publishers and one publisher cannot supply the entire nation textbooks, they can specify for each Grade level or phase level. For example, the respondents mentioned Platinum, Focus, Oxford, Study and Master etc. Platinum can be for all foundation phase, Focus can be for intermediate phase, while Oxford can be for senior phase (GED), then Study and Master for (FET).

Policy makers should evaluate the content of these textbook to check for printing errors and incorrect answer to exercises therein. They should monitor the publishers in terms of when to publish new edition of their books which must be at the end of the section and not in-between. They must ensure that textbooks adhere to language policy stipulated in the CAPS documents. Copies of these books must be thoroughly vetted by specialists in their organization. The language used must allow easy interpretation and application during the class activities.

5.10 SUGGESTIONS FOR FURTHER STUDY

The study investigated the use of textbooks by primary school teachers in lesson planning and delivery. It also examined the challenges related to textbooks encountered by the teachers and the heads of department in three selected primary schools in East London Education District. Further study in schools in rural areas involving some learners in the samples as respondents and not the teachers and the heads of department alone may yield interesting results. This study could also be carried out in private schools to glean new insights and see if different contexts would give different findings. A study could focus on public schools and government schools to do a sort of triangulation. By and large, this study used qualitative approach; and another study could look at the efficacy of using Mathematics textbook on learners' performance by using quantitative methods.

5.11 CONCLUDING REMARKS

This chapter has presented a summary of the conclusions drawn from the findings and the recommendations which offered on the basis of these findings. The study sought to explore the views of Grade four teachers and heads of department in East London on the use of Mathematics textbooks for lesson planning and delivery. The first component of the study sought to establish the selection of textbook by the teachers for teaching Mathematics. The view of heads of department was also sought. The second component of the study was to establish how Grade four teachers used the textbook to plan their daily activities. The heads of department views were also identified. The third component of the study was to establish how Grade four teachers used the textbook to deliver their lesson in class. The heads of department views were also explored. The final component was on the challenges encountered by teachers and heads of department when selecting and using Mathematics textbook for lesson planning and delivery. The study also analyzed the observation recorded by the researcher during the field work

This chapter also presented the conclusions of the study. One of the most crucial conclusions was that as good and vital the textbook is for planning and teaching day to day lesson activities; it can also be a hindrance if not carefully and professionally planned and used. Overdependence on it without the use of other resources may cause more problems, similarly, the age Grade and level of the learners must also be considered at all time in term of the contents of the textbooks. The chapter went on to present some practical recommendations and suggestions for further research studies.

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APPENDIX A: ETHIC CLEARANCE CERTIFICATE



University of Fort Hare
Together in Excellence

ETHICAL CLEARANCE CERTIFICATE REC-270710-028-RA Level 01

Certificate Reference Number: MAP131SADU01

Project title: **The use of textbooks by teachers in teaching mathematics at selected Primary Schools in East London Education District.**

Nature of Project Masters in Education

Principal Researcher: Kemi Olajumoke Adu

Supervisor: Prof C Maphosa

Co-supervisor: N/A

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

Special conditions: Research that includes children as per the official regulations of the act must take the following into account:

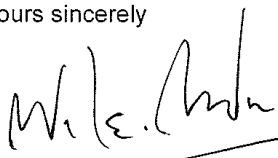
Note: The UREC is aware of the provisions of s71 of the National Health Act 61 of 2003 and that matters pertaining to obtaining the Minister's consent are under discussion and remain unresolved. Nonetheless, as was decided at a meeting between the National Health Research Ethics Committee and stakeholders on 6 June 2013, university ethics committees may continue to grant ethical clearance for research involving children without the Minister's consent, provided that the prescripts of the previous rules have been met. This certificate is granted in terms of this agreement.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
 - Any unethical principal or practices are revealed or suspected
 - Relevant information has been withheld or misrepresented
 - Regulatory changes of whatsoever nature so require
 - The conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.
- In addition to the need to comply with the highest level of ethical conduct principle investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to the Dean of Research's office

The Ethics Committee wished you well in your research.

Yours sincerely


Professor Wilson Akpan
Acting Dean of Research 20/06/2017

29 June 2017

APPENDIX B: LETTER OF PERMISSION TO SCHOOLS

50 Summerwoods, 37 Main Road
Abbotsford
East London
5241
21st August, 2017.

The Principal,
Centre of Excellence Primary School
Saint John Road
East London

Dear Sir/Madam,

REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH IN YOUR SCHOOL

I am currently a Master student in the faculty of Education at the University of Fort Hare. My research topic is

‘THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS AT SELECTED PRIMARY SCHOOLS IN EAST LONDON EDUCATION DISTRICT’

The research will be conducted in your school between 21st August to 1st September making use of Grade four Mathematics teachers and one Head of Department as respondents. The interview schedule and Mathematics class observation will take just 30minutes each respectively. Every information supplied by the respondents will be treated with utmost confidentiality.

I will appreciate it if my request is granted to use the teachers of Mathematics and Head of Department of your school to conduct the research. Waiting patiently to receive feedback from you for the day chosen for me to come on 201510102@ufh.ac.za , attached is a letter of approval from the Department.

Yours truly,



Kemi O. Adu (Mrs.)

50 Summerwoods, 37 Main Road
Abbotsford
East London
5241

21st August, 2017.

The Principal,
King's Primary School
East London

Dear Sir/Madam,

REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH IN YOUR SCHOOL

I am currently a Master student in the faculty of Education at the University of Fort Hare. My research topic is

*'THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS AT
SELECTED PRIMARY SCHOOLS IN EAST LONDON EDUCATION DISTRICT'*

The research will be conducted in your school between 21st August to 1st September making use of Grade four Mathematics teachers and one Head of Department as respondents. The interview schedule and Mathematics class observation will take just 30minutes each respectively. Every information supplied by the respondents will be treated with utmost confidentiality.

I will appreciate it if my request is granted to use the teachers of Mathematics and Head of Department of your school to conduct the research. Waiting patiently to receive feedback from you for the day chosen for me to come on 201510102@ufh.ac.za , attached is a letter of approval from the Department.

Yours truly,



Kemi O. Adu (Mrs.)

50 Summerwoods, 37 Main Road
Abbotsford
East London
5241

21st August, 2017.

The Principal,
Althorpe College
Amalinda
East London

Dear Sir/Madam,

REQUEST FOR PERMISSION TO UNDERTAKE RESEARCH IN YOUR SCHOOL

I am currently a Master student in the faculty of Education at the University of Fort Hare. My research topic is

*'THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS AT
SELECTED PRIMARY SCHOOLS IN EAST LONDON EDUCATION DISTRICT'*

The research will be conducted in your school between 21st August to 1st September making use of Grade four Mathematics teachers and one Head of Department as respondents. The interview schedule and Mathematics class observation will take just 30minutes each respectively. Every information supplied by the respondents will be treated with utmost confidentiality.

I will appreciate it if my request is granted to use the teachers of Mathematics and Head of Department of your school to conduct the research. Waiting patiently to receive feedback from you for the day chosen for me to come on 201510102@ufh.ac.za , attached is a letter of approval from the Department.

Yours truly,



Kemi O. Adu (Mrs.)

APPENDIX C: PERMISSION LETTER FROM THE DEPARTMENT



Province of the
EASTERN CAPE
EDUCATION

STRATEGIC PLANNING POLICY RESEARCH AND SECRETARIAT SERVICES

Steve Vukile Tshwete Complex • Zone 6 • Zwelitsha • Eastern Cape
Private Bag X0032 • Bhisho • 5605 • REPUBLIC OF SOUTH AFRICA
Tel: +27 (0)40 608 4773/4035/4537 • Fax: +27 (0)40 608 4574 • Website: www.ecdoe.gov.za

Enquiries: B Pamla

Email: babalwa.pamla@ecdoe.gov.za

Date: 11 August 2017

Mrs. K.O Adu
50 Summerwood
37 Main Road
Abbotsford
East London
5241

Dear Mrs. Adu

**PERMISSION TO UNDERTAKE A MASTERS THESIS: THE USE OF TEXTBOOKS BY
TEACHERS IN TEACHING MATHEMATICS AT SELECTED PRIMARY SCHOOLS IN EAST
LONDON EDUCATION DISTRICT.**

1. Thank you for your application to conduct research.
2. Your application to conduct the above-mentioned research at three selected primary Schools in East London (Buffalo city District) of the Eastern Cape Department of Education (ECDoE) is hereby approved based on the following conditions:
 - a. there will be no financial implications for the Department;
 - b. institutions and respondents must not be identifiable in any way from the results of the investigation;
 - c. you present a copy of the written approval letter of the Eastern Cape Department of Education (ECDoE) to the Cluster and District Directors before any research is undertaken at any institutions within that particular district;
 - d. you will make all the arrangements concerning your research;
 - e. the research may not be conducted during official contact time;

building blocks for growth

Page 1 of 2



Ikamva eliqaqambileyo!

- f. should you wish to extend the period of research after approval has been granted, an application to do this must be directed to Chief Director: Strategic Management Monitoring and Evaluation;
 - g. your research will be limited to those institutions for which approval has been granted, should changes be effected written permission must be obtained from the Chief Director: Strategic Management Monitoring and Evaluation;
 - h. you present the Department with a copy of your final paper/report/dissertation/thesis free of charge in hard copy and electronic format. This must be accompanied by a separate synopsis (maximum 2 – 3 typed pages) of the most important findings and recommendations if it does not already contain a synopsis.
 - i. you present the findings to the Research Committee and/or Senior Management of the Department when and/or where necessary.
 - j. you are requested to provide the above to the Chief Director: Strategic Management Monitoring and Evaluation upon completion of your research.
 - k. you comply with all the requirements as completed in the Terms and Conditions to conduct Research in the ECDoE document duly completed by you.
 - l. you comply with your ethical undertaking (commitment form).
 - m. You submit on a six monthly basis, from the date of permission of the research, concise reports to the Chief Director: Strategic Management Monitoring and Evaluation
3. The Department reserves a right to withdraw the permission should there not be compliance to the approval letter and contract signed in the Terms and Conditions to conduct Research in the ECDoE.
 4. The Department will publish the completed Research on its website.
 5. The Department wishes you well in your undertaking. You can contact the Director, Ms. NY Kanjana on the numbers indicated in the letterhead or email nykanjana@live.co.za should you need any assistance.



NY KANJANA
DIRECTOR: STRATEGIC PLANNING POLICY AND RESEARCH
FOR SUPERINTENDENT-GENERAL: EDUCATION



APPENDIX D: LETTERS OF CONSENT-CHILD ASSENT TEMPLATE

NAME OF APPLICANT

Ethics Human 2011

<<Approved

>>

OFFICE USE ONLY

Ref:

Date:



University of Fort Hare
Together in Excellence

CHILD ASSENT TEMPLATE

NB! DELETE THIS PAGE BEFORE ADAPTING THE TEMPLATE TO YOUR PROJECT!

Please note:

1. Children who are able to understand the basic concepts of research should be given the opportunity to assent to a research study. Generally children between the ages of 7 to 17 should assent to research. This is not a fixed rule and some children younger than 7 may well have sufficient insight and understanding to give assent for a study.
2. If they refuse assent then this refusal should be accepted, even if the parents have consented. There may be exceptional cases where this rule may not apply. The University Research Ethics Committee (UREC) should be consulted.
3. This template is specifically for 7-12 year olds and can be adapted to suit adolescents.
4. If you are including a wide range of children in your project you will need 2 different versions of assent, one for younger children and a more detailed one for adolescents.
5. You can adapt the template to suit the needs of your specific project including deleting sections which are seen as not applicable/appropriate.
6. This assent document must be used in conjunction with a parental Information Leaflet and Informed Consent form, which should obviously cover the project in more depth and detail.
7. Once your project has been approved and you have a reference number, you should replace the information in the 'footer' with your own information e.g. Project No.....
Assent template Version 1.1; Date 22 01 2012

PARTICIPANT INFORMATION LEAFLET AND ASSENT FORM



TITLE OF THE RESEARCH PROJECT: the use of textbooks by teachers in teaching Mathematics at selected primary schools in East London education district

RESEARCHERS NAME(S): Mrs. K.O. Adu

ADDRESS: SGCE East London

CONTACT NUMBER: 0848495221

What is RESEARCH?

Research is something we do to find new knowledge about the way things (and people) work. We use research projects or studies to help us find out more about disease or illness. Research also helps us to find better ways of helping, or treating children who are sick.

What is this research project all about?

The purpose of this study is to establish how teachers use textbooks in the teaching of Mathematics in primary schools in east London education district of South Africa. This study is also aimed at filling the knowledge gap as most research work earlier carried out focused on shortage of textbooks in the teaching of core subjects.

The duration of the research project

S/N	WEEK	RESEARCH ACTIVITIES
1	1st -3rd week	Visiting school to administer the interview questions and to observe Mathematics teacher when teaching Grade 4

Why have I been invited to take part in this research project?

You are invited to participate in this study in order to provide information on the effectiveness of the instrument (strategy) for decision to be taken on its effectiveness.

Confidentiality

The research work is qualitative; it involves asking questions from teachers of Grade four in selected primary schools in East London Education District. However, the information of the participants will be kept with utmost secrecy.

If a sponsor is to be involved

No sponsor is involved.

Who is doing the research?

Mrs. Kemi O. Adu. This work is conceived in order to determine the use of Mathematics textbook in teaching Mathematics.

What will happen to me in this study?

You are to serve as participant in the study mentioned above in your school. It is envisage that no harm will occur in the process since you are free to disengage any time you wish.

Can anything bad happen to me?

No risk is envisaged because the study will involve Mathematics teachers.

Who else is involved in the study?

Nobody except Mathematics teachers

Can anything good happen to me?

Yes, as it will enable you to know the importance of using textbook while teaching Mathematics.

Will anyone know I am in the study?

Yes, since it involves many teachers, however, the information to be gathered will kept with utmost secrecy and used strictly for the purpose of research

Who can I talk to about the study?



Prof C. Maphosa- Faculty of Education, University of Fort Hare,
East London

What if I do not want to do this?

Yes, you are free to decline your interest if you so wish, no punishment is attached. Disengagement could be done at any stage of the experiment since rooms have been created for that.

Do you understand this research study and are you willing to take part in it?

YES

NO

Has the researcher answered all your questions?

YES

NO

Do you understand that you can pull out of the study at any time?

YES

NO

Signature of Child

Date

APPENDIX E: LETTERS OF CONSENT-PARENT CONSENT FORM

NAME OF APPLICANT

Ethics Human 2011

<<Approved

>>

OFFICE USE ONLY

Ref:

Date:



University of Fort Hare
Together in Excellence

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR USE BY PARENTS/LEGAL GUARDIANS

TITLE OF THE RESEARCH PROJECT: The use of textbooks by teachers in teaching Mathematics at selected primary schools in East London education district

REFERENCE NUMBER: 201510102

PRINCIPAL INVESTIGATOR: Mrs. K.O. Adu

ADDRESS: SCHOOL OF GENERAL AND CONTINUING EDUCATION, EAST LONDON

CONTACT NUMBER: 0848495221

Your child (*or ward, if applicable*) is being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how your child could be involved. Also, your child's participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you or your child negatively in any way whatsoever. You are also free to withdraw him/her from the study at any point, even if you do initially agree to let him/her take part.

This study has been approved by the University Research Ethics Committee at the University of Fort Hare and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

- To investigate how do the teachers select textbooks for teaching Mathematics
- To find out how do the teachers use text books in lesson planning and delivery
- To ascertain what challenges do teacher encounter in the use of textbooks in teaching Mathematics

Why has your child been invited to participate?

- *Answer this question clearly.*

What will your responsibilities be?

- *Answer this question clearly.*

Will your child benefit from taking part in this research?

- Explain all benefits objectively. If there are no personal benefits then indicate who is likely to benefit from this research, e.g. future patients

Are there any risks involved in your child taking part in this research?

- No risk will be involved because teachers are involved.

If you do not agree to allow your child to take part, what alternatives does your child have?

- *Clearly indicate in broad terms what alternative treatment is available and where it can be accessed, if applicable.*

Who will have access to your child's medical records?

- Explain that the information collected will be treated as confidential and protected. If it is used in a publication or thesis, the identity of the participant will remain anonymous. Clearly indicate who will have access to the information.

What will happen in the unlikely event of your child getting injured in any way, as a direct result of taking part in this research study?

- Clarify issues related to insurance cover if applicable. If any pharmaceutical agents are involved will compensation be according to ABPI guidelines (Association of British Pharmaceutical Industry compensation guidelines for research related injury which are regarded as the international gold standard)? If yes, please include the details here. If no, then explain what compensation will be available and under what conditions.

Will you or your child be paid to take part in this study and are there any costs involved?

You or your child will not be paid to take part in the study, but out-of-pocket expenses will be covered for each study visit. There will be no costs involved for you if your child does take part. *(Edit as applicable)*

Is there any thing else that you should know or do?

- You should inform your family practitioner or usual doctor that your child is taking part in a research study. *(Include if applicable)*
- You should also inform your medical insurance company that your child is participating in a research study *(Include if applicable)*
- You can contact Dr..... at tel..... if you have any further queries or encounter any problems.
- You can contact the Chairperson of the University Research Ethics Committee if you have any concerns or complaints that have not been adequately addressed by your child's study doctor.
- You will receive a copy of this information and consent form for your own records.

Assent: Children with an age of 7 and above must give assent to participate in research

Declaration by parent/legal guardian

By signing below, I *(name of parent/legal guardian)* agree to allow my child *(name of child)* who is years old, to take part in a research study entitled *(insert title of study)*

I declare that:

- I have read or had read to me this information and consent form and that it is written in a language with which I am fluent and comfortable.
- If my child is older than 7 years, he/she must agree to take part in the study and his/her ASSENT must be recorded on this form.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurized to let my child take part.
- I may choose to withdraw my child from the study at any time and my child will not be penalized or prejudiced in any way.
- My child may be asked to leave the study before it has finished if the study doctor or researcher feels it is in my child's best interests, or if my child does not follow the study plan as agreed to.

Signed at (*place*) on (*date*)

.....

Signature of parent/legal guardian

.....

Signature of witness

Declaration by investigator

I *Mrs. K.O. Adu* declare that:

- I explained the information in this document to **Participants**.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above
- I did/did not use an interpreter (*if an interpreter is used, then the interpreter must sign the declaration below*).

Signed at (*place*) on (*date*)

.....

Signature of investigator

Declaration by interpreter (Only complete if applicable)

I (*name*) declare that:

- I assisted the investigator (*name*) to explain the information in this document to (*name of parent/legal guardian*) using the language medium of Afrikaans/Xhosa.
- We encouraged him/her to ask questions and took adequate time to answer them.
- I conveyed a factually correct version of what was related to me.
- I am satisfied that the parent/legal guardian fully understands the content of this informed consent document and has had all his/her questions satisfactorily answered.

Signed at (*place*) on (*date*)

.....

Signature of interpreter

.....

Signature of witness

APPENDIX F: CONSENT FORM



University of Fort Hare
Together in Excellence

Ethics Research Confidentiality and Informed Consent Form

Please note:

This form is to be completed by the researcher(s) as well as by the interviewee before the commencement of the research. Copies of the signed form must be filed and kept on record

(To be adapted for individual circumstances/needs)

I, Kemi Olajumoke Adu, Faculty of Education, University of Fort Hare, is asking Mathematics teachers to answer some interview questions, which i hope will benefit our community and our nation at large now and time to come.

Kemi Olajumoke Adu of Faculty of Education, University of Fort Hare, is conducting research regarding the use of textbooks by teachers in teaching Mathematics at selected primary schools in East London education district. I am interested in finding out more about the appropriateness of using Mathematics textbook to teach Grade four learners.

Please understand that you are not being forced to take part in this study and the choice whether to participate or not are yours alone. However, we would really appreciate it if you do share your thoughts with us. If you choose not take part in answering these questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way. Confidentiality will be observed professionally.

I will not be recording your name anywhere on the interview schedule and no one will be able to link you to the answers you give. Only the researchers will have access to the unlinked information. The information will remain confidential and there will be no “come-backs” from the answers you give.

The administration of the interview questions will last for 3 weeks I beseech you to be open and honest as possible in answering these questions. Some questions may be of a personal and/or sensitive nature. I plead with you to think deeply before answering the questions.

INFORMED CONSENT

I hereby agree to participate in research regarding I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the telephone number of a person to contact should I need to speak about any issues which may arise in this interview.

I understand that this consent form will not be linked to the questionnaire, and that my answers will remain confidential.

I understand that if at all possible, feedback will be given to my community on the results of the completed research.

.....

Signature of participant

Date:

I hereby agree to the tape recording of my participation in the study

.....

Signature of participant

Date:

APPENDIX G: INTERVIEW QUESTIONS FOR HEADS OF DEPARTMENT

INTERVIEW SCHEDULES FOR THE HEADS OF DEPARTMENT

A. Background information.

Thank you for accepting to participate in this academic research. Tell me about yourself.

Respondent: HoD

Date of the interview: ____/____/____

Time: _____

Venue: _____

Interviewer: Mrs. Kemi O. Adu

1. Your age range
2. Marital status.....
3. Your highest academic qualification.....
4. Years of teaching experience.....

B1. How teachers select textbooks for teaching Mathematics?

1. What is the criterial use by teachers to select textbooks for teaching Mathematics?
2. Does the Mathematics teacher select the prescribed textbooks according to CAPS? Give reasons for your answer.
3. How do you assist your teachers in making sure that the right textbooks are selected?
4. At what period do the teacher select Mathematics textbook? And why?
5. How do you ensure that the right textbooks are selected by the teacher?
6. What are the factors militating against the selection of textbooks by the teacher?
7. What are the likely solutions to the problem facing the selection of Mathematics textbook?

B2. How teachers use text books in lesson planning?

1. What are the purposes of using textbooks?
2. How do your teachers use textbook for lesson planning?
3. What are the strategies for using textbook to plan effectively?
4. What can you say about your teacher preparation for Mathematics class?

B3. How teachers use text books in lesson delivery?

1. What strategies do the teachers employ in using textbook to deliver their lessons?
2. How do they use the textbook to deliver the lesson?
3. In what way can the textbook serve as teaching method?
4. How do you evaluate the use of textbook as an approach by the teacher?
5. When the teacher uses the textbook, how closely do you follow it? Why?
6. How does the teacher engage the learners with the textbook during classroom activities?
7. Does your teacher use the textbook throughout the lesson activities? And how?

B4. Challenges teachers encounter in the use of textbooks?

1. What are the difficulties teacher encounters when using textbooks?
2. Are the teachers face problems with learners when using textbook to plan and teach?
3. Explain the challenges faced by the teachers in engaging the learners in class with the textbook
4. Does your teacher face the challenge of understanding the language of the textbook? How?

APPENDIX H: INTERVIEW QUESTIONS FOR TEACHERS

INTERVIEW SCHEDULES FOR TEACHERS

A. Background information.

Thank you for accepting to participate in this academic research. Tell me about yourself.

Respondent: Mathematics Teacher

Date of the interview: ____/____/____

Time: _____

Venue: _____

Interviewer: Mrs. Kemi O. Adu

1. Your age range
2. Marital status.....
3. Your highest academic qualification.....
4. Years of teaching experience.....

B1. How teachers select textbooks for teaching Mathematics?

1. How do you select a particular Mathematics textbook?
2. What factors do you consider in selecting Mathematics textbook?
3. How does your decision making affect the selection of Mathematics textbook?
4. How did you prepare for the lesson with the selected textbook?
5. Does the content of the curriculum affect your selection of textbook? And how?
6. Does the textbook work well for your students? In what way?
7. Do you feel comfortable with the textbook selected?

B2. How teachers use text books in lesson planning?

1. How do you use the textbook for lesson planning?
2. In what way did the contents of the textbook help you to plan your lesson?
3. How do you supplement the use of textbook with other resources?
4. What are the link between your plan book and Mathematics textbook?
5. Explain how you organise your lesson activities with a textbook?
6. How do you prepare for a lesson with the textbook?

B3. How teachers use text books in lesson delivery?

1. In what ways do the textbook serve as teaching method?
2. What qualities do you want in a textbook to assist you in lesson delivery?
3. How does the textbook assist you in assigning homework to learners?
4. Explain how textbook assist you in covering the specific contents of the curriculum
5. What are the strategies you use to deliver your lesson with textbook?
6. How do you know that your student enjoy the lesson with the use of textbook?
7. How closely are the content being taught aligned with the textbook?
8. How do you introduce and conclude the lesson with the textbook?

B4. Challenges teachers encounter in the use of textbooks?

1. Explain the challenges you encounter in using textbook
2. What are your learners' attitude or difficulties when using textbook
3. Explain some difficulties in tailoring your lessons to the specific attributes and interests of students
4. What can you say about the quality of the prescribed Mathematics textbook?
5. What are the limitations of textbook?
6. What other challenges encounter with the use of textbook?

APPENDIX I: OBSERVATION PROTOCOL

1. What, if any, written materials (e.g., a written lesson plan, the textbook or other books, written notes, a worksheet) does the teacher refer to during the lesson?
2. How does the teacher introduce the lesson? Does he/she follow the textbook guideline?
3. What math information does the teacher provide? Formation Does the information comes from maths textbook?
4. What directives does the teacher issue?
5. What questions does the teacher ask? Do the questions taken from the textbook and require exact answers, explanation, and/or opinions?
6. Does the teacher check for understanding during a lesson by using Mathematics textbook as a guide? If so, how?
7. What type of feedback does the teacher offer individual students and the whole class? Are they aligned with the worksheet of the subject?
8. Does the teacher modify the lesson midstream in response to students' successes and difficulties? If so, how?
9. How does the teacher conclude the lesson?

APPENDIX J: LANGUAGE EDITING CERTIFICATE



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17 November 2017

TO WHOM IT MAY CONCERN

I hereby confirm that I have proof read and edited the following Masters thesis using Windows 'Tracking' System to reflect my comments and suggested corrections for the author(s) to action:

THE USE OF TEXTBOOKS BY TEACHERS IN TEACHING MATHEMATICS AT SELECTED PRIMARY SCHOOLS IN EAST LONDON EDUCATION DISTRICT

By

Mrs. K.O. Adu

Although the greatest care was taken in the editing of this document, the final responsibility for the product rests with the author.

Sincerely

17. 11. 2017

SIGNATURE

DATE