PRIMARY SCHOOL TEACHERS' UNDERSTANDING AND IMPLEMENTATION OF CONTEXTUALISATION IN PRIMARY SCHOOL MATHEMATICS TEACHING

MASTER OF EDUCATION (PRIMARY) THESIS

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UNIVERSITY OF MALAWI

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MASTER OF EDUCATION (PRIMARY) THESIS

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DECLARATION

I, the undersigned, hereby declare that this thesis is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

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Full Legal Name

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CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

Signature:_____ Date:_____

Dorothy Nampota, PhD (Associate Professor)

MAIN SUPERVISOR

DEDICATION

To my late parents: Dition Sandram and Jersey Mathias who passed on while I was still doing my secondary education. I am sure you would have loved seeing what your son has achieved. And to you late brother: James Billiat, your pieces of advice bear fruits. Allah have mercy on these departed souls.

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ABSTRACT

Primary school pupils are still underperforming in Mathematics regardless of a number of interventions in improving instructional practices. As such, the researcher sought to investigate how primary school teachers understand and implement contextualisation in primary school Mathematics teaching. The study was qualitative in nature and was guided by constructivism and situated cognitive learning theories. Four standard seven Mathematics teachers from four primary schools in Machinga district were involved in the study. Data were collected through semi-structured interviews and lesson observations. The data were analysed thematically by focusing on the following specific research questions; what knowledge do primary school teachers have about contextualisation in mathematics teaching?, what kinds of context do primary school teachers use in the teaching of mathematics?, and what are the sources of the contexts that primary school teachers use in the teaching of mathematics? Findings from the study indicate that some teachers have little understanding of the concept contextualisation and as a result most of the lessons taught during the study failed to meet the standards of a contextualised learner centred lesson. The study also noted that Mathematics textbooks were the mostly used source of context by the teachers. The study concludes by suggesting that student teachers as well as qualified teachers be given sufficient training on how they can plan and implement contextualisation as they teach Mathematics.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

CORD	:	Center for Occupational Research and Development
CPD	:	Continuous Profession Development
DEM	:	District Education Manager
EDSC	:	Education Development Service Centre
INSET	:	In – Service Training
LCE	:	Learner Centred Education
MEI	:	Innovators in Mathematics Education
MIE	:	Malawi Institute of Education
MoEST	:	Ministry of Education Science and Technology.
NCTM	:	National Council of Teachers of Mathematics
PCAR	:	Primary Curriculum and Assessment Reform
PEA	:	Primary Education Advisor
PIF	:	Policy and Investment Framework
RME	:	Realistic Mathematics Education
SCLT	:	Situated Cognition Learning Theory
UNESCO	:	United Nations Educational, Scientific and Cultural Organization

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 Background to the study

Literature on primary education in Malawi shows that the country has changed its national primary curriculum five times since 1961. According to the Malawi Ministry of Education, Science and Technology [MoEST] (2003a), the aim behind the latest change was that of making the national education programs more reflective of the changing socio-economic and political realities and at the same time making it interesting to the learners by allowing them to take a central position in the learning process. The review process also targeted addressing other challenges encountered by the primary education sector such as "high rates of absenteeism and drop out especially in the first five years; and the overloaded curriculum due to ad hoc incorporation of various subjects to deal with emerging issues" (Gunsaru & Kaambankadzanja, 2007, p. 2). They further argue that among the problems that necessitated the reform process was that of underachievement of pupils in literacy and numeracy. Concerning pupils' achievement in Mathematics, the findings from the, Primary Achievement Sample Survey (PASS) for example, shows that pupils' achievement levels in Mathematics for standard 3, 5 and 7 had mean scores of 19.9%, 9.7%, and 14.2% respectively which are very low (Chimombo, Chiuye, Chide & Chiunda, 2014). They further argued that in standard 7,

99.1% of the pupils scored less than 50%. Overall, it can be observed that a greater proportion of the pupils who participated in the study failed to attain a 50% mark.

The Primary Curriculum and Assessment Reform (PCAR) syllabus, which is the one currently being implemented, ushered in an outcome based curriculum. The current primary school curriculum is supported by Learner Centred Education (LCE) teaching methods which focus on learner involvement in the teaching and learning situation in order to enhance achievement. It is argued in the curriculum that for pupils to achieve the outcomes, "they must be introduced to new knowledge in the context of their existing knowledge so that they can develop new understandings as learning takes place" (MoEST, 2009, p. 8). This means that pupils' construction of new knowledge in the context of their existing knowledge is one of the design features of the outcome based curriculum. The emphasis is on teaching that makes linkages between what pupils learn at school and their daily lives.

The current primary school Mathematics curriculum has the same design feature. For example, the rationale for the subject reads in part "numeracy and Mathematics aims at developing learners' critical awareness of how mathematical relationships are used in social, environmental, cultural and economic context" (Malawi Institute of Education [MIE], 2005, p. 97). This underscores the importance of situating the learning for the pupils so that what is taught in class should be linked to the pupils' social environment and experiences and the local and nation economic environment.

The issue of applying mathematical skills to learners' real-life situations is not unique to Malawi but has long since been recognised worldwide (Nalube, 2007). Many countries advocate for use of pupils' daily life contexts in Mathematics and that has been included in the curricula of such countries. For example, in the United Kingdom (UK), the National Curriculum Council (1991, p. 18) cited by Nalube (2007) states that:

> Pupils should choose and make use of knowledge, skills and understanding outlined in the programmes of study in practical tasks, in real life problems and to investigate within Mathematics itself. Pupils would be expected to use with confidence, the appropriate Mathematical content specified in the programmes of study to other attainment targets.

In the United States of America, the National Council of Teachers of Mathematics (NCTM) which is the largest professional association for Mathematics educators in the world and is recognised as a global leader in the field also highlights the need to teach Mathematics in context. This is demonstrated in some of its core beliefs about pupils, teaching, learning, and Mathematics, of which one of them states that, "Learning Mathematics is enhanced when content is placed in context and is connected to other subject areas and when students are given multiple opportunities to apply Mathematics in meaningful ways as part of the learning process" (NCTM, 2014, p. 4). Malawi responded to the international call by emphasising that the teaching of Mathematics be more learner-centred, more problem-solving and more relevant to everyday life. This is a welcome idea because, according to Centre for Occupational Research and Development [CORD] (1999), most pupils are not abstract learners but they learn best when they can connect new concepts to the real world through their own experiences or experiences teachers can provide them.

The use of pupils' everyday life experiences in the teaching and learning situation has been termed as contextualisation (Spring, 2009). Indeed within the LCE vocabulary, this is also known as situating the learning process. It is argued that situating the learning engages the teachers and pupils in active classroom activities, ensuring that learning is learner-centred, more natural and realistic thereby increasing the likelihood that the acquired information will be useful when pupils are solving similar and related problems in class (Schell & Black, 1997). By relating the Mathematics content to pupils' context, Chernus and Fowler (2009, p. 6) assert that "students experience the subject matter as connected and reinforcing, rather than separate and unrelated".

1.2 Statement of the problem

As argued in the foregoing discussion, the curriculum currently in use in the primary schools in Malawi emphasises use of familiar context in the learning of Mathematics. Teachers are supposed to use teaching strategies that accommodate pupils' contexts. With the so much emphasis on use of context in the primary Mathematics curriculum, little has been done in Mathematics to establish whether or not teachers use various contexts for the pupils, by relating their teaching to pupils' everyday life experiences, to be more specific. Therefore, it is important to investigate if teachers relate the Mathematics content they teach to pupils' contexts, as a way of increasing interest and understanding.

1.3 Purpose of the study

The purpose of this study is to investigate how primary school teachers understand and implement contextualisation in primary school Mathematics teaching.

1.3.1 Main research question

How do primary school teachers understand and implement contextualisation in primary school Mathematics teaching?

1.3.2 Specific research questions

The study will be guided by the following three research questions.

1. What knowledge do primary school teachers have about contextualisation in Mathematics teaching?
2. What kinds of context do primary school teachers use in the teaching of Mathematics?
3. What are the sources of the contexts that teachers use in the teaching and learning of Mathematics?

1.4 Significance of the study

The study will be very meaningful and essential to primary school teachers, teacher educators, and other education stakeholders because of the following reasons;

It might give an insight on how teachers are responding to different learner-centred innovations and how education planners and administrators would intervene with in-service programmes such as Continuous Profession Development (CPD) that would equip teachers with educational changes which need their implementation. Studies show that teachers may be aware of and appreciate the value of more progressive approaches of teaching and learning but fail to make them a consistent part of their practice due to the absence of a supportive environment (Akyeampong & Furlong, 2000). On the same,

Vavrus, Thomas, and Bartlett (2011) contend that improving the quality of instruction depends largely on the pedagogical training and support provided to teachers before they begin their teaching careers and throughout the years they are in the classroom.

It will act as a reminder to Mathematics teacher educators on the importance of emphasising the need to use contextualised teaching so that student-teachers gain the skills while in college. That will mean teacher educators themselves contextualising and then student-teachers emulating. According to CORD (1999) many teachers tend to interpret the learning environment according to their own experience as pupils. That is, they teach the way they have been taught – usually through traditional abstract lecture methods.

The findings from this study will provide yet another basis for other Malawian scholars to carry out further educational studies in the same area involving a very large sample.

1.5 Thesis outline

This thesis is structured in five chapters. The first chapter provides background information to the study and describes the statement of the problem, purpose of the study, research questions and significance of the study. Chapter Two presents literature on LCE, its principles and theories underpinning it. This is followed by theoretical framework and the studies on contextualisation in Mathematics. Chapter Three provides a detailed description and justification of the research methodology. The study sample is discussed followed by a description of the data collection methods and instruments. Data analysis,

ethical considerations and validation of results are discussed after the structure of the data collection instruments. Chapter Four presents the findings of the study. Data have been presented with a special reference to the three critical questions of the study. The last Chapter, Chapter Five, contains discussion of findings, conclusions, recommendations for further studies and the limitation of the study. Following this last Chapter is a list of references.

1.6 Chapter summary

This Chapter has so far presented the background of the study which has illuminated the problem of poor achievement of pupils in Mathematics. As such, research questions have been presented which seek to investigate how primary school teachers understand and implement contextualisation in primary school Mathematics teaching. On the last note, the Chapter discusses the significance of the study before giving the outline of the thesis.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This Chapter presents literature review on LCE, its principles and the theories underpinning it, highlighting contextualisation as one of the six principles. It discusses literature of how teacher practices include use of various contexts that relate to the pupils' everyday life in Mathematics and other subjects. The discussion of this literature has been followed by the theoretical framework and how it relates to teacher use of contexts in the teaching and learning situation. In the final analysis, it looks at studies on contextualisation in Mathematics.

2.2 Learner-Centred Education and contextualisation

Since the 1990s, a number of countries in the sub-Saharan Africa, including Malawi, went through unprecedented attempts at reforming teacher and pupil classroom practices, with LCE being regarded as an "effective antidote to the prevalence of teacher-centred didactic classroom practices" (O'Sullivan 2004, p. 585). Such reforms were taking place within a reasoning frame that learning becomes an interesting endeavour when the learners are involved in the learning process and are able to see the value of the education they are offered. The pedagogical approach which puts emphasis on the learners and what they learn is referred to as LCE. Schuh (2004, p. 835) defines LCE as pedagogical

practices that “move the focus from the teacher and instruction to student and learning”. According to Chiphiko and Shawa (2014), Malawi spelt out its commitment to LCE in its national education documents such as the Policy and Investment Framework (PIF) and were highlighted in the primary school and primary teacher education curricula, which were announced in 2007 and effected in 2008. It should be noted though, that teaching Mathematics from a reform perspective is extremely challenging and requires many changes in beliefs and practices by teachers (Simon & Tzur, 1999).

2.2.1 Theories on Learner Centred Education

Learner Centred Education is derived from the constructivist theory that views learning as an active process where learners should learn to discover principles, concepts and facts for themselves (Gage & Berliner, 1992).

Although the philosophies of LCE sound a bit new to Malawi and probably other countries in Africa, its discourse developed many years back and its origins are rooted in the works of Jean Piaget (1896-1980), Lev Vygotsky (1896-1934) and John Dewey (1859-1952). Both Jean Piaget and Lev Vygotsky supported the notion that individuals construct knowledge; however, individual and social context are viewed differently by the two (Altinyelken, 2010).

According to Piaget (1937), individuals construct a personal reality based on previous knowledge and new experiences. Therefore, knowledge is an interaction between the environment and the individual. Piaget described two processes used by individuals in

their attempt to adapt: assimilation and accommodation. Assimilation is the process of using or transforming the environment so that it can be placed in preexisting cognitive structures. Accommodation, on the other hand, is the process of changing cognitive structures in order to accept something from the environment (Lee, 2006). Both of these processes are used throughout life as the person increasingly adapts to the environment in a more complex manner. Many pre-school and primary programs are modelled on Piaget's theory, which, provided part of the foundation for constructivist learning. Discovery learning and supporting the developing interests of the child are two primary instructional techniques in a learner-centred classroom. It is also recommended that teachers use a wide variety of concrete experiences like use of real objects, working in groups to get experience seeing from another's perspective and field trips to help the pupils learn (Huitt & Hummel, 2003). Within learner-centred approaches, teachers need to provide supportive learning opportunities that are appropriate and challenging for pupils. For this reason, teachers need to know their pupils well and identify their potentials so that they can successfully support their existing capacities.

For Vygotsky, learning is an interactive and constructive activity in which both society and individuals play essential roles (Bruner, 1985). In other words, knowledge is constructed “as a result of social interactions and then internalised by the individuals” (Altinyelken, 2010, p. 152). This social interaction always occurs within a socio-cultural context, resulting in knowledge that is bound to a specific time and place (Perkins, 1993). Miller (2003) supports the concept of social interaction and adds that pupils working in teams under the guidance of the teacher will, according to this view, discover and

comprehend difficult concepts more easily if they can talk to each other about the problem.

Dewey viewed education as a powerful agent of societal transformation. According to his progressive theory, learning is experiencing; hence, his education model emphasises individualised learning based on active engagement, discovery and empirical problem solving. The theory further emphasises on the importance of learners' background experience as a prerequisite to learning (Berding, 1997). Dewey (1985) posits that, to facilitate learning, the forms of skills to be acquired and the subject matter to be learnt must generate interest in learners while at the same time giving attention to learners' specific capabilities, needs, and preferences. This is because learners come to school with their interests and it is the job of the teacher to use these interests to organise activities towards valuable results.

Taking from the three theorists, though with different theories (constructivism and progressivism), the pupil is being valued and put at the centre of the learning process, and that is the essence of LCE. According to Lee (2006) LCE has six principles:

1) Learning should be an active process. In this principle, learners are the centre of the learning process. This means that most of the activities are done by the learners. There is more talking amongst the learners in the process of learning. In addition learners interact with a variety of teaching and learning resources to allow for maximum participation in the different tasks given.

2) Learning must be a constructive process. This entails that learners do not depend on the knowledge from the teacher but build their own knowledge in the process of teaching and learning using provided resources. The focus is on learning and not teaching. Pupils learn through exploration under the guidance of the teacher.

3) Learning must be a situated process. According to this principle, learning should be embedded in daily life connections. Learners should be able to relate the Mathematics they learn at school to their everyday experiences at home. The teacher on the other hand ensures that learning experiences are linked to learners' real and imagined experiences as much as possible in order to make learning meaningful (inWent, 2009).

4) Learning must be a cooperative process. This is the exchange of arguments and ideas among pupils and the teacher (inWent, 2009). This means that a learner constructs knowledge in collaboration with other learners together with the teacher. Collaborative learning promotes the exchange of arguments and ideas among learners and teachers (Gage & Berliner, 1992).

5) Learning should be a reflective process. Reflective learning means awareness of one's own learning process and gaining confidence in ones abilities (inWent, 2009). In reflective learning learners are encouraged to make summaries of activities with the guidance of the teacher.

6) Learning should be supported by the teacher. The role of the teacher is to guide and facilitate the construction of knowledge. The teacher also creates a conducive learning environment by among other things preparing teaching and learning resources, giving room for learners to talk more than the teacher and using appropriate language. (inWent, 2009).

For teachers to have effective lessons, they need to consider all the six principles and try to involve the pupils much during instruction. For this study, the focus is on learning as a situated process which is also known as contextualisation. By situating the learning, a teacher builds the lesson on pupils' context – knowledge which they develop through daily life experiences. By using pupils' experiences, teachers assist pupils to construct knowledge on their own basing on what they already know.

2.2.2 Meaning of contextualisation

Contextualisation is identified as a promising strategy that actively engages pupils and promotes improved learning and skills development. Simply, contextualisation is defined as a conception of teaching and learning that helps teachers relate subject matter content to real world situations (Berns & Erickson, 2001).

According to Ewing, Cooper, Baturo, Matthews and Sun (2010), contextualisation refers to anything that already exists, including cultures and home languages. It is argued that, educators need to demonstrate in explicit ways the importance of recognising and respecting the languages of the pupils they teach (Disbray, McConvell, Meakins, Moses,

O'Shannessy, Simpson, & Wigglesworth, 2004). “In doing so, pupils are more likely to gain access to learning and engage in ways that are conducive to educational success” (Ewing et al. 2010, p. 9).

In broader terms, Mazzeo (2008) defined contextualisation as a diverse family of instructional strategies designed to link the learning of foundational skills and academic or occupational content by focusing teaching and learning squarely on concrete applications in a specific context that is of interest to the student.

Therefore, in this study, contextualisation informs a teaching and learning process in which a teacher brings in pupils’ daily experiences such as the social, economic and cultural life to help explain abstract content which in turn assist pupils to understand and solve mathematical problems – that is; situating the learning process by using realistic ideas and everyday experiences and practices of the pupils.

2.2.3 Characteristics of contextualised lessons

To ensure that a lesson is contextualised, inWent (2009) alludes that it should build upon pupils’ knowledge – experiences which they develop through daily life. Such connections between lesson content and daily life make learning meaningful and help pupils to understand Mathematics concepts and problems.

Spring (2009) articulates several characteristics of contextualised learning frameworks including: 1) problem-solving within realistic situations, 2) learning in multiple contexts, 3) content derived from diverse work and life situations and 4) authentic assessment. According to the Innovators in Mathematics Education [MEI] (2015), a context that serves the purpose of enhancing and promoting understanding in the teaching and learning process, has to be: Authentic and Realistic, Useful, Purposeful, Effective, Motivating, Relevant, Challenging, Inclusive, Creative, Accessible, Differentiated, Encouraging, Inspiring and Holistic. These are explained in Table 2.1.

Table 2.1: Guidelines when constructing contextualised instructions

TRAIT	EXPLANATION
Authentic and Realistic	Is it a genuine example? Can pupils see how the task relates to real life?
Useful	Does it draw on the pupils' own experience?
Purposeful	Can pupils see why they are using the Mathematics?
Effective	Are pupils learning from the task?
Motivating	Do pupils want to tackle the problem?
Relevant	Can pupils see where they could use the Mathematics in their area or personal interests?
Challenging	Do all pupils feel they have had to work to solve the task?
Accessible	Can all pupils tackle the problem when they see it or are they overwhelmed?
Inclusive	Can all genders, ethnicities and cultures relate to it?
Creative	Does the task help pupils develop confidence and independence?
Differentiated	Can it meet the needs of different pupils?
Encouraging	Do all pupils feel they have achieved something?
Inspiring	Do pupils want to carry on and do more Mathematics?
Holistic	Could it develop other skills without compromising the learning of Mathematics?

Adapted from (MEI, 2015, 5).

Much as it may be appreciated to have such a guide, it should also be noted that not every topic in Mathematics can be easily contextualised. MEI (2015) reiterated that, it is indeed difficult to teach the content of some topics in context and as such other principles of LCE can be employed.

The different attributes given to contextualised instruction (see, inWent, 2009; Spring, 2009; MEI, 2015) are just a complement to one another since they all put an emphasis on using real life experiences and activities that meet the needs of different pupils. There is also an indication of the need to employ more collaborative, discovery and problem-solving approaches which are motivating and relevant to the pupils. Adopting attributes like those of the MEI can indeed make a lesson interesting and motivating thereby enhancing learning. However, some expertise is needed to come up with such a lesson. It is therefore important to look at contextualisation from Johnston's (2002, p. 24) view point that it is a "holistic system" with several components working together to create a systemic learning approach – suggesting that instruction and learning derives from the whole and not from a discreet part. She argues that together, these components create a network by which pupils are better able to create meaning and retain information.

Basing on Johnston's argument, this study adopts nine standards which can be used to assess whether a lesson is contextualised or not and have taken on board suggestions from different contributors. The standards are determined in the following questions:

- Are new concepts presented in real-life (outside the classroom) situations and experiences that are familiar to the pupil?

- Are concepts in examples and pupils' exercises presented in the context of their use?
- Are new concepts presented in the context of what the pupils already know?
- Do examples and pupils' exercises include many real, believable problem-solving situations that pupils can recognize as being important to their current or possible future lives?
- Do examples and pupils' exercises cultivate an attitude that says, "I need to learn this"?
- Do pupils gather and analyse their own data as they are guided in discovery of the important concepts?
- Do lessons and activities encourage the pupil to apply concepts and information in useful contexts, projecting the pupil into imagined futures (e.g., possible careers)?
- Are pupils expected to participate regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision making occur?
- Do lessons and exercises improve pupils' reading and other communication skills in addition to mathematical reasoning and achievement? (CORD, 1999).

2.3 Constructivism as a theoretical framework for the study

Theoretical framework positions research in the discipline in which one is working (Henning, Van Rensburg & Smit, 2004). It provides lenses to view a phenomenon under study. The fact that this study investigates teachers' practices basing on LCE, a constructivist theoretical framework is used. Constructivism is a theoretical perspective

that underpins a shift in classroom dynamics towards a view of the pupil as the key agent in the learning process. This shift from the pupil as the receiver to the pupil as the constructor of meaning based on prior knowledge and experiences is known as constructivism (Spring, 2009).

One strand of constructivism, individual constructivism, has its origins in Piaget's genetic epistemology and related cognitive views. In this strand, Piaget's central concern was with the process by which humans construct their knowledge of the world (Piaget, 1937). Piaget postulated the existence of cognitive schemes that are formed and developed through the coordination and internalisation of a person's actions on realities in the world. According to Driver, Asoko, Leach, Mortimer and Scott (1994), the schemes evolve as a result of equilibration, a process of adaptation to more complex experiences. New schemes thus come into being and modifying old ones. According to this individual constructivist's view, meaning is made by individuals and depends on the individual's current knowledge schemes. Therefore, learning occurs when those schemes are changed by the resolution of disequilibration. Such resolution requires internal mental activity and results in development of new knowledge scheme.

The other strand of constructivist learning theory has its origins in Vygotskian and neo-Vygotskian psychology. While the individual constructivism places emphasis on seeing meaning-making as a cognitive process in the individual, the social constructivism focuses on an account of individuals as they function in social contexts. Bruner (1985) argues that a social constructivist perspective recognises that learning involves being

introduced to a specific cultural community. In this perspective knowledge and its understanding are constructed when individuals engage socially in talk and activity about shared problems and tasks. Making meaning is thus a dialogic process involving persons in conversations, and learning is seen as the process by which individuals are introduced to a culture by more skilled members.

In constructivism individuals construct their own new understandings or knowledge through the interaction between what they already know and believe with ideas, events, and activities with which they come in contact (Cannella & Reiff, 1994). In concurrence, Bruner (1966) argues that constructivism brings forward learning as an active process, in which learners construct new ideas or concepts based on their current knowledge. As such, learning has to take into account experiences and contexts that make the pupils willing and able to learn. He further argues that learning should have to include social and cultural aspects.

Ernest (1989, p. 151) argues that "children construct their knowledge of Mathematics over a period of time in their own, unique ways, building on their pre-existing knowledge". This view is supported by Simon & Blume (1998), who maintain that pupils in constructivist classrooms get rich opportunities for understanding Mathematics.

According to Doolittle (1999); Driver (1995); Richardson (2003) some of the main pillars of constructivist pedagogy are: learning is a student-centred process, pupils' autonomy should be fostered; learning should be contextualised and associated with authentic real-

world environments and examples; social interaction and discourse form an important part of learning; the taught elements should be made relevant to the learner; the taught elements should be linked with the learners' previous knowledge; and teachers should consider multiple representations of their teachings.

Constructivist theory ties well, in broader terms, with this study, as it embeds learning in realistic and relevant contexts. Pupils create meaning in relationship to experience and every student's version of the world is unique, even when concepts are shared. According to Chang (2011), contextualising learning using an authentic environment and real-world examples is an important pillar in constructivist pedagogy. With that, the Situated Cognition Learning Theory comes in as a support to constructivism.

2.4 Situated Cognition Learning Theory (SCLT) and contextualisation

In addition to constructivism, this study also draws from the literatures on Situated Cognitive Learning Theory (SCLT). Situated Cognitive Learning Theory is an instructional approach which was developed by Jean Lave and Etienne Wenger in the late 1980s and it follows the work of Dewey, Vygotsky, Piaget and others (Clancy, 1995). According to Brown, Collins, & Duguid (1989), Situated cognition states that whenever possible, learning should occur within the context of a given situation and should attempt to replicate as closely as possible practices used by experts in a given culture. It has also been argued that "Situated cognition theory focuses on the relationship between learning and the social situations in which learning occurs" (Lave & Wenger, 1991, p. 14). In concurrence, Schell & Babich (1993) argue that the foundation of situated learning is the

placement of learning in a real-life context rather than as an individual abstract mental activity.

This theory is also crucial in the study considering the fact that its base is from the same theorists whose theories lay a foundation for LCE and has the principle of encouraging teachers to relate Mathematics content to pupils' contexts during instruction.

According to Lave and Wenger (1991), situated learning places learners in realistic settings where socially acquired ways of knowing are often valued. The two further argued that situated learning increases the likelihood of application within similar contexts and strategically applying the student's prior knowledge on a given subject content. In a similar manner it has also been argued that situated learning essentially "is about creating meaning from the real activities of daily living where learning occurs relative to the teaching environment" (Stein, 1998, para. 2).

With situated learning, the pupils are actively involved in addressing real world problems. They become "situated" in the learning experience and knowledge acquisition becomes a part of the learning activity, its context, and the "culture in which it is developed and used" (Oregon Technology in Education Council, 2007). Pupils construct their own knowledge from experiences they bring to the learning situation and the success of situated learning experiences relies on social interaction and kinesthetic activity. It is further argued that situated learning involves pupils in cooperative activities where they are challenged to use their critical thinking and kinesthetic abilities. These

activities should be applicable and transferable to pupils' homes, communities, games and workplaces (Stein, 1998).

A situated learning environment provides an authentic context that reflects the way the knowledge will be used in real-life, that preserves the full context of the situation without fragmentation and decomposition, and that invites exploration and allows for the natural complexity of the real world (Brown, Collins and Duguid, 1989; Brown and Duguid, 1993). Svinicki (2004) defines an authentic situation as a real life situation in which the skills are needed and will really be used eventually, but not necessarily representative of the pupils' future use of them. Learning that takes place within authentic situations engages the pupil as a participant rather than an observer. An authentic context therefore, helps the pupil to see the relevance of information and creates a pathway for the pupil to understand the material.

Constructivist theory and situated theory share a number of principles, but of importance to this study is the provision of an aspect of learning in real and relevant context. It should also be noted that situating the learning process or contextualisation, is one of the principles of LCE (see, inWent, 2009) and that LCE according to Altinyelken (2010) is a principle under constructivism. Thus, from the perspective of constructivist learning theory, situated learning theory in specific, several requirements for new learning tools can be given; they should enable active construction of knowledge, use authentic problems, allow for multiple perspectives in learning, enable learning by social

interaction within communities, and allow for reflection about own knowledge (de Jong, Specht & Koper, 2008).

2.5 Context in Mathematics

The term context has a direct link to the term contextualisation. In some circumstances, the two terms are used inter-changeably. The term context has been defined differently by different scholars. Van Den Heuvel-Panhuizen (2005) provides two different meanings for the term 'context'. The first meaning looks at context as the characteristics of a task presented to the pupil. The second meaning regards context as a learning environment; this includes the different situations in which learning takes place. Sullivan, Zevenbergen and Mousley (2003) had a similar understanding of the term context and differentiated the two meanings by calling them 'task context' and 'pedagogical context' respectively.

Task context refers to "the real or imagined situation in which a mathematical task is embedded" (Sullivan et al. 2003, p. 109). This involves use of word problems which are set in such a way that they make the tasks seem more understandable to the pupils. On the other hand, pedagogical context includes the ways that a teacher makes the mathematical goals of the tasks clear, describes the appropriate forms of response and the expected processes (such as discussion, experimentation and mathematical enquiry) (Sullivan et al. 2003). This aspect of context is what Cobb (1990) described to include personal interests, perspectives, interpretations, and purposes and much of the general nature of social location, situation, and interactions.

Much as the current curriculum emphasises on the use of context in teaching Mathematics, it is not clear which form of context (task or pedagogical) has to be used. Therefore, this study takes the dual perspective as the working definition of context with much emphasis being placed on pedagogical contexts.

2.5.1 Related studies on teacher use of contexts for teaching

"The importance of using real-life contexts in teaching Mathematics is emphasised in many policy and curriculum statements" (Harvey & Averill, 2012, p. 41). As a testimony to adherence to teachers' use of context in the teaching of Mathematics, a number of studies have indicated the importance of the use of context in the subject. For example, it has been argued that the contexts in which Mathematics is studied play an important role in helping pupils understand not only how, when, and why particular concepts, procedures, and skills are used, but also what makes them significant and worth knowing (Nicol & Crespo, 2005). In concurrence, Boaler (1993) contends that the context in which the Mathematics is placed determines mathematical procedures that the teacher will use during instruction and help improve pupils' performance. She further argues that "using real-world, local community and even individualised examples which pupils may analyse and interpret, is thought to present Mathematics as a means with which to understand reality" (Boaler, 1993, p. 13).

According to Herrington and Oliver (1995) pupils gain knowledge in learning environments which provide authentic context and activities that reflect the way the knowledge will be used in real-life and promote reflection to enable abstractions to be

formed. The underlying assumption is that the context provides meaningfulness to abstract information, making it more concrete and therefore, easier to learn. It is also argued that teaching Mathematics is about providing experiences that will enable pupils to discover relationships and construct meaning. Pupils should be assisted to see the importance of Mathematics not by rote learning but by investigating and relating to real-life situations (Susuwele-Banda, 2005).

From the facts presented in the discussion, it can be noted that context in Mathematics promotes understanding and mathematical reasoning. It motivates pupils and makes Mathematics accessible to many people. From MEI (2015) perspective, context helps in the learning of new skills, consolidation of learned skills, appreciation of the usefulness of Mathematics and an enhancement in understanding. Sparrow (2008) argues that if children can experience real Mathematics that engages them by connecting with their interests of the moment, and also work with purposeful activities that bring together mathematical skills and knowledge that they have, then there may be a better chance that children will become engaged and experience success in Mathematics.

2.5.2 Types of contexts

Contexts can be classified into different categories depending on the way one interprets it. According to Julie and Mbekwa (2005), educators from South Africa, Zimbabwe, Uganda, Eritrea and Norway identified different types of contexts which Mthethwa (2007) tabulated as in Table 2.2.

Table 2.2: Kinds of contexts that are used in Mathematics

Main Cluster of contexts	Clusters and examples
Health	Contexts that deal with HIV/AIDS issues and Body Mass Index (BMI)
Finances	• Contexts deal with banking related issues such as accounts, investment, loans, interest (simple and compound) and ATM's • Contexts that deal with marketing related issues such as income and expenditure, selling price, profit, and discounts • Contexts that deal with budgeting
Municipal tariffs	Contexts that deal with water, electricity and sewerage costs (monthly charges)
Transport and communications	• Contexts that deal with telephone charges and cell phones; • Contexts that deal with mailing (ordinary and fast mail) envelope sizes and postcard etc. • Contexts that deal with travelling
Sports	Contexts that deal with different types of sporting disciplines
Mathematics	Contexts that deal with Mathematics content like linear equations and algebraic graphs
General	• Contexts that deal with baking and cooking

Adapted from (Mthethwa, 2007, p. 9)

Generally the classification in Table 2.2 is related to the nature of the different topics that are taught in Mathematics. The kinds of context that have been given cover some of the emerging issues the curriculum aims at addressing such as socio-economic, health and environmental issues. Using the classification in Table 2.2 is simple and straight forward. However, by using that classification, it is not possible to categorise some context when they have been presented as word problems. For instance, it would be difficult to identify the kind of context in the following word problem; "A school received 345 boxes of pens. In each box, there were 50 pens. If all the pens were shared equally to 15 classes, how many pens did each class receive?" This shows that there is a gap in the classification more especially when context is regarded as word problems. In addition, some of the kinds do overlap and can easily be confused. For example, finances, municipal tariffs and transport and communications. These kinds are all dealing with monetary issues and can be fused into one category.

Du Feu (2001) also classified contexts into five different kinds. The five kinds include real, cleaned, parable, contrived and context-free. Table 2.3 outlines a list of the kinds, their explanations and examples (bearing Malawian contexts):

Table 2.3: Du Feu's classification of context

Kind of context	Explanation and example of the context
Real	These are real contexts with real problems. They involve real names of individuals, institutions, organisations or products. (e.g. a question can be set based on the data obtained from hospital about cancer patients. Learners can then interpret data given to make relevant calculations)
Cleaned	These are similar to real contexts, but the only difference is that the mathematical model has been simplified in order to make the question accessible to the user. (e.g. a distance between Blantyre and Lilongwe is 310km. How long will it take for a car from Blantyre to reach Lilongwe if the car travels at 100km/h?). In this example it is assumed that the car will move at a constant velocity (irrespective of road blocks, robots, pothole, traffic etc).
Parable	These are fictitious contexts. Names used in these contexts are not real. (e.g. Chentanga and Usauchi filled a drum with water in 7 days. How long will it take Usauchi to fill the same drum working alone?)
Contrived	These contexts are invented to fit a particular mathematical point, irrespective of how appropriate these are to the real life. (e.g. Mavuto buys cattle and sheep at a total price of K71 275. He buys 100 animals, the cattle at K820 each and sheep at K105 each. How many of each kind has he bought?). This problem can be solved mathematically but in real life situation you cannot buy a sheep for K105
Context-free	These include simple questions with one-step arithmetic computations to long multifaceted proofs (e.g. 25 – 12). These can be viewed as real contexts where the context is Mathematics.

Du Feu's categorisation caters for all contexts including mathematical tasks situated either in words or illustrations that help the pupils to understand the task. Context is being reflected by considering how real-life experiences of the pupils have been tailored in word problems. This classification assists teachers in determining the authenticity of the contexts being used. This covers the gap in Julie and Mbekwa (2005) classification of context. This study adopts the two categorisations for easy classification of the kinds of context teachers used in the study and an understanding of the appropriateness of the contexts that teachers used. In that case, context can be described by combining the two classifications. For example, there could be real financial context or cleaned financial context. Likewise, parable cultural context or contrived cultural context.

However, it can be argued that, when context-free experiences are used, the Mathematics becomes decontextualised. Likewise, the Mathematics context lacks real life experiences of the pupils and that renders it to be decontextualised. Hence, the teaching and learning process becomes abstract. So, the Mathematics context and the context-free kinds as per Mthethwa and Du Feu respectively lack the characteristics so that they can be regarded as relevant context to aid understanding.

In addition, there is one more important kind of context which is not included in the two classifications, the cultural context. According to Gutstein, Lipman, Hernandez, and de los Reyes (1997), culture is defined as "the ways in which a group of people make meaning of their experiences through language, beliefs, social practices, and the use and creation of material objects". It is further argued that the pupils' knowledge and culture

are valuable sources of classroom knowledge (Gutstein et al. 1997). In concurrence, Ladson-Billings (1994) posits that pupils come to school with a rich store of cultural and experiential knowledge, talents, and strength that are a foundation for further learning.

2.6 Research findings on contextualised lessons

Many studies have been carried out all over the world focusing on context in Mathematics. In the proceeding paragraphs, some studies that have looked at contextualised lessons are reviewed.

Just like the motivation of this current study, a general underachievement and poor participation rates of pupils in Mathematics in Nepal motivated the Kathmandu University to think of ways of improving pupils' achievement and participation in Mathematics. In trying to address that problem, a study exploring the effects of culturally contextualised resource materials on pupils' performance was initiated in 2008. According to UNESCO (2008) a conceptual framework for shifting the teaching and learning practices of Mathematics from traditional school Mathematics to contextualised school Mathematics, in the short-term, and finally to contextualised progressive school Mathematics in the longer-term was used. During the study, 12 teachers were provided with basic orientation on how to use culturally contextualised resource materials and 47 pupils were involved in classroom trialling. Both teachers and pupils hailed the instruction practice of contextualisation for improving the performance of the pupils in Mathematics. The pupils also admitted that learning in their cultural context assisted them to learn Mathematics with understanding as they found learning activities

interesting. From that study, contextualisation was thought of as a remedy to underachievement in Mathematics and that was coupled by progressive teaching practices. That situates the current study in a similar platform. By giving teachers a training on how to use culturally contextualised materials, shows how important it is to have pedagogical knowledge on contextualisation. This is why this study is trying to find out whether the teachers have that knowledge and how they use it in implementing contextualisation.

Another study that shows the importance of having enough knowledge on contextualisation was carried by Chu and Laurie (2013). In the study, 106 lessons were observed on six teachers from two urban high schools. The aim of the study was to explore how real-world contexts serve as sources of analogies for introducing mathematical concepts and procedures. Out of the 106 lessons, 50 which represents 47% contained real-world context and 13 lessons (12%) included analogies with real-world context. In three of the 13 lessons, the analogies created by the teachers did not map well to the target mathematical idea. For instance, in a lesson about the distribution of rational numbers on the number-line (9/21/09), the teacher asked pupils to think about fitting more and more people into a room. He said crowdedness was a way of thinking about the density of the number line. This real-world contextualisation does not map well to the mathematical target because rational numbers, unlike people, do not occupy space. This example illustrates that contextualisation is possible. However, it requires teachers who have adequate content knowledge so that they develop analogies that promote student understanding.

In four other instances, analogies were mentioned at the beginning of a lesson as an initial motivation or explanation but were not referred to again in the lesson. However, findings from a high percentage of the contextualised lessons observed indicated that context assisted in explanation of abstract concepts and promoted understanding of mathematical content. For example, the use of context of societal expectations around dating and gender assisted in introducing the concept of functions and non-functions. Other contexts that were used in other lessons included; parts of a pie, mountain climbing, legal arguments and combining purchases of burgers and fries. The study shows that there is a diversity of contexts teachers can use in teaching Mathematics. What is very important is the creativity in choosing what context to use in a particular circumstance. That is why this current study thought of investigating kinds of context and their sources in teaching standard seven Mathematics.

In a similar manner, Tilana (2011) investigated teachers' selection and use of contexts in Mathematics literacy. It was a mixed research design in which data was gathered and analysed both qualitatively and quantitatively. The study concluded that teachers mainly used the work schedule and text books to select the context-oriented tasks for their learners and that their selections of tasks were guided by the mathematical content to be taught. It was also noted that most of the tasks' contexts lacked authenticity and the tasks consisted of pure mathematical content. The teachers mainly used the context to introduce the content to be learned. The tasks that were used promoted mathematical goals and were not context-driven. Though carried in a different context to Malawi and also in Mathematics Literacy, the findings of the study are thought to guide this particular

study in Mathematics. It should be noted that there are many similarities in curriculum developments in relation to contextualisation in South Africa and Malawi, and that both countries are in Southern Africa where learning of Mathematics is in second language – English.

Within Malawi, some studies have also been conducted in which contextualisation was involved. According to Chilora, Jessee & Heyman (2003), The American Institute for Research carried a study in Mangochi and Balaka districts involving standard 2, 3 and 4 pupils. The aim of the study was to investigate pupils' performance on Mathematics word problems in lower primary schools in Malawi. In the study, pupils were given similar problems both in words, using familiar contexts like (bottle tops, market goods and classroom materials), and in numerical form. The problems were presented in both written and oral form. It was observed that pupils achieved more in Mathematics when problems were in contexts that were familiar to them than numerical or unfamiliar Mathematics problems (Chilora et al., 2003). The researchers concluded that, word problems provide contextual clues to mathematical operations that particularly young children may have difficulty understanding, especially when questions are in abstract form such as symbols or operator terms.

A study by Kazima (2015) investigated reasons Malawian students have for preferring particular contexts in mathematics. The study explored students' preferences of contexts using a survey questionnaire that contained 27 contexts and asked students to indicate

their level of interest for each context on a 4-point scale and to write down reasons for their most preferred contexts.

Much as the two studies included an element of context, none of them investigated teachers' knowledge on contextualisation. Kinds of context and their sources were also not explored in the two studies. The study by Kazima (2015) was investigating students' preferred contexts in secondary schools and not primary. It is noted that there are some gaps in the literature on the issue of contexts in Mathematics, in particular teachers' knowledge on contextualisation, the kinds and sources of contexts the teachers use in teaching Mathematics. A need for a further research on teachers' understanding and implementation of contextualisation in Mathematics was recognized.

On the kinds of contexts to be used by teachers, Julie's (2006) findings indicated that teachers prefer contexts which are local in nature, contexts which are related to learners' socio-economical background and those which will not in conflict with their (teachers') personal pedagogical ideology. Julie (2006) further argues that teachers consider local contexts as appropriate, while the less preferred contexts (which are not local) are dismissed by teachers with indications that learners are not ready to deal with these contexts. However, use of local context cannot be generalised and with that in mind this study also tried to find out the contexts teachers in some schools of Machinga district prefer to use.

Within the Mathematics education community however, some studies have shown that using of contexts in Mathematics does not always promote mathematical understanding in the pupils. Cooper and Dume (2000) argue that the context, when recruited into the Mathematics, tends to conceal or draw some pupils' attention away from the Mathematics. In the same manner, Sethole (2004) in his case study describes the experiences of two teachers, Bulelwa and Kevin, who attempted to take on board the notion of incorporating the everyday into Mathematics. In her lesson Bulelwa used AIDS context which Sethole (2004) describes it as "not benign"; it had the potential to spark different types of non-mathematical arguments and discussions as the AIDS context had an emotional appeal to this classroom community because of the proximity of the school to an area where an AIDS activist was stoned to death for declaring her HIV positive status.

Though there are challenges when using contexts, the advantages of using the same outweighs the challenges. In support of this, Sullivan et al. (2002) after demonstrating that the contexts in which classroom tasks are embedded can have the effect of alienating some students, postulated that:

> We are not arguing that contexts should not be used, indeed we believe that contexts have much to offer. The issue for us is that teachers need to be fully aware of the purpose and implications of using a particular context at a given time with particular students; to choose contexts that are relevant to both the content of problems and children's experience; and to develop strategies for making uses of contexts clear and explicit to students.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This Chapter describes the research methodology for the study. It starts with a discussion of the different research methodologies available in the literature and a choice is made of the method that was used in the study. It then gives a series of discussions on administration of data collection instruments, study sample and data analysis. The Chapter further presents ethical considerations and validation of the research findings.

3.2 Research methodology

A research methodology is an overarching plan for the collection, measurement and analysis of data (Gray, 2009). It is classified into three; quantitative, qualitative and mixed methodology.

According to Gray (2009), quantitative methods are the systematic and mathematical techniques used to collect and analyse quantitative data. Quantitative investigations look for distinguishing characteristics, elemental properties and empirical boundaries and tend to measure how much or how often (Nau, 1995). They can be conducted using either surveys or experimental designs. Quantitative methods have a number of advantages. For instance, subject under analysis is measured through objective methods rather than being

inferred subjectively through sensation, reflection or intuition. In addition, reliability and validity may be determined more objectively than qualitative techniques (Amaratunga, Baldry, Sarshar & Newton, 2009).

The weaknesses of such quantitative research designs lie mainly in their failure to ascertain deeper underlying of meanings and explanations of subjects, even when significant, reliable and valid data is obtained.

Another important research design is the qualitative one. Atkinson, Coffey and Delamount (2001) defines Qualitative research as a form of social inquiry that focuses on the way people interpret and make sense of their experiences and the world in which they live. According to Denzin & Lincoln (2004) Qualitative research is a multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret phenomena, in terms of the meanings people bring to them. This is in line with Amaratunga et al. (2009) who assert that one major feature of qualitative design is that of putting a focus on naturally occurring, ordinary events in natural settings, so that there is a view on what "real life" is like. They further argued that qualitative data provide rich descriptions that are vivid, nested in a real life context, and have a ring of truth. Furthermore, Gray (2009) posits that the inherent flexibility of qualitative studies gives further confidence that what has been going on is really understood. This research design uses interviews, participant observation and document studies as some methods of data

collection. The rich data that is collected is analysed either thematically or by using grounded theory, constant comparative and ethnographic analysis.

Mixed research on the other hand is a method that uses more than one method of generating data (Robson, 1993). It generally denotes a reference to a combination of research methods - thus the use of qualitative and quantitative techniques together to study the topic - which is very powerful for gaining insights and results, and for assisting in making inferences and in drawing conclusions (Fellows & Liu, 1997). Researchers use this method with the growing attention focused on triangulation in research (Yin, 1994). Triangulation is the combination of methodologies in the study of the same phenomenon and the assumption is that the effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another. Mixed methods of data generating increase validity and discrepancies between can be revealing in their own right.

This study, however, adopted a qualitative research design. This design was adopted considering the fact that the study sought to investigate primary school teachers' understanding and implementation of contextualisation in primary school Mathematics teaching. According to Creswell (2014), the design appropriate for exploring and understanding the meaning individuals or groups ascribe to a social or human problem has to be qualitative in nature.

The study was also concerned with an investigation of teachers' experiences in their class as they teach; that is the implementation part of contextualisation. Kelly (1999) argues that qualitative research design is mainly concerned with making sense of human experiences from within a specific context and from the perspective of human experience. It made it possible for the researcher to enter into the lives of the teachers and uncover what their professional experiences are like. Therefore, by using qualitative design, it is possible to describe social phenomena as they occur naturally and also to develop possible explanations or representations of the social phenomena (Denzin & Lincoln, 2000). In concurrence, Kelly (1999) argues that qualitative research allows the study of phenomena as they unfold in real life situations without manipulation.

3.2 Study sample

The study focused on how primary school teachers understand and implement contextualisation in Mathematics as they teach pupils, with a special reference to a standard seven class. A non-probability sampling, specifically purposive sampling was used in the selection of the class. It is argued that in purposive sampling the researcher selects particular elements from the population that will be representative about the topic of interest on the basis of researchers' knowledge of the population (Schumacher & Macmillan, 1993). They further contend that judgment is made about which participants should be selected to provide the best information to address the purpose of the research. In concurrence, Cohen and Manion (1994) argue that in purposive sampling, the researcher handpicks the participants to be included in the sample on the basis of their

judgement of their typicality. This ensures that the researcher builds up a sample that is satisfactory to their needs.

The standard seven class was chosen considering that pupils in this class are able to understand English language better than the lower classes. In such a case, the teacher is at liberty to use various contexts thereby allowing pupils grasp what the teacher tries to communicate to them. The class was also chosen as it has a longer duration for a lesson (35 Minutes) compared to either infant (30 minutes) or junior classes (30 Minutes). In addition, the Mathematics that is taught in standard seven is generally abstract in nature as compared to concrete Mathematics in junior primary. Standard eight would have been more convenient but it was exempted due to the busy schedule which the class is accorded in preparation for public Primary School Leaving Certificate of Education examinations.

One teacher was involved from each school. So, by virtue of being a Mathematics teacher in standard seven, one qualified to be considered a participant in the study. The teachers participated at their own will without being forced. Therefore, the study involved four primary school teachers from four different schools in St. Therese zone in Machinga District. Both the schools and the district where the research took place were purposively sampled.

The study was conducted in Machinga district because this is where the researcher resides. Creswell (2014) argues that proximity of the research site provides an easy

access to participants and information. Participating schools were visited more than three times starting from the time consent was being sought to the time data was collected. So, schools which were easily accessed were selected to participate.

3.3 Data collection methods and instruments.

Mukherji and Albon (2010) point out that research which is usually concerned with describing experiences, emphasising meaning and exploring the nature of an issue in some detail use qualitative techniques. This research being qualitative in nature, utilised the following data collection methods; interviews and lesson observation.

3.3.1 Interviews

Mukherji and Albon (2010) define an interview as a method where one person asks questions to an individual or group of people with the expectation of getting answers to a particular question or an elaboration of their views on a particular topic. They further argue that interviews are either structured, semi-structured or unstructured. According to Johnson and Christensen (2008), classification of the interviews are due to the degree of flexibility that the interviewer has to probe and ask additional questions and the degree of flexibility that the participant has to say what they want.

A structured interview follows a predetermined schedule without diverting from its sequence or question wording in any way. Although offering the potential for interviewing large numbers of participants whilst still generating manageable data sets, structured interviews may not capture sufficient detail or may fail to leave room for

interviewees to provide important contextual information. Such a positivist approach to interviewing may only generate a list of things people have said, or be "simply a presentation of factors or realities about the world vocalised or reported upon by an informant" without offering the opportunity to focus on influences and contextual structures that may be evident in people's talk (Sayer, 1992, p. 69).

Unstructured interviews, on the other hand, may not sufficiently cover all the details required to answer the research question. Basically this type of interview involves collecting a broad spectrum of data as it is more flexible than the other two types**.**

For the purpose of this study, semi-structured interview was used as a main source of data collection. According to Opie (2004) novice interviewers are encouraged to use semi-structured interviews than unstructured interviews in their research projects. They generate the data that is most appropriate for the focus of the study as they offer flexibility and a limitation on the amount of data to be collected. In support of that, Mason (2000) argues that semi-structured interviews allow flexibility and fluidity in addressing the topics and areas that are being investigated. Interviews as a method for data collection have many advantages. Sax (1979) describes an interview as more than just an exchange of small talk but it represents a direct attempt by researcher to obtain reliable and valid measures in the form of verbal responses from one or more respondents. He further asserts that interviews are useful in collecting personal information, attitudes, perceptions or beliefs by probing for additional information. Thus, participants feel more relaxed and open. Therefore, interview was used on four teachers

to generate data on the questions: what knowledge and understandings do primary school teachers have about contextualisation in Mathematics teaching, what kinds of context do primary school teachers use in the teaching of Mathematics and what are the sources of the contexts that teachers use in the teaching and learning of Mathematics.

Due to flexibility of semi-structured interviews in allowing for probing and restructuring of questions, a pilot study was not conducted. From the interview guide that was prepared, there was room for probing more and rephrasing of questions where participants seem not to get what the question was looking for and that assisted to ensure that data needed to answer the research questions were collected. As such, data analysis started right away after the first interview to ensure that the second interview was well covered.

During interviews, an interview guide was used. The interview guide had three parts, each answering one of the three specific research questions (see appendix 1a). Note taking was used where the responses were written. Responses from the probing and follow up questions were also written down in the notebook. Interviews were conducted after all lesson observations were done on each teacher and they took about twenty five to thirty minutes each. In addition, the interviews were audio recorded. Audio recording provided a more accurate record of what the teachers were saying. For this reason, a recorder was used as a supplementary instrument for preciseness and verification of the details that were noted during interviews.

3.3.2 Lesson observation

During the study, three Mathematics teachers, TA, TB and TD were observed teaching for two days each and TC was observed teaching for three days. Basically, each teacher was supposed to be observed three times but it did not work that way. This was so due to a four days holiday that the sampled schools and other schools in the zone where the study was conducted had. This holiday came in to pave way for standard eight pupils to write district mock examinations which were written at cluster centres. Some participants were also not available on the scheduled days due to their engagement in the marking of the mock examinations. This forced the researcher to keep on rescheduling the days up until the schools started writing end of term two tests and then no more observation would have been possible. Therefore, a total of four teachers and nine lessons were observed in the study. It would have been enough to observe one lesson each, however, the researcher wanted to ensure that amongst the lessons, the researcher observes what they were looking for. It also assisted the researcher to identify different kinds of context the participants used by actually observing them teaching.

Observation has been defined as the systematic noting and recording of events, behaviours, and artefacts in the social setting chosen for a particular study (Marshall & Rossman, 2006). According to Patton (1990), the importance of observation is that the researcher generates information and behaviours that participants are unwilling to disclose in an interview. Creswell (2009) also makes a similar claim and adds that observations are useful because the researcher is able to record information as it occurs. However, observations have some limitations which may need to be noticed. Creswell

(2009) contends that during observation private and excess information may be observed. Some of this information may mislead during data analysis. The researcher in this study tried to record the necessary information and behaviours by strictly recording the behaviours that answered the questions under study. This ensured objectivity and direction of the data that was collected.

During the study, two lesson observation schedules were used concurrently to collect data in the course of instruction. The first part of the first observation schedule addressed a simple background of the participant, followed by the date and time of the lesson. Following this was the purpose of the observation. This was then followed by a table in which the general proceedings of the lesson were recorded. Both the teacher's and pupils' activities were recorded in the table for analysis (see appendix 1b). The other observation schedule was more of a checklist. Nine characteristics of a contextualised lesson, as indicated in the literature section, were being checked and marked as the lesson progressed. This lesson observation schedule was more specific because it only focused on what a contextualised lesson has to have. For a better understanding of this, refer to appendix 1c.

3.4 Data analysis

Data analysis is the only means of drawing meaning to the collected data. It needs to be undertaken in order to interpret the data and draw conclusions. According to Cohen, Manion, and Morrison (2007), data analysis is a process of making sense of data in terms of participants' definitions of situation, noting patterns, themes, categories and

regularities. It involves making sense out of words, text and image data, and is more concerned with meaning. This study being qualitative in nature, data was analysed qualitatively with a special reference to thematic approach. This is in accordance to Braun and Clarke (2006, p. 82) who state that, "themes in thematic analysis capture something important about the data in relation to the research questions and represents some level of patterned response or meaning within the data set". As part of data analysis, the data from the interviews was first transcribed, read, categorised and then presented in table form, to enable a comparative summary of what each teacher said during the interviews. The categories used here originated from the specific research questions. This was done to provide an overview analysis of what each teacher said in relation to each category. In each category, the data were analysed using the literature reviewed – linking it to the concepts of Mathematics contextualisation as well as the theoretical framework as discussed in Chapter 2.

Data from the observation schedule was analysed by generating simple frequencies of occurrence of the specific issues under observation for example the kinds of context teachers used and the sources of the context that were used. Tables were used to present the data that were collected so that comparison between sets of the data is explicit.

3.5 Ethical considerations

When conducting a study it is important to consider some ethical protocols and it is the responsibility of the researcher to be aware of the ethical issues that may arise while conducting the research. This study involved four teachers who are located in four

primary schools. All the necessary steps were followed in getting access to the participants.

A letter authorising the researcher to conduct the study as a Masters student of the University of Malawi, was sought from the Chancellor College. Knowing that all primary schools in a district are under the administration of the District Education Manager (DEM), permission was also sought from that office. The Primary Education Advisor (PEA)'s office for St. Therese zone was visited and permission was sought to conduct research in schools in the zone. Upon arriving at each school, a courtesy call to the head teacher's office was made where the researcher introduced himself, explained his study and its purposes, and showed copies of permission letters obtained from the Chancellor College, DEM's and PEA's offices to conduct the study at any school. Copies of the said letters have been included in the appendix section.

The teachers who participated in the study did so willingly without feeling threatened. The researcher explained the purpose of the study and the required time and commitment. All four teachers agreed to participate in the study. Schumacher and Macmillan (1993) posit that the investigator should inform the participants of all aspects of the research that might influence willingness to participate and answer all inquiries of participants on features that may have adverse effects or consequences. It is further argued that participants have rights and should therefore be given a chance to make informed decisions either to participate or not (Neuman, 2003).

The researcher also assured each one of them of the confidentiality of their information and of their anonymity. Anonymity of schools and participants were ensured by use of codes on all research documents as well as in this dissertation. The four schools that participated in the study were coded; school 1, school 2, school 3 and school 4 and the four teachers from the schools were identified by codes; Teacher A, Teacher B, Teacher C and Teacher D respectively.

3.6 Validation of the results

Researchers want to have confidence in their data and also those who read their work to have confidence in the researcher's findings. To ensure validation of the results from this study, the researcher used triangulation. According to Mukherji and Albon (2010) triangulation is the use of a variety of methods, researcher's perspectives, theories and methodological approach to answer a research question, in order to corroborate results and increase reliability. There are different types of triangulation which can be adopted such as data triangulation, methodological triangulation, investor triangulation and theory triangulation (Durrheim, 1999). In this study the researcher used two research data collection methods with the four teachers, which constitutes methodological triangulation. According to Denzin and Lincoln (2000, p. 5), triangulation of methods of data collection is important because it helps to add "rigor, breadth, complexity, richness and depth to any inquiry". Apart from that, data triangulation was also used in the study. This involves the use of multiple data sources to help understand a phenomenon. In this respect, the researcher made use of all similar data collected from the different sources answering a particular research question in order to understand it better and make

meaning of it. In addition, the researcher also used direct quotations from participants during data analysis to increase validation of the study. Furthermore, the researcher tried to avoid bias by ensuring that all the data collected, regardless of it being against what the researcher expected was taken into consideration during analysis.

3.7 Chapter Summary

This Chapter has presented the research methodology that was used in conducting the study. It has presented the justification of the methodology actions used and their theoretical background. Ways of collecting data and how the data were analysed have also been highlighted. The Chapter has concluded with some ethical considerations.

CHAPTER 4

PRESENTATION OF FINDINGS

4.1 Introduction

The study reported in this thesis set out to investigate how primary school teachers understand and implement contextualisation in primary school Mathematics teaching. Data that were collected through interviews as well as lesson observations have been presented together due to some commonalities in them. Data from interviews, which was the main instrument for data collection in the study, were transcribed and then categorised. Categories were generated from each of the research questions. This Chapter presents the findings of the study.

In the presentations, TA is used to mean Teacher A, so are the other codes. L1 represents Lesson 1 and L2/ 26-02-16 is for lesson 2 of 26th of February 2016.

The Chapter has been demarcated into four parts. The first part presents participants' profile and school contexts. Part two presents findings on teachers' knowledge about contextualisation. This is followed by findings on kinds of context used by the four teachers and finally sources of contexts used by the teachers.

4.2 Participants' profile and school contexts

4.2.1 Teacher A's context

Teacher A was a woman who had five years of teaching experience. She qualified as a (T2) teacher through Initial Primary Teacher Education (IPTE) program. She learnt about LCE while in college. During the study, she was teaching Mathematics in standard seven at school 1. At the school, standard seven was taught by two teachers and they had shared the subjects to teach.

School 1 was classified as an urban school by the DEM's office. It had enough classrooms and teachers. All pupils in standard seven were sitting on desks that were arranged in such a way that pupils were in groups. The class enrolment was sizable – not more than forty pupils. Mathematics textbooks were available and were given to pupils during a Mathematics lesson to be used when writing exercises. The school is one of the teaching practice schools in Machinga district and is privileged to receive textbooks and teachers' guides from Machinga Teacher Training College.

4.2.2 Teachers B's context

Teacher B was a woman who started teaching in 1997 and had a teaching experience of nineteen years. She qualified as a T2 teacher and had learnt about LCE through in-service trainings (INSET). During the study, she was teaching Mathematics in standard seven at school 2 and claimed to have been teaching Mathematics for so many years. Two teachers were responsible for teaching the class, hence subjects were shared.

School 2 was from an urban area and had a large enrolment. The standard seven class had about eighty pupils. One Mathematics textbook had to be used by five to six pupils. All pupils were sitting in rows on desks. Teacher mobility during lessons was not easy due to congestion. The school had insufficient classrooms but well fenced.

4.2.3 Teacher C's context

Teacher C was a woman with fifteen years of teaching experience. She qualified as a T2 teacher and had learnt about LCE through PCAR INSET. When this study was being carried out, she was teaching Mathematics in standard seven A at school 3. Teaching subjects in the class were shared between two teachers. Teacher C was also responsible for teaching her subjects in seven B.

School 3 was an urban school located at a Teacher Development Centre (TDC). The school had a large enrolment with more than sixty pupils in one class. There were enough classrooms as well as teachers. Female teachers dominated the population of teachers at the school. All pupils in standard seven were sitting on desks and in rows. Mathematics books were not enough for every pupil and five pupils had to share one book.

4.2.4 Teacher D's context

Teacher D was a man who had been teaching for twenty four years. The teacher claimed to have learnt about LCE through PCAR INSET. During the study, the teacher was teaching all the subjects in standard seven at school 4.

School 4 was in rural area. There were insufficient classrooms at the school and an enrolment of less than forty in each of the senior classes. There were enough Mathematics textbooks as the school was a teaching practice school. The school had enough desks for pupils and two teachers' houses. The pupils were seated in groups. Most of the teachers at the school were males who were cycling from Liwonde Township, a distance of about twenty Kilometres, daily.

Having presented the context of the schools and the participants, the proceeding section presents the findings answering each of the three specific questions and related findings on implementation of contextualisation.

4.3 Findings on each research question

Analysis of findings revealed the following results on each research question:

Research question 1: Teachers' knowledge about contextualisation

This category aimed at exploring teachers' knowledge and understanding of the concept contextualisation. It was assumed that knowledge of the concept informs teachers practice during instruction. Data collected from interviews on the question on teachers' knowledge about mathematical contextualisation, show that each participant had a unique response different from the other participants. The responses that were generated include; no idea, use of locally available resources, relationship of what is done at home and school, technique of presenting a lesson, and critical thinking. Table 4.1 presents each teacher's knowledge of contextualisation.

Table 4.1: Teachers' knowledge about contextualisation

Participants' meaning of contextualisation	TA	TB	TC	TD
No idea	√	×	×	×
Use of locally available resources	√	×	×	×
Relationship of what is done at home and school	×	√	×	×
Technique of presenting a lesson	×	×	×	√
Critical thinking	×	×	√	×

KEY:

√ = Respondent to the given meaning × = Not a respondent to the given meaning

Table 4.1 reveals that teachers' knowledge of contextualisation varied greatly. It further shows that TA gave two different ideas. The following paragraphs contain verbatim responses the participants gave during interviews in relation to their understanding of contextualisation.

a. No idea

Teacher A indicated that she does not have an idea of the concept when asked for the first time. Responding to the question on how she understood contextualisation as regard to the teaching of Mathematics, the participant said, "I have no idea. It's a new word to me". However when probed further, the teacher then said, "What I know is when we are

teaching Mathematics we use locally available resources". This shows that the teacher's understanding of contextualisation is in line with the prescribed understanding of the term. However, the researcher thinks that though the participant gave this response, she did not know that using local and familiar resources is part of contextualisation. This was demonstrated when the participant was asked to name some contexts some teachers have used in their lessons. Responding to the question, TA said, "no. I have never heard. Its very new". This response was coming after the participant had also indicated that she does not use contextualisation in her lessons and that was testified during lesson presentations. Of the two lessons that were observed, TA did not use any local resource.

However, the data that were collected during lesson observation indicated that locally available resources were used by two teachers. The two participants, TB and TD used locally available resources (radio and cell phone charger) and local language (Chichewa) as teaching aids during their lessons. Unlike TA who came up with this idea, the two participants did not indicate, during interviews, in their explanation of contextualisation, that this has something to do with the use of local resources.

b. Use of learners' daily life activities

One participant, TB, said the following regarding contextualisation: "we just call them call it relationship ee on what they do at home and what they learn at school". This description was arrived at as the researcher was trying to probe more since the participant's first trial showed that she was meeting the term for the first time. It can be assumed that TB had knowledge of the concept because when it was inquired as to how

the participant came to know the concept, the response was like, "… if we recall, we were told at a certain INSET at Ngadu". According to the researcher's understanding, this could be true because the participant had a teaching experience of nineteen years, meaning that the knowledge was acquired after LCE was introduced, which must be some years after the participant had qualified as a teacher. So there was no any other way of knowing other than the PCAR INSET(s) that were given to qualified teachers after the new curriculum had been launched. This idea however was not shared by the other three teachers showing that it is not a common understanding among them.

c. Technique of presenting a lesson

Teacher D described contextualisation as a technique of presenting a lesson. In his response, the participant said, "aaaa it can be methodology, the technique how you present the lesson". This description would have been incomplete had it been that the participant was not asked to give an example of context. The participant mentioned pair work, individual work, group work and class work as examples of context he uses. The participant also talked about teacher centred as one of the context other teachers use in their lessons. These examples clearly indicate that the word "technique" meant teaching methods in LCE and not necessarily contextualisation.

d. Critical thinking

The idea that TC raised in connection to the understanding of contextualisation is that of critical thinking. TC responded by saying, "may be from the word context it means learners are able to understand the word counting, counting and critical thinking. Its like a

science subject where by learners are able to think what to do critically". This explanation alone gives a picture that the teacher did not know exactly what the concept meant. Supporting this claim is the response that was given when the participant was asked to say where she learnt about the concept. In her response the participant said, "It was from our books. I was, I I learnt sometimes back. I was taught by my teacher sometime back while I was in standard seven". This is enough evidence that TC had no knowledge of the concept, also considering the fact that the participant had fifteen years of teaching experience.

From the findings it is evident that the concept of contextualisation meant different things to the participants and some of the meanings had little to do with contextualisation. There is an indication that TC and TD, lacked a clear knowledge of the concept where as TA and TB had the knowledge about contextualisation but with different levels of understanding. This was however, inconsistent with the way the teachers presented their lessons. For example, TD whose explanation of contextualisation was not clear, happened to present a well contextualised learner-centred lesson. Table 4.2 shows the extent to which characteristics of contextualisation were met by the particular teachers during instruction.

Table 4.2 Classroom application of contextualisation

Guidelines for a contextualised lesson	TA		TB		TC			TD	
	L1	L2	L1	L2	L1	L2	L3	L1	L2
New concepts presented in real-life situations and experiences that are familiar to the student.	×	×	√	√	×	×	×	√	√
Concepts in examples and student exercises presented in the context of their use.	√	√	√	√	√	×	√	√	√
New concepts presented in the context of what the student already knows.	×	×	√	×	×	×	×	√	×
Examples and student exercises include real, believable problem-solving situations.	√	√	√	×	×	√	√	√	×
Examples and student exercises cultivate an attitude that says, "I need to learn this".	×	×	√	√	×	√	×	√	√
Students gather and analyse their own data as they are guided in discovery of the important concepts.	×	×	×	√	×	×	×	√	×
Lessons and activities encourage the student to apply concepts and information in useful contexts.	×	×	√	√	×	×	×	√	×
Students participating regularly in interactive groups where sharing, communicating and decision making occur.	√	×	√	×	×	√	×	√	×
Lessons and exercises improve students' reading and other communication skills in addition to mathematical reasoning.	√	√	√	√	√	√	√	√	√

KEY:

√ = Available × = Not available

From Table 4.2, one lesson by TD managed to contain all the prescribed standards of a contextualised lesson. This is the lesson in which TD had a radio and a cell phone charger

as teaching and learning resources, L1/ 23-02-16, and was teaching about discount. L1/ 04-03-16 of TB also contained all, except for one standard. This lesson was covering work on the topic commission and discount. Coming third is L2/ 07-03-16 of TB which fulfilled about six standards. Excerpts of the lessons are presented under kinds of contexts used by the four teachers.

For the remaining six lessons, though they are said to have context in them, they fall short in standards. These are the lessons in which context was considered from the word problems which the teachers used during their lessons. These problems were taken from the learners' books and pupils had to work following the set procedures the teachers had demonstrated when solving the examples. Much as context was used in the lessons, the fact that the lessons were more teacher-centred concealed the essence of contextualisation.

Therefore, it can be concluded from the findings that six out of the nine lessons that were observed lacked the flesh to be regarded as fully contextualised. The degree of contextualisation was very minimal so as to produce the results a contextualised lesson is expected to produce.

Research question 2: Kinds of context used by teachers

This category aimed at establishing the kinds of context used by teachers as they teach. It was assumed that if participants use different kinds of contexts during instruction they would be able to say the kinds they mostly use.

An analysis of the data that were collected during interviews indicated that only one participant out of the four was able to give an example of the context she had once used, which is not surprising bearing in mind that some of the participants did not have clear ideas of what contextualisation meant. Responding to the question that demanded for some examples of context the participant had used, TB was quoted saying, "when we were doing commission, I gave them an example that they can be given something like a cell phone or a book to sell, that amount they receive from the owner is what they call, that is what is called commission. They usually do those things at home." From that explanation, the researcher agrees that context was used, however the participant did not disclose the kind of context that was used.

Teacher A, indicated that she does not use context in her lessons and TC revealed that the question was difficult for her. TD gave examples of teaching techniques like pair work, group work and individual work. These findings reveal that three out of four participants had no knowledge about the kinds of context they use during instruction.

However, during lesson observation, the data that were collected showed that three teachers used context of a particular kind during their instruction or exercises. That contradicts with what some of the participants had said that they do not use context. Table 4.3 presents kinds of context the participants used in each of the lessons they taught.

Table 4.3 Kinds of context teachers used during lesson observation

Kinds of context	TA		TB		TC			TD	
	L1	L2	L1	L2	L1	L2	L3	L1	L2
Finances	√	√	√	×	√	×	√	√	×
Transport and communication	×	×	×	√	×	×	×	×	√
Mathematics	×	×	×	×	√	√	√	×	×
Cultural	×	×	√	√	×	×	×	×	×

KEY:

√ = Available × = Not available

The findings in Table 4.3 show that in the nine lessons observed, TA used context in all the lessons taught and the same was true for TB and TD. As for TC, all the three lessons that were observed, were decontextualised. Finances, transport and communication, Mathematics and cultural contexts were used during the study. Though the Mathematics context is mentioned, technically it is said to be decontextualised – context free.

In the first lesson, L1/ 24-02-16, TA started context by revising with pupils how they can calculate discount. Then the participant wrote the following example on the chalkboard. "What was the selling price of a pot which was marked at K870.00 and the discount was K52.00?" She read the example and demonstrated to the pupils how they could work out the problem. Then similar word problems from page 62 of the standard 7 Mathematics learners' book were given to the pupils for practice.

In L2/ 26-02-16, the introduction part was a revision on how to calculate selling price and marked price. Thereafter, the following example was written on the chalkboard. "A newspaper seller gets a commission of K2 on every newspaper sold. If he sold 247 newspapers, how much commission did he receive?" TA read the question and then demonstrated the procedure to arrive at the correct solution. Pupils were asked to do some calculations in the process of solving the example. Pupils were then given the Mathematics learners' books and asked to open at page 63 where they discussed how the example, "a sales lady gets a commission of K10.00 on every K500 she makes. If she makes K60, 000.00 out of the goods she sells, what is her commission?" was worked out. Then pupils were asked to work out some problems from exercise 13C of page 63. Both in the two lessons, the examples and the exercises dealt with what happens during marketing. These examples and exercises that the teacher used belong to the kind of context known as finances. Situations to do with buying and selling form part and parcel of pupils' daily life undertakings. However, the context embedded in the examples that were used in the two lessons was 'contrived' according to Du Fue's classification of context.

As for TB's L1/ 04-03-16, the introduction was about explaining the meaning of the term commission. The teacher said, "Commission *ndi ndalama zomwe munthu amalandira pambuyo pomgulitsira munthu wina chinthu* (is the money one gets after selling somebody's item)". The teacher then called two pupils to the front of the classroom where she said, "suppose Mary* here gives John* (*pseudonym) a book and asks him to sell that book for her, say at K50.00 and then takes K5.00 from the K50.00 and gives it to

John. That K5.00 is what is called commission". In this demonstration, the teacher was trying to give a clear explanation of the word commission apart from explaining it in pupils' local language. After that demonstration the teacher wrote on the chalkboard the following example which she then discussed with pupils how to solve it: What will be the commission of a shopkeeper if he sells 50 cartons of soap at a commission of K20.00 per carton? Pupils were then asked to do problem number 4 and 5 of exercise C of page 63 of the learners' book. In this lesson, two kinds of context were used. The contexts were financial and cultural. Use of the Chichewa language constitutes cultural context.

In L2/ 07-03-16 on postal services, TB introduced the lesson by looking back at what the pupils had learnt in the previous topic on commission and discount. Then a new topic was introduced where pupils were asked to discuss some services rendered by the post office. During explanation of some of the services, Teacher B (TB) interacted with the pupils (ST) as follows:

> TB: During our time, we used to have what we called local buses and express buses. Not the mini buses you are using nowadays, Ok. Now, *ikakhala express bus yochokera ku Blantyre kupita ku Lilongwe, imagoyima malo ochepa okha. Ikachoka ku Blantyre, imadzayima mu Zomba, kuchoka Zomba imayima pa Liwonde kenako Balaka* (for an express bus from Blantyre to Lilongwe it had limited stops. From Blantyre it would stop in Zomba, then Liwonde and then Balaka). Within some few hours it was in Lilongwe but it was expensive. As for local buses, *bola sitegi, izi zimayima pena paliponse. Mukuganiza kuti zotsatila zake zinali zotani?* (provided there is a bus depot, these stopped at every depot. What do you think were the consequences?).
>
> ST: Shouting, "*kuchedwa*!" (arriving late!).

TB: That's it. The only advantage was that it was cheap. This can be likened to express mail and ordinary mail. Which one do you think can reach where it is going in few days?
ST: Express mail.
TB: Good! And which one can be cheaper here?
ST: Ordinary mail.

In this lesson, transport and communication, and cultural contexts were used. In the two lessons, TB used both 'real' and 'contrived' finances, transport and communication, and cultural kinds of context and could use more than one kind of context in one lesson.

Teacher C taught three lessons in which the teacher used almost the same kind of context. In L1/ 24-02-16, the teacher used the mathematical context in the example as well as the exercise. Having discussed with pupils the formula for calculating rate, the teacher wrote the following example on the chalkboard: At what rate will K600 yield an interest of K30 in 3 years? This was followed by a discussion on how to calculate rate and then pupils were asked to do exercise 16C on page 78 of the learners' book for standard 7. From the researcher's view point, abstraction was the nature of the Mathematics that the pupils were involved in. The emphasis in the lesson was on the procedure to get the correct answer. In Du Feu's (2001) understanding of context, the lesson was context – free.

A similar scenario prevailed in another lesson of the same participant. Pupils were exposed to yet another mathematical kind of context. In L2/ 25-02-16, pupils were involved in calculating time using the formula $T = \frac{100 \times I}{P \times R}$ where T, I, P and R stands for time, interest, principal and rate respectively. After discussing the formula, the teacher

wrote the following example on the chalkboard. “How long does it take to get K300 interest on K5, 000 at 3% per annum?” The teacher discussed with the pupils how they were supposed to solve problems of that nature. Such context which does not reflect what pupils normally practice in real life and the emphasis being step by step calculation of a problem constitutes a Mathematics context. In the lesson, pupils were then asked to do exercise 16D on page 79 of the learners’ book.

L3/ 26-02-16 started with a revision task. The teacher asked the pupils to state the formulas for calculating rate and time. Then TC led a discussion, asking guided questions that assisted the pupils to come up with the formula for calculating the principal. Upon coming up with the formula, the teacher wrote the following example on the chalkboard: Find the principal if K3, 000 interest is obtained in 2 years at 2% per annum. The problem was worked out and then the pupils were asked to do exercise 16E on page 80. From the three lessons that were observed on TC, findings have revealed that the participant did not use familiar contexts of the pupils during instruction. The Mathematics were context free hence abstract.

TD taught two lessons which were observed. In the first lesson, L1/ 23-02-16, the teacher used context of the kind, finances. The lesson started with an explanation of the meaning of the term discount. The teacher used a context of a table to explain what it means by discount. Thereafter, the teacher showed the pupils a radio and then asked:

TD: How much can you buy this radio?

ST 1: K4000.

ST 2: Aaaa, sir K7000 tsiku la mtsika (on market day).

TD: Ok, let us take K6500 so that no one gets angry. Now, how much will you be willing to pay after a discount?

ST 3: K5800, sir.

TD: Ok then. How much money has been deducted?

ST4: K700

TD: How have you found that?

TD: Let us have this example, "A radio marked K6500 was sold at K5800. Calculate the discount."

From there, the teacher discussed with the pupils how they could work out the problem. After that example, a second one was given involving a cell phone charger before pupils settled on problems on page 61 of the learners' book. In this lesson, TD used real financial context.

In summary, the four teachers used different kinds of context, the most prevalent being financial context. This was the case because of the nature of the topics that were observed. It is also important to note that the contexts in the word problems that were used during instruction were mostly contrived. They were not real even though it was proper to use authentic scenarios. For example, a seller giving a discount of K52. 00, L1/ 24-02-16. In real sense costs nowadays are pegged as multiples of K5 or K10. It would be real if the discount was say K50 or K55. Teachers' failure to modify examples to fit current situations testifies that the kinds of context the teachers used were determined by the topics and textbooks.

Research question 3: Sources of context used by teachers

This category aimed at identifying the sources of context used by primary school teachers during instruction. Data were collected during interviews as well as lesson observation and the findings are presented in table 4.4.

Table 4.4 Sources of context teachers used during lesson observations

Sources of context	TA		TB		TC			TD	
	L1	L2	L1	L2	L1	L2	L3	L1	L2
Books	√	√	√	×	√	√	√	√	×
Pupils' everyday experiences	×	×	√	√	×	×	×	√	√
Teachers' prior experience	×	×	×	√	×	×	×	×	×

KEY

√ = Available × = Not available

Table 4.4 reveals that three sources of context were used by the participants during the study.

a. Books

Findings in Table 4.4 show that all participants used books in their lessons as a source of context except for L2 of TB and L2 of TD. Responding to the question which sought to investigate the origins of the examples the participants used, they all indicated that they get them from either the teachers' guides or the learners' book. For instance, TD said, "We take examples right away from textbooks", and TA stated that, "I take them from the teachers' guide and also learners' textbooks". The examples they used and the word

problems they gave the pupils to write contained the context to assist the pupils in the learning process. As for TA, it was indeed testified during lesson observation that all the examples that were used during instruction came from books.

b. Pupils every day experiences

Table 4.4 also reveals that two teachers used the everyday experiences of the pupils as a source of the context they used. TD used familiar materials which pupils use almost on daily basis in their respective homes. For instance, the teacher used a radio and a cell phone charger in his examples which he knew that the pupils have an access to them on every day basis. TB used the Chichewa language in her lessons to explain some concepts. For example L2/ 07-03-16, which has already been presented, used a language which pupils use commonly.

Responding to the question as to why Chichewa language was used during instruction when the language policy does not allow that, the participant responded, "when am teaching in English throughout, the pupils do not understand. So, I use Chichewa so that they can understand the Mathematics better." The familiar materials and Chichewa language the teachers used constitutes the everyday experiences of the pupils.

c. Teachers' prior Experience

In addition to the sources that have been discussed, the table also shows that one participant used own experience as a source for the context that was used in her lesson. In the lesson, TB compared an ordinary mail and express mail to local bus and an express

bus respectively. In the lesson, L2/ 07-03-16, on postal services, TB was the one who had the knowledge about how the express and local buses operated. So that experience was used in the lesson to explain the concepts of express and ordinary mail. The participant had also indicated the same when she was asked where she gets the examples used in her lessons. Responding to the question the participant said, "Examples in the learners' books. Some I just give them my own examples. I just create them". In here, the teacher uses the experience she has as a source of context.

4.4 Chapter summary

All in all, there is evidence that some participants lacked enough knowledge of contextualisation as testified by the way they presented their lessons. Lack of adequate knowledge informed the participants' way of teaching in the sense that there was little inclusion of pedagogical contexts in their lessons. Even in cases where task context was provided by the books, some participants still failed to recognise and make use of it. Therefore, it can be ruled out that actual contextualised lessons as advocated for by LCE lacked during the study. It can now be speculated that lack of contextualised lessons is contributing to the underachievement of the pupils in Mathematics. This speculation bases on the documented facts that contextualised lessons help motivate and improve pupils' understanding.

This Chapter has presented the profile of the teachers that were involved in the study, the context in which the study was situated and the major findings of the study basing on the data that were collected from interviews and lesson observation.

CHAPTER 5

DISCUSSION OF FINDINGS, CONCLUSION, RECOMENDATIONS AND LIMITATION OF THE STUDY

5.1 Introduction

This study focuses on primary school teachers' understanding and implementation of contextualisation in primary school Mathematics teaching. To determine teachers' understanding and implementation of contextualisation in primary school Mathematics, a qualitative study of four standard seven Mathematics teachers was carried out. During the study, semi-structured interviews with four teachers were conducted. In additional, each teacher was observed teaching twice except for one teacher who was observed three times. Results from analysis of the teachers' responses and classroom lesson observations have shown that the teachers had little understanding of contextualisation and inadequate implementation of the same.

The Chapter is divided into six sections. Sections one to three, discusses the findings of the study which reveal that the teachers who participated in the study had little understanding of contextualisation hence failed to fully teach learner-centred lessons in context. This is consistent with Chu and Laurie (2013) findings in which some teachers, despite having being introduced to contextualisation ideas, failed to deliver their lessons in appropriate contexts.

5.2 Discussion of findings

Knowledge about contextualisation

Findings on this question revealed a variety of ideas on how the participants understood the concept of contextualisation. The findings showed a continuum between lack of knowledge and having the knowledge. It is important, before making further strides in the discussion, to note that all participants had knowledge about LCE because they were trained through INSET(s) when PCAR was being launched. Only teacher A indicated to have received LCE training while in college. It was assumed that knowledge of LCE would translate into knowledge of contextualisation since the latter is a principle of the former. However, the participants' understandings were completely varied.

Firstly, consider the teacher who indicated that lacked an idea about contextualisation, for example. The researcher thinks this response was given before the respondent had given a deeper thought of what it meant altogether. What was new would have been the word contextualisation but not the concept itself. However, it should not be completely ruled out that some participants might not have any idea due to the fact that some teachers tend to make interpretation of the learning environment according to their own experience as pupils (CORD, 1999). In such a case, some teachers who learnt through traditional, teacher-centred methods are likely to ignore innovations such as LCE and cling to what they experienced as pupils. But even in such a situation, the knowledge has to be there and if anything the implementation part is what has to suffer. Unless the participants learnt about LCE, then they can claim not to have an idea about contextualisation.

However, regarding contextualisation as a process of using locally available resources signifies some knowledge in the concept. Some teachers have also a similar understanding. For instance, one participant in a study by Tilana (2011, p. 59) had the understanding that it is about "Use of different resources from everyday life situations". There are many resources which pupils get in touch with on daily basis and are familiar to them. By using such resources, pupils are connected to the real world thereby become motivated to learn the Mathematics content. According to Drews (2007), local materials can be brought to the classroom and used successfully as resources to support and develop pupils' understanding of Mathematics in real-life context. He further argues that through manipulating familiar objects and materials, pupils are assisted to rationalise their experience. In concurrence, Schell & Babich (1993) argue that the foundation of situated learning is the placement of learning in a real-life context rather than as an individual abstract mental activity.

According to Richardson (2003) one of the pillars of constructivism is that teachers should consider multiple representations of their teachings. This can be done by using different local materials. In support of this, Chang (2011) argues that contextualising learning using an authentic environment and real-world examples is an important pillar in constructivist pedagogy. Local resources form an authentic environment in the learning process of the pupils.

Despite having this knowledge, of using local resources, the participant who raised this idea, TA, failed to use the knowledge during instruction. In the two lessons that were

observed on the teacher, the only resource used was a learners' book, yet there were opportunities to use a variety of local resources to aid construction of knowledge and the understanding of the concepts taught. In fact, the two lessons the teacher taught were task oriented despite having a sizable class and a conducive environment for a contextualised, learner centred lesson. In this case, the researcher thinks that the participant had no idea about contextualised teaching apart from having LCE knowledge and five years of working experience. It has been argued that teachers work with contexts they are familiar with (Julie, 2006). It could be that TA was not familiar with the context hence failed to have strategies for making the use of the context clear and explicit to the students. This was also a problem to most of the pupils as they could not fully understand the English language used in the books. Therefore, the context failed to assist the pupils in solving the problems. Brunner (1985) argues that in social constructivism, knowledge and its understanding are constructed when individuals engage socially in talk and activity about shared problems and tasks. This lacked in the pupils even though groups were used because they could not communicate in English.

The reason behind contextualisation is to bring a relationship in the teaching and learning process of the Mathematics content and what the pupils bring with them from home, their everyday life experiences. It is assumed that such practices make Mathematics more meaningful and relevant to the pupils and also aid understanding. Mwakapenda (2004) posits that understanding is one of the most important traits associated with the attainment of educational goals. By describing contextualisation as a relationship shows that TB had a better understanding of the concept. Many educationists have also

described the concept in a similar manner. For instance, Berns and Erickson (2001) takes it as a conception of teaching and learning that helps teachers relate subject matter content to real world situations. The words, "real world situation" embed everything familiar to the pupils or anything the pupils could relate to. Teacher B demonstrated understanding of contextualisation by implementing it during instructions. Despite having a very big class, the teacher used her experience to ensure that her lessons were contextualised. The word problems that were used from the textbooks were explained using pupils' experiences thereby simplifying the abstract concepts and allowing pupils to share their experiences in the learning process. The inclusion of Chichewa language (code switching) in explaining and discussing ideas with pupils assisted the pupils to take an active role in constructing their knowledge. This is in line with the social constructivists' view that meaning-making is portrayed as originating in social interactions between individuals, or as individuals' interactions with cultural products that are made available to them in books or other sources (Leach & Scott, 2003).

Much as scholars refer to contextualisation as a conception of teaching and learning, describing it as a technique of presenting a lesson is very broad. The description can mislead and may mean a number of things to different people. It can, therefore, be assumed that TD did not exactly know what the concept meant. That is why when the participant was asked to give examples, he talked of group work, pair work and individual work. These, in fact, are some techniques under LCE advocated for in constructivist pedagogy. This gives the impression that the participant had knowledge about LCE and a faint knowledge on contextualisation. Faint in the sense that what the

participant said had some connection to contextualisation. Teacher D presented a well contextualised lesson despite giving unclear definition of contextualisation. This could be attributed to the sizable class he had, enough textbooks and a vast teaching experience that assisted him in choosing the right materials and context to use in the teaching process.

Teacher C's description of contextualisation as critical thinking is another indication of lack of correct knowledge of the concept. Though having a large class, the fifteen years of teaching experience and LCE knowledge she possessed were enough to guide her to use contexts in her lessons. However, all the three lessons that were observed on the teacher lacked context. In that respect, the researcher concludes that TC had no knowledge about contextualisation and its implementation.

From the discussion it can be noted that the participants understood contextualisation differently. However, some of the ideas that were given are not consistent with what contextualisation is all about. That lack of adequate knowledge in some participants influenced their teaching process. It is very likely not to practice a skill one is not conversant with, or if anything, unsatisfying performance results.

Kinds of contexts used by the four teachers in the study

Kinds of context can be regarded as in exhaustive. There is a diversity in regards to kinds of context. However, some educationists categorise them for easy identification. Basing on Julie and Mbekwa (2005) categorisation, participants' data revealed that teachers used

the following kinds of context; finances, transport and communication, cultural and Mathematics.

From the data collected, finance was the mostly used kind of context during the study. This has been the case because the topics that were taught during lesson observation were almost the same in the four schools. This was not by design, only that the participants followed the topics in Mathematics books the way they were presented when writing. According to Julie and Mbekwa, as cited in Mthethwa (2007), finances as a category of context involves contexts that deal with banking related issues such as simple interest, contexts that deal with marketing related issues such as discounts and contexts that deal with budgeting. Contexts that deal with monetary issues, buying and selling for instance, constitutes pupils' daily life undertakings. Almost every student by the time she or he reaches standard seven has an experience with money and how transactions to do with the money are handled. When students learn things that are close to their lives, their interests are attracted and maintained (Perkins, 1993). In concurrence Cannella and Reiff (1994) argues, that in constructivism individuals construct their own new understandings or knowledge through the interaction between what they already know and believe with ideas, events, and activities with which they come in contact.

Contexts that involve marketing can also be easily role played in class by pupils. Teachers are encouraged to establish shopping corners in their classrooms where such contexts can be role played. There are a lot of locally available resources which teachers can use to come up with a well contextualised lesson in monetary issues. However, no

class had any shopping corner to advance Mathematics understanding through contextualisation and kinesthetic activity. This is contrary to the sociological aspect of the situated cognition theory which states that meaningful learning will only take place if it is embedded in the social and physical context within which it will be used (Brown, Collins & Duguid, 1989). Because of that, the researcher suggests that the widely use of financial context was due to the topics taught during lesson observation and not participants' choice. So too was the use of transport and communication kind of context. However, if kinds of context are regarded from Du Feu (2001) categorisation, most lessons were taught using contrived context instead of real context. What it means is that some of the participants did not bother to modify the examples from books to suite pupils' real life situations. Because of that some participants ended up teaching their lessons traditionally as they could not think outside what the books presented.

Another kind of context used, was the Mathematics context. Du Feu (2001) called it context-free kind of context. With this kind, the Mathematics is abstract and focuses on procedures. The findings have revealed that TC used Mathematics context in all her lessons on Interest. In other ways there was no use of context in such lessons. However, one teacher in another context in Tilana's (2011) study, teaching a similar topic on Interest managed to develop and use context. According to Tilana (2011, p. 69) the teacher said:

> Initially we were talking about "Mashonisas" (money lender), talking about what they know, I said to them supposing you went to Mashonisa and borrowed R500, and that you are going to return it as R500 after two months, they said no maybe as R750, or what. Then in business that money that is added on is called an

> interest, so I tried to use what they know then I went to banks, and look at what do they do if you are borrowing or investing.

The researcher takes the situation in this study as an indication of the teacher's lack of adequate knowledge and creativity on how to formulate contextualised instructions. However, it should be appreciated also that not all Mathematics content can be contextualised MEI (2015).

According to Ewing et al. (2010) contextualisation refers to anything that already exists, including cultures and home languages. Language and culture are intertwined and cannot be separated. Taking context from that perspective, Chichewa as a local language deserves to be regarded as an element of the cultural context. Chichewa language was a familiar and unifying language to the pupils in the areas where the study took place. Almost each and every student was able to hear and speak without many problems. Though the policy stipulates that from standard five up to eight pupils should be learning all subjects in English except for Chichewa, one participant still switched to Chichewa in teaching standard seven Mathematics. The reasoning behind was that pupils do not understand when they are taught in English. This has also been highlighted in some literature but it is open for argumentation. Ewing et al. (2010, p. 4) in their study about contextualising the teaching and learning of measurement within Torres Strait Islander schools, also reported the same in their findings that, "often it was not that the pupils did not know the mathematical concepts; rather, it was that they did not understand English and consequently what was being asked of them". This explains why some pupils perform poorly in Mathematics.

However, the cultural context was the least used kind of context even though this is the only kind of context that can be used in every lesson in Mathematics. Clearly, pupils were denied the right to explain, justify, and defend their answers due to language barrier. There was no encouragement of mathematical communication as is expected during pupils' interactions. One advocate of constructivism, Miller (2003) argues that pupils working in teams under the guidance of the teacher will discover and comprehend difficult concepts more easily if they can talk to each other about the problem. And communication is said to have taken place if people involved are able to understand one another. So, by clinging to English let the fleshiness of contextualisation to evaporate from the lessons as the pupils failed to understand and share ideas comfortably. This argument is supported by Kazima, Pwele and Kasakula (2011) findings which revealed that using home language (in this case Chichewa) as a resource in teaching and learning Mathematics, promotes learning and increases learner participation in the lesson. However, Mthethwa (2007, p. 77), while making recommendations on appropriateness of a context, cautioned that "teachers should ensure that they do not disempower learners in developing communication skills in English language as it is a medium of instruction".

It is very important to realise that using different kinds of contexts is very important because pupils have different experiences when coming to school. Therefore, the teacher has to bring varied contexts to accommodate the needs of all pupils.

Sources of context used by the four teachers

The contexts that teachers use during instruction have their sources. There might be many sources out there but as for this study, three were identified.

Whilst all teachers admitted of using textbooks in their lessons and for their teaching, there was a considerable variation in the way they were used. In some schools, pupils had the books all the time and could take them home while in other schools the books were only given during lesson time. Millett and Johnson (1966) argue that Mathematics has long been regarded by many teachers as a subject for which the textbook is the main source. However, this does not mean that it has to be followed without considering some modifications like the bible because this limits teacher creativity.

Taking for example the standard seven Mathematics textbook currently in use, was published in 2008. Since then, there have been many changes taking place in many areas. This has made the contexts that were real by then to be contrived by now. A good example to explain this is the cost of different items; it is no longer the same as it was in 2008. This is where the teachers needed to modify the examples in the books to make the Mathematics real to the pupils. However, only two teachers were able to do that.

Generally, some participants used textbooks for explanations and procedures without paying any attention to the context that was given by the books. The researcher thinks this is counterproductive in the sense that pupils failed to understand the concepts which would have been easily understood if context had been taken into consideration. In some

instances, some teachers deliberately used different worked examples from those in the textbooks, in order to initiate class discussion about the problems that they intended to give the pupils. However, in almost all cases, the exercises were usually given from the textbooks, regardless whether they were contextualised or not.

Taking it from the findings, the participants could be categorised as either faithful followers of the textbooks with little or no time on additional materials or followers of the plan and progression of the textbook but selective in its use by adding extra materials which was in line with pupils' context. For instance, some participants were able to incorporate examples outside the textbook but rich in every day experiences of the pupils. This gives an impression that while some participants were able to formulate their own examples, some participants lacked the capability to formulate their own examples with relevant context. Tilana (2011, p. 94) faced a similar scenario during her study and explains, "Teachers seemed not to be able to design or identify their own context for their learners; they use the context from the textbooks". On overall books were heavily used by the participants. A very good explanation to that could be that "Decisions about the kind of contexts to use are often made by developers of curriculum materials such as test developers, authors of textbooks and teachers" (Kazima, 2015, p. 111). In the case of this study, authors of textbooks contributed greatly to the lessons that were taught and observed.

Another source of context is the everyday experiences of the pupils. The word "everyday" in this perspective embraces a wide spectrum of things which are familiar to

the pupils. It involves pupils' daily life experiences and practices. It should be understood that the term has a variety of meanings depending on the type of situation it is used.

Pupils' everyday experiences are a very rich source of context for Mathematics. This varies from one place to another due to factors like the environmental and socio cultural aspects of the pupils. However, some contexts can be generalised to a number of pupils across a particular region. For instance, the use of Chichewa language during instruction has been treated as originating from the pupils' everyday life experience, thereby making the everyday as a source for the Chichewa context. Carraher and Schliemann (2002) argue that naturally occurring everyday situations immerse pupils in learning situations that are diverse and consistently challenging enough to provide a wide-ranging background in Mathematics. It is further argued that the teacher's knowledge about pupils' everyday experience is an influential resource for the teacher (Haara, 2015). This counts in the teacher's efforts to get to know each student, and in this particular case, when relating mathematical content to everyday situations and activities relevant to pupils' experiences outside school. For example the participant who used a buying and selling context during a lesson. That context too, is one of the most commonly and locally used context which is accessible to majority of the pupils.

Another source of context teachers used during the study was experience. Whose experience by the way? This source describes the experiences of the teachers and not of the pupils. Teachers possess a lot of rich experience that if well utilised can assist in pupils' learning and understanding of Mathematics. Haara (2015, p. 330) argues that, "for

teachers with a developed professional knowledge in Mathematics, everyday life experiences may represent a rich source of relevant situations and examples for teaching Mathematics through practical activities". In constructivism, teachers are supposed to introduce new ideas or cultural tools where necessary and to provide the support and guidance for students to make sense of these for themselves (Driver et al, 1994). However, the study reveals that most of the participants did not utilise such experiences in their lessons but relied mostly on books. Their classroom instructions were dictated by either the learners' book or the teachers' guide. Teachers are regarded as custodians of knowledge and expected to have adequate experience to support pupils in constructing new knowledge. That is why constructivists commend that learning should be supported by the teacher (inWent, 2009). This however, works where the teacher has the experience.

The findings confirm that: books, pupils' everyday life experiences and teachers' experiences are potential sources teachers can rely upon when preparing and teaching contextualised lessons. Much as the books have proved to be the most utilised source of context, the teacher's attention to pupils' everyday experience is a more important resource than the teacher's personal experience. Pupils' everyday experiences ought to prevail when it comes to issues to emphasise when choosing to use a contextualised activity in Mathematics teaching. However, such experiences were not utilised potentially thereby making learning more abstract.

5.3 Conclusions

The purpose of the study was to establish how teachers understand and implement contextualisation in primary school Mathematics teaching. Lesson observations and semi-structured interviews were conducted to record and generate teachers' classroom practices and ideas respectively.

Analysis of the study findings focussed on addressing the following critical areas:

- Knowledge about contextualisation
- Kinds of contexts used by the four teachers in the study
- Sources of context used by teachers in the study.

The findings have shown that;

a) Teachers' knowledge and understanding about contextualisation tends to be limited, at least for the teachers involved in the study.

b) Despite limited knowledge of the concept, some teachers are able to apply the concept of contextualisation in some of their lessons. This is possible because most of the task contexts they used are found in textbooks and teachers' guides.

c) The contexts used in the lessons observed were generally 'contrived' – invented to fit particular mathematical points irrespective of how appropriate these were to the real life situations of the pupils.

d) Textbooks and teachers' guides were the most relied source of context used by all teachers in the study. These were used regardless of whether the context was appropriate and familiar to the pupils. However, other sources of context such as

pupils' everyday experiences and teachers' prior experiences were also manifested.

e) There was lack of creativity in some teachers as far as using their prior experiences in formulating contextualised instruction was concerned. This is evidenced in the use of contrived contexts during the teaching process.

5.4 Recommendations

A number of issues have been raised from this study. It is therefore, important to suggest and recommend that:

- Teacher educators should ensure that their teachers understand and implement use of different contexts in their lessons during teaching practice. It is necessary in training Mathematics teachers to teach in context, to develop the skills needed to be able to relate Mathematics and context in a more problem-solving or inquiry oriented approach.
- Schools should be in a position to plan and come up with CPDs where teachers can be sharing ideas on how best they can plan and teach contextualised lessons. Equipping teachers to teach in context will require extensive and continued training. Knowledge gained will be of great help than having books with contextualised problems already.

The researcher also suggests the following potential area for further studies. There is need to explore the practices of more teachers to check their understanding and implementation of contextualisation.

5.5 Limitations of the study

The study was small scale, as it only focused on four teachers. It would be interesting to see if these findings are true more broadly for teachers from different districts and education divisions, and the data could have consisted of variety of responses based on how teachers in each district implement contextualisation in Mathematics teaching. Focusing on a quarter of a term's work also provided limitations, as there was a possibility that teachers would use more contexts had it been that the study had lasted for about a full term or two.

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APPENDICES

Appendix 1: Data collection instruments

a. Interview guide for teachers.

Questions

Knowledge and understandings

1) What do you understand by the term contextualisation with regards to the teaching of Mathematics?
2) How did you come to know about this concept? Is it from TTC training or in-service teacher education?
3) What are your views about contextualisation in Mathematics- do you think it is important? Why.

   Probe: *Are there other advantages of contextualisation?*

Kinds of contexts

4) Considering your own practices in class, do you use contextualisation (use of pupils' real life experiences and examples) when teaching Mathematics?
5) How frequently do you use contextualisation in your lessons? (every lesson, every other lesson, once a week, once a month?
6) Could you share with me some examples of contexts you have used in your lessons and the concept that you were teaching.
7) Are there other contexts that you have heard from other teachers but you have not used them or contexts that you have read about?

Sources

8) Where do you take the examples you use when teaching Mathematics?
9) Probe: (*If they are from books) Do you modify them in any way or you just use them as they are?* Probe: *What prompts you to/ Why modify them?*
10) Do you feel comfortable using the examples in the textbooks and teachers' guide? Probe: *Would you explain why*.

b. Lesson observation schedule

LESSON OBSERVATION SCHEDULE

Name of teacher: _____ID_____ **Date**: _____

Name of school: _____ID_____ **Time**:_____

Experience: _____ **Sex**: _____

Topic: _____

The purpose of this observation is to collect information on the kinds of contexts primary school teachers use and how they implement contextualisation in the teaching of Mathematics

Step	Context mentioned (Tick)		If yes, state the context used
	Yes	**No**	
5 minutes Introduction			
5 minutes			
5 minutes			
5 minutes			
5 minutes			
5 minutes			
5 minutes Conclusion			

c. Lesson observation schedule (checklist)

LESSON OBSERVATION SCHEDULE

Name of teacher: _____ **Date**: _____

Extent to which learning as a situated process is practised	Tick		
	Yes	**No**	**Comments**
Are new concepts presented in real-life (outside the classroom) situations and experiences that are familiar to the student?			
Are concepts in examples and student exercises presented in the context of their use?			
Are new concepts presented in the context of what the student already knows?			
Do examples and student exercises include many real, believable problem-solving situations that students can recognize as being important to their current or possible future lives?			
Do examples and student exercises cultivate an attitude that says, "I need to learn this"?			
Do students gather and analyse their own data as they are guided in discovery of the important concepts?			
Do the lesson and activities encourage the student to apply concepts and information in useful contexts?			
Are students participating regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision making occur?			
Do the lesson and exercises improve students' reading and other communication skills in addition to mathematical reasoning?			

Appendix 2 : Authorisation letters.

CHANCELLOR COLLEGE

Principal: Richard Tambulasi
B.A (Pub Admin), BPA(Hons) MPA, PhD

P. O. Box 280, Zomba, MALAWI
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bchulu@cc.ac.mw

OFFICE OF THE DEAN OF EDUCATION

17th December, 2015

TO WHOM IT MAY CONCERN

Dear Sir/Madam

LETTER OF INTRODUCTION (MASTER OF EDUCATION)

The Faculty of Education would like to introduce to you Mr Lameck D Sandram, Registration no. MED/PR/SC/04/14, Chancellor College M.Ed Student who is supposed to do research in area of his interest.

This letter serves to request you to assist his with data collection in your zone.

The Faculty of Education will appreciate your support in this very important aspect of our students' training.

Yours faithfully,

UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE
2015 -12- 17
DEAN
FACULTY OF EDUCATION

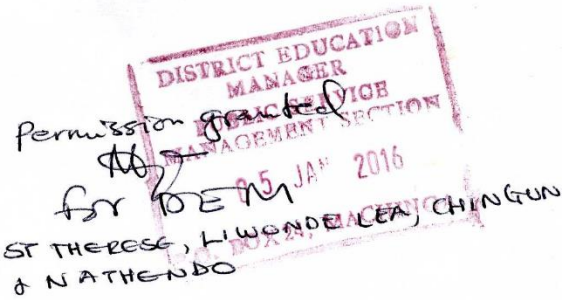
F. Kholowa, (PhD)
DEAN OF EDUCTAION

cc: Supervisor

5th January, 2016.

FROM: Lameck D. Sandram
Machinga Teachers Training College
P. O Box 140
LIWONDE
Cell: 0991246100 /0881741664
E-mail: sandramlameck@gmail.com

TO: The District Education Manager
Machinga District Education Office
P. O Box 24
MACHINGA



Dear Sir

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SOME SCHOOLS IN MACHINGA DISTRICT

I am a Master of Education student at the University of Malawi, Chancellor College and I am carrying a research in partial fulfilment of the requirements of this degree. My area of interest is to investigate how primary school teachers understand and implement mathematical contextualisation as they teach students.

I write to request your office to permit me observe some lessons and then conduct interviews at some of the primary schools in your district. I promise to treat the identity of the teachers, schools and any information to be obtained from these sources with maximum confidentiality.

Thank you in advance for your cooperation.

Lameck Dition Sandram

6th January, 2016.

FROM: Lameck D. Sandram
Machinga Teachers Training College
P. O Box 140
LIWONDE
Cell: 0991246100 / 0881741664
E-mail: sandramlameck@gmail.com

TO: The Primary Education Advisor
St. Tereza Zone
P. O Box 50
LIWONDE

Dear Sir/ Madam,

REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SOME SCHOOLS IN YOUR ZONE

I am a Master of Education student at the University of Malawi, Chancellor College and I am carrying a research in partial fulfilment of the requirements of this degree. My area of interest is to investigate how primary school teachers understand and implement mathematical contextualisation as they teach students.

I write to request your office to permit me observe some lessons and then conduct interviews at some of the primary schools in your zone. I promise to treat the identity of the teachers, schools and any information to be obtained from these sources with maximum confidentiality.

Thank you in advance for your cooperation.

Lameck Dition Sandram