DEPARTMENT OF EDUCATION

TEACHER METHODOLOGIES AND POOR PERFORMANCE IN MATHEMATICS LEARNING AT ZJC IN CHECHECHE CLUSTER IN CHIPINGE DISTRICT

BY

MACHUMI PHILEMON

REGISTRATION NUMBER   B1337326

DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE DEGREE OF MASTER OF SCIENCE EDUCATION IN CURRICULUM STUDIES

30 OCTOBER 2015
DECLARATION

I, Machumi Philemon declare that this research is my own original work. It is being submitted for the Degree of Master of Science Education (Curriculum Studies) at this university and I affirm that it has not been submitted to this or any other university in support for a degree or any other qualification.

Signature of Student……………………………..   Date……………………….

Signature of Supervisor………………………………  Date……………………….
DEDICATION

This dissertation is dedicated to my wife Yuna and my three children; Tinevimbo, Tanatswa and Phil. They were my source of inspiration as I worked on this dissertation.
ACKNOWLEDGEMENTS

I would like to express gratitude to institutions and individuals who participated in this study. Without the support of them this dissertation would not have been produced. I would like to apologize to those whom I fail to mention by name but, however, value their support.

My most sincere and heartfelt gratitude goes to Bindura University of Science Education for offering me a place to do my masters of education degree. I also want to thank the government of Zimbabwe through the Ministry of Primary and Secondary education for giving me permission to carry out the research in schools. I sincerely thank fellow school heads of schools in which this study was conducted for their immense support.

I sincerely thank Mr Z Ndemo, my supervisor for providing guidance throughout the study. This dissertation is what it is because of his assistance.

While carrying out the study the researcher received great support from fellow students, David Marango, Cathbert Butete, Silindokuhle Sibanda and Raminos Madi. I say thank you for your encouragement and support guys. May God bless you?

My most sincere and deepest gratitude goes to my wife, Yuna, for the support and encouragement to soldier on when the going got tough. Without her support and advice this project would not be what it is today. I also want to thank my three children Tinevimbo, Tanatswa and Phil for understanding when dad was busy working on this research project.
This study sought to investigate the teaching methods that lead to poor performance in mathematics at Zimbabwe Junior Certificate (ZJC) in Chipinge district. The mixed method research design was used. The population comprised ZJC mathematics teachers, mathematics heads of department and form one and two students. The sample was made up of 30 mathematics teachers and 20 students. Random and purposive sampling was used to select the participants. The questionnaire was used to collect information from the teachers. Interviews, observation and documentary analysis were some of the instruments which were used to collect information from the respondents. The research revealed that teachers do not use methods that make students conceptualize mathematics ideas. The study also found out that most mathematics teachers needed to further their education by attaining degrees which would result in them improving their content knowledge.
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 4.1:</td>
<td>Sex of respondents n = 20</td>
<td>32</td>
</tr>
<tr>
<td>Table 4.2:</td>
<td>Age of respondents n = 20</td>
<td>33</td>
</tr>
<tr>
<td>Table 4.3:</td>
<td>Qualifications of respondents n = 20</td>
<td>33</td>
</tr>
<tr>
<td>Table 4.4:</td>
<td>Teaching experience of respondents n = 20</td>
<td>34</td>
</tr>
<tr>
<td>Table 4.5:</td>
<td>Student-centered methods. n = 20</td>
<td>36</td>
</tr>
<tr>
<td>Table 4.6:</td>
<td>Motivation in mathematics lessons n = 20</td>
<td>38</td>
</tr>
<tr>
<td>Table 4.7:</td>
<td>Syllabus use in mathematics n = 20</td>
<td>39</td>
</tr>
<tr>
<td>Table 4.8:</td>
<td>Age range of HODs. n = 10</td>
<td>41</td>
</tr>
<tr>
<td>Table 4.9:</td>
<td>Qualifications of HODs n = 10</td>
<td>42</td>
</tr>
<tr>
<td>Table 4.10:</td>
<td>Electronic media in mathematics department n = 10</td>
<td>45</td>
</tr>
<tr>
<td>Table 4.11:</td>
<td>Prior knowledge in mathematics department n = 10</td>
<td>45</td>
</tr>
<tr>
<td>Table 4.12:</td>
<td>Motivation in the mathematics department n = 10</td>
<td>46</td>
</tr>
<tr>
<td>Table 4.13:</td>
<td>Syllabus usage in mathematics department n = 10</td>
<td>46</td>
</tr>
<tr>
<td>Table 4.14:</td>
<td>Sequencing of syllabus topics when scheming n = 10</td>
<td>47</td>
</tr>
<tr>
<td>Table 4.15:</td>
<td>Summary of results from questionnaire data in Section C</td>
<td>48</td>
</tr>
<tr>
<td>Table 4.16:</td>
<td>Questionnaire Agree responses from teachers and HODs using Pearson’s product</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>moment correlation coefficient</td>
<td></td>
</tr>
</tbody>
</table>
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 4.1:</td>
<td>Graph showing variety of teaching methods</td>
<td>35</td>
</tr>
<tr>
<td>Figure 4.2:</td>
<td>Pie Chart showing use of student-centered methods</td>
<td>36</td>
</tr>
<tr>
<td>Figure 4.3:</td>
<td>Bar graph showing use of electronic media</td>
<td>37</td>
</tr>
<tr>
<td>Figure 4.4:</td>
<td>Column graph showing the use of prior knowledge</td>
<td>38</td>
</tr>
<tr>
<td>Figure 4.5:</td>
<td>Graph showing staff development workshops in mathematics</td>
<td>39</td>
</tr>
<tr>
<td>Figure 4.6:</td>
<td>Pie Chart showing the sequencing of topics by teachers</td>
<td>40</td>
</tr>
<tr>
<td>Figure 4.7:</td>
<td>Pie Chart showing sex composition of HODs</td>
<td>41</td>
</tr>
<tr>
<td>Figure 4.8:</td>
<td>Column graph showing HOD experiences</td>
<td>42</td>
</tr>
<tr>
<td>Figure 4.9:</td>
<td>Column graph showing the methods used in the department</td>
<td>43</td>
</tr>
<tr>
<td>Figure 4.10:</td>
<td>Pie chart showing use of student-centered methods</td>
<td>44</td>
</tr>
<tr>
<td>Figure 4.11:</td>
<td>Column graph showing responses for student-centered challenges</td>
<td>44</td>
</tr>
<tr>
<td>Figure 4.12:</td>
<td>Bar graph showing HODs responses on workshops on syllabus interpretation</td>
<td>47</td>
</tr>
<tr>
<td>Figure 4.13:</td>
<td>Bar graph showing supervision reports collected</td>
<td>51</td>
</tr>
</tbody>
</table>
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendices</th>
<th>Descriptions</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>ZJC mathematics teacher questionnaire</td>
<td>72</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Mathematics Hod Questionnaire</td>
<td>75</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Pupils’ Interview Guide And Questions</td>
<td>77</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Letters Of Approval</td>
<td>79</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF APPENDICES</td>
<td>viii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>ix</td>
</tr>
</tbody>
</table>

## CHAPTER 1 ........................................................................................................ 1

### 1.0 INTRODUCTION ............................................................................................. 1

1.1 Background to the study .................................................................................. 1
1.2 Statement of the problem .................................................................................. 2
1.3 Research question ............................................................................................. 2
1.4 Research sub-question ...................................................................................... 2
1.5 Statement of hypothesis .................................................................................... 3
1.6 Research objectives ........................................................................................... 3
1.7 Purpose of the study ......................................................................................... 3
1.8. Significance of the study.................................................................................. 3
1.9 Assumptions ....................................................................................................... 4
1.10 Definition of terms .......................................................................................... 5
1.11 Limitations to the study .................................................................................. 6
1.12 Delimitations of the study .............................................................................. 6
1.13 Summary ........................................................................................................... 6

## CHAPTER 2 ............................................................................................................. 7

### 2.0 REVIEW OF RELATED LITERATURE ................................................................ 7

2.1 Introduction ...................................................................................................... 7
2.2 Theoretical Framework ....................................................................................... 7
2.2.1 The Constructivist theory ............................................................................. 7
2.2.1.2 The Socio-cultural theory ....................................................................... 8
2.3 Global Trends on Mathematics performance ................................................... 9
2.4 Teaching Methods and how they contribute to poor Mathematics performance .. 11
2.5 Teacher content knowledge ............................................................................. 16
2.6 Mathematics syllabus interpretation .................................................................. 20
2.7 Summary ........................................................................................................... 22
4.3.1. Distribution by gender ........................................................................... 41
4.3.2 Distribution by age .................................................................................. 41
4.3.3 Distribution by qualifications ................................................................. 42
4.3.4. Mathematics HOD Experience ............................................................... 42
4.3.5 Responses from mathematics HODs ....................................................... 43
4.3.5.1 Methods used in the mathematics department (Question 5)............... 43
4.3.5.2 Student-centered methods in mathematics (Question 6) ..................... 44
4.3.5.3 Challenges face when using student-centered methods (Question 7)... 44
4.3.5.4 Electronic media in mathematics department (Question 8) ............... 45
4.3.5.5 Prior knowledge in mathematics (Question 9) ..................................... 45
4.3.5.6 Motivation of pupils in the mathematics (Question 10)..................... 46
4.3.5.7 Syllabus use in mathematics (Question 11) ....................................... 46
4.3.5.8 Mathematics staff development workshops (Question 12) ............... 47
4.3.5.9 Sequencing of topics in the syllabus (Question 13) ......................... 47
4.4.0. Data collected student interviews ......................................................... 49
4.5.0 Observations data .................................................................................. 50
4.5.0 Data from document analysis ................................................................. 50
4.6.0 Research Findings ................................................................................. 51
4.7.0 Discussions ............................................................................................ 54
4.7.1 Teaching methods which contribute to poor performance in mathematics. 54
4.7.2 Teacher content knowledge ................................................................ 55
4.7.3 Syllabus interpretation ......................................................................... 56
4.8 Summary ................................................................................................. 57

CHAPTER 5 ........................................................................................................ 58
5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS ....................... 58
5.1 Introductions ............................................................................................. 58
5.2 Summary .................................................................................................. 58
5.3 Conclusions .............................................................................................. 59
5.4 Recommendations .................................................................................... 60
REFERENCES ................................................................................................. 62
APPENDICES ................................................................................................. 72
CHAPTER 1

1.0 INTRODUCTION

1.1 Background to the study

Poor performance in mathematics is a cause of concern to every nation. Mathematics is inevitably utilized in daily activities, Social Sciences, Engineering, Aerodynamics, and military advancements among other fields (Cockroft 1982). According to the European Commission (2011), Mathematical competence has been identified by Education Ministers as one of the key competences necessary for personal fulfillment, active citizenship, social inclusion and employability in a knowledge society. Mathematics is a subject in which accomplishment in secondary school is particularly significant for both an individual’s and a country’s economic well-being. (Hanusheck, Peterson and Woessmann, 2010). Mastery of mathematics skills is tied to critical thinking, analysis and abilities to succeed in tertiary level and workplace. Poor performance in mathematics may results in citizens who are likely to have challenges in the solving of problems such as global warming and socio-scientific issues. Zekele (2000) relates the importance of Mathematics to scientific, industrial, technology and social progress of a society.

Most students perform poorly at secondary schools in mathematics despite the important role the subject plays both at school and in life in general. The results of a research conducted in 2009 by the Programme for International Student Assessment (PISA), revealed that U.S. students ranked a dismal 25th out of 35 countries (OECD Programme for International Student Assessment, PISA, 2009). European Commission once reported that policy-makers need to do more to help schools tackle low achievement in Mathematics (European Commission press release, 2011). A report on the teaching of Mathematics in Africa (2014) says secondary level mathematics education is weak in most African countries, reducing the potential population of talented students who choose mathematics majors at the university level. A lot of researches on the causes of poor performances in mathematics at junior level in secondary schools have been
conducted outside Zimbabwe. In Zimbabwe, most researches on the causes of poor performance in mathematics were carried out at ‘O’ level. The poor performance in mathematics at secondary school has motivated the researcher to carry out this research in Checheche cluster in Chipinge district in Zimbabwe so as to fill the gap. The way mathematics is taught has generated interest to investigate factors that contribute to students’ poor performance in mathematics at Zimbabwe Junior Certificate (ZJC) so that corrective measures can be taken at an early stage before students do mathematics at ‘O’ Level, ‘A’ Level and tertiary institutions. This is supported by Ausubel (1968) and Simpson (1978) who say prior experiences in a subject area influence future learning experiences in that area. The experience of the researcher as a ZJC mathematics teacher has motivated the research to investigate the disparities that exist between the intended and how the subject is actual taught which are likely to cause poor performance in mathematics.

1.2 Statement of the problem

Most of the ZJC mathematics teachers are trained and the government and parents are providing most of the resources that are needed in the learning of mathematics. The ZJC mathematics performance is not pleasing despite all these efforts. The purpose of this study was to investigate if poor mathematics performance at ZJC is caused by methodologies used by teachers.

1.3 Research question

Does teacher methodology contribute to poor performance in mathematics at ZJC?

1.4 Research sub-question

The following were some of the sub-questions that forced the study to be carried out:

i) Which teacher’s methods contribute to poor performance in Mathematics at ZJC?
ii) Does teacher content knowledge contribute to poor performance in mathematics at ZJC?
iii) Do the challenges that teachers face when implementing the syllabus contribute to poor performance in mathematics at ZJC?
1.5 Statement of hypothesis

The higher the quality of teacher methodology the lesser the students would perform poorly in mathematics.

1.6 Research objectives

The following are some of the research objectives:

i) To find out teaching methods that contribute to poor performance in mathematics at Zimbabwe Junior Certificate.

ii) To find out whether teacher content knowledge contribute to poor performance in mathematics at ZJC.

iii) To find out whether the challenges that teachers face when implementing the syllabus contribute to poor performance in mathematics.

1.7 Purpose of the study

The purpose of the research was to investigate how teaching methods contribute to poor ZJC mathematics performance in secondary school. The research also sought to find out the disparities that exist between the intended and what actually takes place in the teaching of ZJC mathematics.

1.8 Significance of the study

The study would appraise the Ministry of Primary and Secondary Education which is an organ of the government on what need to be done so that Mathematics can be effectively taught in secondary schools in Chipinge district in particular and Zimbabwe in general. The study would also help the policymakers in coming up with what to include in the teacher training course of secondary school teachers. The study might also be of great importance in coming up with the teaching qualifications needed for teachers who teach secondary school Mathematics.

This study has significant implications for the student in acquainting them with factors affecting their Mathematics performance so that they know how to overcome the negative factors and how
to make use of the positive factors. The importance of this study would also be that if the causes of student poor performance in Mathematics are known, the solution to mitigate these causes will be offered. This might result in improved Mathematics performance, which will give them opportunities to pursue Mathematics and science related courses at ‘O’ level, ‘A’ level and in higher institutions of learning.

The research is likely to add knowledge to the already existing studies on the factors that contribute to Mathematics poor performance in secondary schools. The study if it is the first one to be carried would make a great contribution the body of knowledge and could be used as a baseline data. The study would also help illuminate those Mathematics teaching and learning methods that are applicable to the Zimbabwean context.

The study may also encourage mathematics teachers to use teaching methods that might result in improved Mathematics performance at secondary school. The research would also enlighten teachers of furthering their education thus keeping them abreast of the new teaching methods. The research would also enlighten teachers on the importance of the effective use of the Mathematics syllabus.

The study would encourage the heads of schools hold staff development workshops on effective Mathematics teaching methods and effective use of the syllabus. The study would also encourage District Education Officers to hold district workshops on the teaching of Mathematics.

### 1.9 Assumptions

The researcher had the following assumptions to the study.

i) Teaching methods contribute to poor performance in mathematics at Zimbabwe Junior Certificate.

ii) Teacher content knowledge contributes to poor performance in mathematics at ZJC.
1.10 Definition of terms

The following definitions were provided to ensure uniformity and understanding of these terms throughout the study.

**Pedagogy:** Simon (1981) defines pedagogy as the science of teaching. Alexander (2008) defines pedagogy as the process of teaching. He further says it can be approached as what we need to know, the skills we need to command, in order to make and justify the many different kinds of decisions needed to be made. In this study pedagogy is going to be taken as all the teaching activities.

**Pedagogical knowledge:** These are teaching strategies (Shulman, 1986). Teaching strategies are methods. In this study pedagogical knowledge is going to be taken as methods that teachers use to make ZJC pupils learn mathematics.

**Syllabus:** According to Aggarwal (2000), a syllabus identifies the subject, content and activities to be learnt by the pupils. In this study the syllabus is taken as something which provides the knowledge to be taught to students and a guideline on the teaching methods to be used to teach certain type of knowledge.

**Poor performance:** It is a performance that is adjudged by the examinee or testee and some other significant as falling below an expected standard (Aremu and Sokan, 2003). In this study poor performance is taken as failing to get half or above half in mathematics written exercises and tests.

**Content knowledge (CK):** It refers to the body of information that teachers teach and that students are expected to learn in a given subject such as mathematics. CK generally refers to the facts, concepts, theories and the principles that are taught and learnt. In this study CK means all the mathematics ideas that teachers have learned in academic courses and professional courses.

**Pedagogical content knowledge (PCK):** Shulman (1987) defines pedagogical content knowledge as the teachers’ interpretations and transformations of the subject matter knowledge in the context of facilitating student learning. Pedagogical content knowledge is a form of knowledge that makes science teachers rather than scientists (Gudmundsdottir, 1987a). In this
study PCK is taken as the teachers’ knowledge of mathematics which is used to teach and is used to help students understand mathematics

**Knowledge construction process:** Describes how teachers help students to understand, investigate, and determine how the biases, frames of reference, and perspectives within a discipline influence the ways in which knowledge is constructed within it (Banks, 2001). In this study knowledge construction process is taken as the activities that teachers give students in mathematics to make them learn the concepts.

1.11 **Limitations to the study**

The study used a small sample and sub-samples; hence findings of the study would have limited generalizability. The other limitation is that respondents may give false responses thereby affecting the validity of the findings. The weakness could be overcome through the use of mixed methods which this study employed in form of questionnaires and interviews.

1.12 **Delimitations of the study**

The study was carried out in Checheche cluster, Chipinge District, in Zimbabwe. Views from 20 ZJC Mathematics teachers, selected from ten secondary schools, were used in the study. 20 ZJC students and 10 mathematics heads of department also provided information in the study. The study was done using ZJC students so that solutions to mitigate factors that contribute to high failure rate in mathematics are known earlier before students get to do mathematics at a higher level.

1.13 **Summary**

In this chapter background to the study, statement of the problem, research question, research sub-question, aim of the study, research objectives, the purpose of the study, significance of the study, assumptions, definitions of terms, limitations to the study and delimitations to the study have been dealt with. The problem to be investigated and the area from which the sample will be taken have been shown. In the subsequent chapter the related literature will be reviewed.
CHAPTER 2

2.0 REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter outlines the theoretical framework of this study. The theories that will be looked at are Constructivist theory and the Socio-cultural theory. Review of the literature related to this study will also be done in this chapter.

2.2 Theoretical Framework

2.2.1 The Constructivist theory

Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. Therefore children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences (Jonassen, 1994). Constructivism is a "view of learning in which learners use their own experiences to construct understanding that make sense to them, rather than having understanding delivered to them in already organized form…" (Kauchak & Eggen, 1998, p.184). The proponents of the constructivist theory are John Dewey and Jean Piaget. The major theme in the constructivist theory is that learning is an active process in which learners construct new ideas or concepts based upon the current or past knowledge (Brunner, 1966). The constructivist theory advocates for the teacher to try and encourage students to discover ideas and knowledge by themselves. According to Brunner (1966), theory of instruction should be in ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner. The mathematics teacher should use methods that make the students learn concepts through the manipulation of information and objects in the environment. Piaget, another proponent of Constructivism, argues that people produce knowledge and form meaning based upon their experiences (Zindi, Peresuh and Mpofu, 1997). According to Piaget, two of the key components which create the construction of an individual’s new knowledge are accommodation and assimilation. Assimilation causes an individual to incorporate new experiences into the old
experiences and accommodation is reframing the world and new experiences into mental
capacity already present (Zindi et al, 1997). Piaget believed that interaction encourages
development by creating disequilibrium cognitive conflict or cognitive dissonance which
motivates change. Piaget believed that the most helpful interactions were those between peers
because peers are on an equal basis and can challenge each other’s thinking (Zindi et al, 1997).
According to Brunner (1973), the guiding principles of the constructivist theory are knowledge is
constructed, not transmitted, prior knowledge impacts the learning process and building useful
knowledge structures requires effortful and purposeful activity. A constructivist teaching strategy
is based on the belief that students learn best when they gain knowledge through exploration and
active learning (Jonassen, 1994). Students learn better by doing and from each other and the
teacher through interactions. Tobin and Tippin (1993) say Constructivism is a way of thinking, a
referent for building models of teaching, learning and curriculum. Constructivist theory
influences mathematics teaching methods and how teachers plan their lessons from the syllabus.
According to Douglamas (1998), there are five faces of Constructivism, namely trivial, radical,
social, cultural and critical. All these types of Constructivism play important roles in the teaching
of mathematics at secondary school (Cobb, 1994). Various approaches in pedagogy derive from
the constructivist theory.

2.2.1.2 The Socio-cultural theory

Socio-cultural was coined by Lev Vygotsky. It is also called the social constructivism. He
believed that parents, caregivers, peers and the culture at large were responsible for the
development of higher order functions (Vygotsky, 1978). An important component of the
sociocultural theory is known as the zone of proximal development (ZPD). According to
Vygotsky, the ZPD is the distance between the actual development level as determined by
independent problem solving and the level of potential development as determined through
problem solving under adult guidance or in collaboration with more capable peers (Vygotsky,
1978). Another component of the sociocultural theory is the more knowledgeable other (MKO)
(Wertsch, 1991). MKO refers to someone who has a better understanding or a higher ability level
than the learner, with respect to a particular task, process, or concept (Vygotsky, 1978). For
example the teachers, other adults, advanced students, sometimes even computers form the
MKO. Furthermore, Tudge and Scrimsher (2003) note, Vygotsky was not only interested in what
more knowledgeable others brought to the interaction, but also in what the child himself and herself brought to the interaction, as well as how the broader cultural and historical setting shaped the interaction. Another theme of Vygotsky’s theory is that human action, on both the social and individual planes, is mediated by tools and signs (semiotics) (Wertsch, 1991). The semiotic means include maps, diagrams, computers and calculators (Tudge and Scrimsher, 2003). Mathematics teaching can be done using the sociocultural theory (Ball, 1930). There is the issue of scaffolding in the sociocultural theory. Scaffolding is the process of guiding the learner from what is presently known to what is to be known. This occurs in the ZPD. The more competent person supports the learner in their endeavor to reach the new level of development (Wertsch, 1991).

2.3 Global Trends on Mathematics performance

Mastery of mathematics skills is tied to critical thinking, analysis and abilities to succeed in tertiary level and workplace. United States President, Barrack Obama, once said “Leadership tomorrow depends on how we educate our students today, especially in Math, Science, Technology, and Engineering.” (Hanusheck et al, 2010). Poor performance in Mathematics undermines pupils’ chances of pursuing courses like Engineering and Medicine and other career related fields, consequently resulting into poor opportunities in the job market (Nyabuto and Njoroge 2014). Good performance in Mathematics assures most nations citizens who are likely to contribute in the solving of problems such as global warming and socio-scientific issues. Zekele (2000) relates the importance of Mathematics to scientific, industrial, technology and social progress of a society. Several developed nations including USA realized that their role as leaders in the world’s economy and their capacity to produce wealth and quality jobs depend directly on the ability of the education system to produce students who can compete in Mathematics and Science dominated industries of the future. Thus, improving Mathematics and Science education has been the priority of the policymaking agenda (Anon, 2005). Although mathematics is an important subject, it has been performed poorly in secondary schools. Parents and governments of different nations are worried about this Mathematics poor performance. Bansilal, James and Naidoo (2010) argue that poor performance in Mathematics has been made worse by the fact that ordinal people fail to see the everyday application of school mathematics. Poor performance in Mathematics is a problem faced by most countries in the world. This
research sought to find out if the Mathematics poor performance at Zimbabwe Junior Certificate in secondary schools was lack of knowledge to interpret the syllabus.

America, one of the developed countries in the world, is not happy about the Mathematics performance of its students at secondary school. When it comes to students’ performance in Mathematics in U.S, there is cause for concern (Smith 2015). 15-year-olds with their peers in OECD (Organisation for Economic Co-operation and Development) countries stated that U.S. students ranked in the bottom quarter of participating countries in Mathematics (National Center for Education Statistics, 2009). The incapacity of American schools to bring students up to the highest level of accomplishment in Mathematics is much more deep-seated than anything induced by recent federal legislation (Hanusheck, et al 2010). This poor performance in Mathematics not only portends significant academic challenges, but increasingly dire consequences at both the individual and macro-economic levels (Smith, 2015). At the individual level, students may find themselves unable to compete academically and miss out on employment opportunities in some of today’s fastest growing career sectors. At the macro level, poor Mathematics performance suggests an alarming outlook for our country’s competitiveness in the international arena (Smith, 2015). This research intends to find the causes of Mathematics poor performance at Zimbabwe Junior Certificate level.

Although students in some Asian countries are performing well in Mathematics, poor Mathematics performance is still a cause for concern in most Asian countries. Asian nations, consistently high achievers in international comparisons of math and science, are not immune from demanding better math and science education at all levels (Das and Baruah, 2015). Amongst the subjects taught in schools in India, Mathematics is considered as one of the toughest subjects with poor performances of students. The lower level of pass percentage has been a matter of serious concern. Thus, science subjects in general and Mathematics in particular has been a problem area for majority of secondary schools in India (Das and Baruah, 2015).

Most secondary school students in African countries are performing dismally in mathematics despite an awareness of the benefits by Zekele (2000) which include industrial and technological development. The problem of Mathematics poor performance is not just in Nigeria, but worldwide, and people tend to run away from it, yet experts say it is an interesting subject which
could be understood with a lot of dedication, interest, and the right way to approach it (Mefor, 2015). Mathematics is a compulsory subject at both primary and secondary levels in Kenya but there has always been poor performance in the subject at national examinations (Aduda, 2003). This research seeks to find teaching strategies that impede students learning and make them perform poorly in Mathematics in secondary schools, particularly at junior level in Zimbabwe.

South Africa performs poorly on international assessments of Mathematics. Learner performance at both at primary and secondary school levels does not appear to have improved significantly over the past 10 years (Create, 2010). According to Howie (2003: 1), South Africa faces the challenge of providing quality mathematical education for its multicultural society. Consequently, Mathematics has been dogged by poor performance since time immemorial (Chikodzi and Nyota, 2010: 4; Makgato and Mji, 2006: 257).

Most studies that have been conducted were done outside Africa. Therefore this research sought to undertake a research in the African context with particular reference to Zimbabwe. This will help to add value to research findings that have been found outside Zimbabwe. Despite the important role Mathematics plays both at school and in life in general, most students perform badly in Zimbabwe’s secondary schools in this subject. Skemp (2008) argues that the failure rate in Mathematics in Zimbabwean schools is unacceptably high. Bush (2009) also cites several studies pointing to high failure rate in Mathematics in Zimbabwe.

2.4 Teaching Methods and how they contribute to poor Mathematics performance

Mathematics is not only important from the point of view of getting an academic qualification at school or college, but it is also a subject that prepares the students for the future as well, irrespective of which walk of life they choose to be a part of (Davis and Hersh, 2012). In addition some mathematics concepts and skills like measurement, statistics, scale drawing, and calculus are useful and are applied in other subjects like Physics, Chemistry, Biology, and Geography (Yara and Otieno, 2010; Scopes 1973). The significance of the subject is seen when it helps us balance our checkbooks, pay our taxes and even tip waitress at restaurants (Skemp, 2008). Also, four basic goals for teaching of mathematics have been identified as: utilitarian, personal development, economic growth, and cultural values (Scopes 1973). Mathematics has
been made a compulsory subject in Zimbabwe and in most of the countries because of its contribution to individual and societal development.

Despite the importance of the subject it is strongly believed that mathematics has attained an unfortunate “filter status” for the majority of students in Zimbabwe (Ndemo and Mtetwa, 2010, p. 1). Poor mathematics performance not only results in the child having a low self-esteem, but also causes significant stress to the parents (Karande and Kulkarni, 2005). Literature has many reasons for the mathematics poor performance by students. Several studies on the contribution of teaching methods on pupils’ mathematics performance have been carried out in attempts to try to improve mathematics performance at secondary school level, particularly at ‘O’ level.

Skemp (1987) argues that teachers should carry the major part of the blame when they are more authoritative in their teaching approaches. Such teachers mostly promote rote learning or drill and memorization methods instead of learning for understanding which he calls "schematic" learning. Both the constructivist theory and the sociocultural theory are applicable in the teaching of mathematics at secondary school. The Constructivist learning theory suggests that learning is more effective when a student is actively engaged in the learning process rather than attempting to receive knowledge passively (Gary, 2015). Gary further says that Constructivist teaching fosters critical thinking and creates motivated and independent learners. Students should be encouraged to learn through active participation, exploration, and manipulation, in order to foster their abilities in collecting and analysing information, obtaining new knowledge, and solving problems, and ability in communication and collaborations (Leung and Yeping, 2015). Piaget (1977) asserts that learning occurs by an active construction of meaning rather than by receiving ideas passively through the lecture method. One of the most important factors for improving mathematics performance is students’ involvement (Polya 2011). Thus, teaching methods, such as group work, project work and cooperative learning, which foster active participation and student-centered should be used by teachers in the teaching and learning of mathematics. The educational relevance of constructivism has been well expressed by Ogborn (1997, p. 131), e.g. that the design of teaching should give high priority to making sense to pupils, capitalizing on and using what they know, and addressing difficulties that may arise from how they imagine things to be. East Asian countries have been experimenting with child-centered, constructivist
practices in teaching mathematics, seeing them as the U.S. secret to economic success (Leung and Yeping, 2015). When teachers use cooperative learning and groupwork there would be the idea of scaffolding whereby the less able students would be assisted by the talented ones to understand the concepts. Scaffolding is the tenet of the sociocultural theory. Learners should not be taught what they are not yet ready to learn or able to do instead teach what the learner could understand with guidance (Vygotsky, 1978).

In the constructivist classroom, the teacher’s role is to prompt and facilitate discussion. Thus, the teacher’s main focus should be on guiding students by asking questions that will lead them to develop their own conclusions on the subject (Gray, 2015). The researcher has observed that topics such as Constructions and Point, Lines and Angles in the Zimbabwe Junior Certificate syllabus can be taught using the Constructivist approach. Students are likely to gain knowledge through discovery when they are given opportunity to bisect angles and construct triangles and parallelograms. Learning environments which include visual aids and manipulative objects should support students’ active construction of knowledge since all learning happens through the senses (Gunmen, 1992). Mathematics teachers should use a lot of teaching and learning aids when teaching. Research has shown that the three major roles for the teacher in constructivist learning environments are modeling, coaching and scaffolding (Jonassen, 1999). Teachers should know how the constructivist theory is used in the classroom.

Although the Constructivist theory was found to be an effective teaching method it has some shortcomings. Gray (2015) reports that one possible deterrent for this approach is that, due to the emphasis on group work, the ideas of the more active students may dominate the group’s conclusions. Another limitation of the constructivist theory is on production materials that require learning to be behaviorally active and not be "cognitively active" (Mayer, 2004). This shows that even though the learners are engaged in activity, they may not be learning (Kirschner, Sweller, and Clark, 2006). Literature has shown that if teachers solely use the Constructivist approach in their class, learners with Attention Deficit or Hyperactivity Disorder will not be able to concentrate long enough to construct knowledge from the event (Jonassen 1999). Sweller (1999) argues that students learn to become better at solving mathematics problems when they study worked out examples rather than when they solely engage in hand on problem solving. In a
study Sweller (1999) found evidence that practice by novices during early schema acquisition, distract these learners with unnecessary search based activity, when the learners’ attention should be focused on understanding (acquiring schema). A mixed approach that incorporates components of constructivist learning along with other approaches, including more guided teaching strategies, would better meet the learning needs of the majority of students in a classroom by accounting for differences between learning styles and capacities (Mayer, 2004). In the same vein, Fennema and Peterson (1985) have suggested that learning habits that involve working independently on high-level tasks may enable some children to do better in mathematics and science. The researcher has observed that teachers in Zimbabwe do not use a variety of methods that cater for different learning styles in teaching mathematics despite the significant contributions they make to mathematics performance. Therefore, this study sought to investigate factors that affect the use of pupil-centered methods in the teaching of mathematics at junior level in secondary schools.

In mathematics, we need to emphasize not only students’ learning of knowledge and skills but also the process of students’ knowledge development, and provide students with opportunities to connect mathematics with their daily lives (Leung and Yeping, 2015). Drama and group projects are some of the teaching methods which can be used to teach mathematics in real life situations (Gibson, 2015). He further says that these methods motivate and create interest in learners. If manipulated well, cultural activities and plays are an indigenous way of learning the school curricula and help to relate subjects like mathematics to the learners' everyday lives (Tatira, Mutambara and Chagwiza, 2012). The sociocultural theory by Vygotsky can be used to teach mathematics since learning is thought to occur through interaction, negotiation and collaboration (Cobb, 1994). Interaction, negotiation and collaboration are characteristics of cooperative learning (Ball, 1993). The school curricula and teaching in most cases do not represent the local culture at all (Lipka and Adams, 2004). By linking culture and the curriculum, teachers nurture the love for mathematics outside the classroom in order to assist what happens inside the classroom (Wyk, 2009). Studies have shown that children learn more effectively when they are interested in what they learn and that they will achieve better in mathematics if they like mathematics (Leung and Yeping, 2015). Teaching methods that pay close attention to students’ interests and their experiences are important for effective mathematics learning. This is
consistent with the constructivist learning theory which recommends the use of prior knowledge in the learning of new concepts. The sociocultural theory also emphasize the importance of creating interest in learners when it say that what the learner already knows should not be taught since it creates boredom (Vygotsky, 1978). Approaches ought to be devised to help link mathematics with everyday life in the classroom, so as to help mathematics concept-formation and drive away the fear of the subject amongst learners. The researcher has observed that cultural activities and plays were not used in teaching mathematics at secondary school in Zimbabwe. This study, therefore, sought to investigate ways of incorporating students’ interest and experiences into the teaching and learning of mathematics.

Prior studies have shown that most female students have a tendency to approach mathematical concepts using rules or working in cooperative groups, whereas male students tend to favor competition in order to master mathematical concepts (Fennema and Peterson, 1985: Hopkins, McGillicuddy-De Lisi and De Lisi, 1997). Differences in mathematics performances do exist (Shroyer, Borche, Smith and Wright, 1994), so methods that cater for different learning styles should be used in the teaching and learning of mathematics. Many teachers interact and behave with their students the way they were taught when they were children. Schools today are very different from those that teachers knew when they were children. Issues of fairness and equity were once considered unimportant; however, this has changed due to legal obligation and moral necessity to provide an effective education to all students (Scott & McCollum, 1993). There is need for teachers to use various assessment and teaching styles so that all students have equal chance for achievement. Explanations should be given to students for choosing certain learning methods so that they know objectives for using them. Students can be asked to choose the methods to use. Research have shown that as teachers listen to their students, they gain their trust and in an on-going relation of care and trust, it is more likely that students will accept what teachers try to teach (Noddings, 2002). Furthermore teachers if engage students in dialogue, they learn about their needs, working habits, interests and talents. Teachers gain important ideas from them about how to build their lessons and plan for the individual student’s progress (Noddings, 2002). Student need to be involved in a variety of activities that will make them active in the teaching and learning situations such as visual, audio hands-on activities, writing and speaking exercises. Some research had indicated that students achieved more when teachers
clearly inform them of the lesson’s objective (Shulman, 1986). For example, give students a choice of how to present a project or group activity. Most mathematics teachers were accustomed to learning through memorization with hard work, but not independent thinking and creativity. Mathematics instructions should not be dominated by lecture method and memorization. The traditional focus on knowledge acquisition and the approaches used wouldn’t meet the needs of the development of society (Leung and Yeping, 2015).

General factors affecting the academic performance in mathematics include invalid teaching methods (Lawrence, 1983). Ineffective learning practices result in learners not being given the opportunity to develop structures required for the development of higher order cognitive competences in mathematics. Naidoo and Naidoo (2010) review a wide range of studies on the contribution of teaching methods on mathematics performance. The studies showed that the poor performance in mathematics has been attributed to the fact that basic concepts are not being taught properly at lower school levels. This lack of mathematics mastery at lower secondary school levels later on manifests at higher secondary and tertiary levels. In this study, effort was sought to improve performance in mathematics education at lower levels of secondary school by exploring a variety of child-centered teaching methods to cater for different learning styles amongst the learners. However, the lecture method is effective in a situation where large amount of content need to be covered.

2.5 Teacher content knowledge

The teacher content knowledge includes CK and PCK. Content knowledge and pedagogical content knowledge are key components of teacher competence that affect student progress in mathematics. Silva, Tadeo, Reyes and Dadigan (2006) argue that students are bound to fail mathematics if teachers’ academic preparedness (content knowledge) and years of experience are not adequate. In the same vein Bull (1996) argues that the learning of mathematics was dependent on the teacher such that those who cannot do mathematics can trace their inability almost certainly to the teacher. There is need for the would-be mathematics teachers to be taught effectively and understand the subject facts and ideas at an early stage. This would help in the development of subject matter knowledge. Tui (1987) emphasizes that teacher’s quality supported by training and experiences has an influencing role in effective teaching-learning of
mathematics. Knowing the importance of the subject to individuals’ and societies’ development has propelled most governments to pay particular attention to the training of mathematics teachers.

Teaching is the central activity of education (Herbart, 1908). Pedagogy, which is the art of teaching, is an important component in the teaching of mathematics. Woven into pedagogy are theories and beliefs that we also need to attend to (Alexander, 2000). The President of the Republic of Zimbabwe Cde R G Mugabe, who was a Guest of Honour when the Teacher Capacity Development was launched, said our country has an obligation to equip our teachers with competencies and pedagogic skills that will enable them to teach science and mathematics, (Dokora, 2014). The components of the teacher knowledge are PCK and subject matter knowledge. PCK is a type of knowledge that is unique to teachers and is based on the manner in which teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach) (Shulman, 1986). The other components of teacher knowledge, which was not part of Shulman’s model, which differentiate teachers from subject matter experts is teacher’s knowledge of students’ abilities and learning strategies, developmental levels, motivations and prior knowledge of the concepts to be taught (Cochran, DeRuiter and King, 1993). This component makes the original model to be consistent with the constructivist theory. The constructivists advocate that teaching strategies, media and mode of instruction have to be matched with the learners’ stage of development. The constructivist theory says prior knowledge is the basis for the construction of new knowledge. The other component of the teacher knowledge that contributes to pedagogical content knowledge is the teachers’ understanding of the social, cultural and physical environments in which students are asked to learn (Cochran, DeRuiter and King, 1993). This component is consistent with Vygotsky’s sociocultural theory which says social set-ups such as peers and adults, who include the teacher, are important in the knowledge construction of students. Critical features of teaching, such as the subject matter being taught, the classroom context, the physical and psychological characteristics of the students are ignored in the quest for general principles of effective teaching (Shulman, 1986). Among those components, PCK is of special interest because it identifies the distinctive bodies of knowledge for teaching. PCK represents the blending of content and pedagogy into an understanding of how particular topics, problems or
issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction (Shulman, 1986).

Tatira, Mutambara and Chagwiza (2012) argue that the role of educators is to elevate plays and cultural activities from being played for fun and pastime, but to relate them to specific mathematical concepts. Teaching experience plays important role in success of education. Teachers need to be trained to use plays and cultural activities in teaching mathematics. Teacher training and experience have a significant contribution to mathematics performance. Demulder and Rigsby (2003) argue that teachers’ knowledge and experience give them expertise, and this growing awareness encouraged them to develop a strong professional voice. An experienced mathematics teacher’s knowledge of mathematics is organized from a teaching perspective and is used as a basis for helping students to understand specific concepts (Gudmundsdottir, 1987b). Literature has shown that new teachers have major concerns about pedagogical content knowledge, and they struggle with how to transform and represent the concepts and ideas in ways that make sense to the specific students they are teaching (Wilson, Shulman and Richert, 1987). Studies show that new teachers have subject matter knowledge and lack the pedagogical content knowledge, which is highly specific to the concepts being taught and develops over time as a result of teaching experience (Shulman, 1986). Other studies have shown that new teachers have incomplete or superficial levels of pedagogical knowledge (Carpenter, Fennema, Petersen and Carey, 1988; Feiman-Nemser and Parker, 1990). A novice teacher tends to rely on unmodified subject matter knowledge and may not have a coherent framework from which to present the information. The novice also tends to make broad pedagogical decision without assessing students’ prior knowledge, ability levels or learning strategies (Carpenter, et al, 1988). The secondary school mathematics teachers should have both the subject matter knowledge and pedagogical content knowledge to ensure all topics in the syllabus are understood by all students. What is unique about the teaching process is that it requires teachers to transform their subject matter knowledge for the purpose of teaching (Shulman, 1986). In their 1998 to 2003 results analysis Zimsec (2002a) attributed the high pass rate to the availability of qualified and experienced mathematics and science teachers. After 2005 Zimbabwe experienced very low pass rates in mathematics. Researches attributed this poor performance in mathematics to high staff turnover which at times leave some pupils without qualified teachers for long periods.
(Chakanyuka, Chung and Stevenson, 2009). In addition Vundla (2012) argues that shortage of well-trained teachers and incessant transfers of mathematics teachers hamper the smooth acquisition of mathematics knowledge. Furthermore teacher qualification is accepted as a significant predictor of student performance in mathematics (Kukla-Acevedo, 2009). A study on the causes of mathematics poor performance of Ordinary Level pupils in Zimbabwe revealed that most teachers teaching mathematics were not competent to teach the subject effectively (Tshabalala and Ncube, 2013). Differences in mathematics achievement begin to occur at lower secondary school level and few studies have been conducted in Zimbabwe, it is important to investigate if these same relationships and patterns of influence hold true in a population of form ones and form twos in Zimbabwe. This study, therefore, sought to discover if ZJC teachers have the necessary qualifications and experience needed to effectively teach and improve mathematics performance of pupils at Zimbabwe Junior Certificate.

The acquisition of the capabilities is shaped in the early years by the nature and quality of input from teachers (Sangonet, 2013). There are many factors which determine the performance of teachers in the classroom but without doubt the preparation they undergo is a major factor that affects their instructional practices (Leung and Yeping, 2015). In the same vein Goldhaber and Brewer (2000) argue that initial teacher preparation, which include degree level and professional level and experience with teaching and learning and related beliefs, are associated with factors affecting mathematics performance. Teaching is, essentially, a learned profession in which the teacher must understand the structures of subject matter, the principles of conceptual organization, and the principles of inquiry that help to answer the question on how new ideas are added and deficient ones are dropped by those who produce knowledge (Shulman, 1986). Leung and Yeping (2015) argue that the quality of the teacher in turn depends much on the quality of the teacher education or preparation offered by the system concerned. Mathematics teachers with Diploma in Education in Zimbabwe are being encouraged to study for mathematics educational degrees so that they increase their content knowledge and subject matter knowledge. Degreed mathematics teachers who do not have professional course only have subject matter knowledge and lack pedagogical content knowledge. These teachers must do Post Graduate Diploma in Education (PGDE) so that they learn the PCK. Learning involves a school and a teacher- a teacher that especially understands how learning occurs. Vygotsky (1978) in his socio-cultural
learning theory argues that the development of scientific tools could be achieved in cooperation with adult interaction. Thus, teachers play a significant role in the knowledge construction process. Literature has shown that teachers with PCK would proceed from the specific to the general, from what is easy to the more difficult and from what is known to the unknown (Gundem, 1992). Teachers are expected to start with easy topics when they start teaching form one and should be always available to assist as they move to the most challenging topics in the syllabus. When teachers do this they would be teaching from simple to complex and prior knowledge would be utilized. This will motivate pupils and help in creating confidence in them. Motivation drives the process of starting and continuing learning. The socio-cultural learning theory compels teachers to provide opportunities for students to make sense of mathematics via thoughtful discussion with their classmates, teacher, even parents, siblings, and other children. If the teacher can make the students want to learn mathematics at a young age, mathematics will be less intimidating and more enjoyable for them as they continue to study it in later forms and tertiary level (Turner and Betts, 2012). High quality instruction requires a sophisticated professional knowledge that goes beyond simple rules such as how long to wait for students to respond (Shulman, 1986). Thus one of the priorities is that foundation phase teachers must have appropriate qualifications and expertise to teach these classes (Sangonet, 2015). This study sought to find if teachers who teach mathematics at Zimbabwe Junior Certificate motivate pupils by teaching from simple to complex.

2.6 Mathematics syllabus interpretation

Poor mathematics performance in pupils has become a focus of concern, by almost all stakeholders in education, in recent years. This is because mathematics is seen by society as the foundation of scientific and technological knowledge that is vital in social-economic development of the nation (Mbugua, Kibet, Mutaa and Nkonke, 2012). Recent studies have shown that mathematics syllabus has an effect on the pupils’ mathematics performance. The most important factor which contributes to student achievement is the kind of mathematics the students learn (Leung and Yeping, 2015). The syllabus is an important factor affecting student achievement in the sense that it prescribes the mathematics topics that students are to learn. (Mbugua, et al, 2012) argue that students are bound to fail mathematics if the syllabus is too long, topics too difficult, poorly sequenced, disintegrated and incoherent. The Zimbabwe Junior
Certificate syllabus should include all the prerequisite topics for secondary school mathematics. Teachers need to know and understand all the mathematics topics and concepts in the Zimbabwe Junior certificate syllabus. UNESCO (2008) points out that quality education depends on the relevance of the syllabus.

All mathematics courses are taught in a specific sequence because every topic builds on the previous topic. If students are having problems with a topic, they should continue working with that topic until they understand it and can work problems successfully (Gibson, 2015). He further says teachers should always begin with the easiest topic or problem, even if you think it will be too easy to solve. Studies have shown that mathematics teaching should not cover too many concepts at the same time (Gundem, 1992). Working problems will make students build confidence and confidence is one hundred percent the name of the game in mathematics. Literature has shown that the teaching of mathematics should proceed slowly and systematically (Gundem, 1992). Leung and Yeping, (2015) argue that the challenge faced by the system is designing a relevant syllabus that meet the needs of students. The mathematics syllabus that meets the needs of students should be connected to the new era of technology. The mathematics syllabus according to Bohme (2014) should make students analyze and determine appropriate ways to integrate technology (the use of computers, calculators, power point, digital cameras, etc.) and manipulative tools (concrete or virtual) into the teaching of the secondary mathematics curriculum. This is consistent with semiotic means of the sociocultural theory which recommends the use the technological devices in the construction of knowledge (Vygotsky, 1978). The use of technology in mathematics motivates the students. This study, therefore, sought to explore ways of improving the mathematics performance through the use of the ZJC mathematics syllabus effectively.

Covering all topics in the mathematics syllabus is critical in Mathematics performance. Shikuku (2009) indicates that late or non-coverage of the Mathematics syllabus contributes to poor performance. Literature has shown that if all topics in the syllabus are not taught, that would provoke an incomplete knowledge of students from the earlier class. It is emphasized that certain content in the syllabus be covered, and specific concepts and skills mastered by students (Shikuku, 2012). It is difficult for the students to understand the new lessons which would be
taught in the next level if some topics were not taught in previous forms. There are many factors that affect the coverage of the syllabus. The researcher has observed that topics such as Statistics are not taught by the teachers because the teachers were not taught the topics when they were at school. Tshabalala and Ncube (2013) report that students also revealed that some of their teachers were always absent from school and when they returned they had to cover previous week’s topics resulting in failure to go through the syllabus. The researcher, as a classroom teacher, has observed and experienced that absenteeism by both students and teachers contribute to non-coverage of the ZJC mathematics syllabus.

2.7 Summary

The main focus of this chapter has been the view of other researchers’ on the teacher methodologies that cause poor performance in mathematics at ZJC in Checheche cluster in Chipinge. The literature review has revealed that there are many researchers who have written on the teacher methods that result in poor performance. The next chapter will look at the research methodology.
CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter will highlight the research design, the population, the sample and sampling techniques to be employed in this study. The data collection methods and data presentation and analysis methods to be used in this study are also going to be described.

3.2 Research Design

This study employed the mixed-methods research design in which both qualitative and quantitative research paradigms would be used to gather information on the causes of poor performance in mathematics. Creswell and Plano Clark (2011) argue that integrating methodological approaches strengthens the overall research design, as the strengths of one approach offset the weaknesses of the other, and can provide more comprehensive and convincing evidence than mono-method studies. The survey method was used. A survey is a process of using a small group to obtain the same kind of data as from a large group of people (or events) in a standardized and systematic way (Axinn and Pearce, 2006). Questionnaires, interviews, and observation to a lesser degree, represent the most commonly used survey data gathering techniques. In this study the researcher used the mixed-methods because it enabled him to provide information from one approach that was not identified in an alternative approach, at the same time, reducing non-sampling error by providing redundant information from multiple sources (Axinn and Pearce, 2006). A combination of survey methods with other less structured methods might provide the flexibility required to create new insights into the situation at hand (Axinn, Fricke and Thornton, 1991). The use of a quantitative research design will enable the study to be generalized to other districts (Anderson, 2012).
3.3 Population

Yin (1989) describes a population as any group of individuals that have one or more common characteristics that are of interest to the researcher. The target population for this study was made up of form one and two pupils and mathematics teachers who teach them. The target population also comprised mathematics heads of departments at secondary schools.

3.4 The Sample

The sample size for this study was 60 participants. The sample in this study consisted of, 30 mathematics teachers, 10 mathematics heads of department and 20 form one and pupils from secondary schools in Checheche cluster in Chipinge District.

3.5 Sampling technique

According to (Yin 1989), sampling has been defined as the process by which inference is made to the whole by examining a part. The researcher purposively sampled ten secondary schools in Checheche cluster which comprised urban, peri-urban and rural schools. The questionnaires were given to two ZJC mathematics teachers at each secondary school. The stratified purposive sampling was also used to select two school pupils who were interviewed at every school. The two pupils from each school comprised one high mathematics achieving and one low mathematics achieving pupil. The mathematics head of department at every school was also requested to fill in a questionnaire. The participants in this study were purposively sampled since this technique ensured that participants were selected because they were likely to generate useful data for the project (Kumar, 2008). Data was collected from ZJC mathematics teachers, pupils and mathematics heads of departments through questionnaires, observations, semi-structured interviews and documents.

3.6 Pilot study

A pilot study is the pre-testing or ‘trying out’ of a particular research instrument (Baker, 1994). In this study a pilot study was carried out at a secondary school that was not part of the schools which took part in the research. Two students, one teacher and mathematics head of department
were requested to provide information during the pilot study. The participants in the pilot study were selected using the purposive sampling. The pilot study was carried out to pre-test the research instrument to be used in the study (De Vaus, 2002). In this study the students were interviewed and teachers were asked to fill in questionnaires. This helped in assessing the validity of the questionnaires. One of the advantages of conducting a pilot study is that it might tell whether proposed methods or instruments are inappropriate or too complicated (De Vaus, 2002. The researcher observed one mathematics lesson. However pilot study has some limitations. One of the limitations is the possibility of making inaccurate predictions or assumption on the basis of pilot data.

3.7 Research Instruments

A combination of semi-structured interviews, questionnaires consisting of open-ended and close-ended questions and lesson observations were used to investigate if the pupils’ mathematics poor performance at Zimbabwe Junior Certificate is associated with the teaching methods used by teachers. These instruments were also used to find out whether teacher content knowledge and the syllabus use contribute significantly to the pupils’ mathematics poor performance at Zimbabwe Junior Certificate.

3.7.1 Questionnaire

A questionnaire is simply a ‘tool’ for collecting and recording information about a particular issue of interest (Oppenheim, 1992). Questionnaire is predefined set of questions assembled in a pre-determined order and respondents are asked to answer the question which provides the researcher with the data that can be analysed. This method is largely associated with survey strategy. The questionnaire was the major instrument for collecting data. The questionnaire increases reliability as an instrument of gathering data because of its greater impersonality (Bell, 2013). The researcher used questionnaires to gather information from teachers and mathematics heads of departments. The ZJC mathematics teacher-questionnaire (ZJCMTQ) (see APPENDIX A) sought information on teachers’ background, academic and professional qualifications, teaching and learning methods used by teachers that contribute to poor mathematics performance. The questionnaire also sought information on the teacher content knowledge and
how the teachers use the syllabus contribute to mathematics poor performance. The mathematics head of department questionnaire (MHODQ) (see APPENDIX B) was used to collect information on the same variables. The questionnaires comprised closed and open-ended questions. Closed-ended questions enabled the researcher to collect pre-determined respondents’ opinion regarding the studied phenomenon (Kumar, 2008). The researcher used the questionnaire because it is relatively quick to collect information using this instrument and the information can be collected from a large group of participants without face-to-face interaction with the respondents. The researcher used a questionnaire because the target population was literate. However Anderson (2012) argues that the questionnaire generally has a low response rate and is inflexible in that it does not allow ideas or comments to be explored in-depth and many questions may remain unanswered. To make sure all the questionnaires were returned the researcher distributed the questionnaires to the targeted schools through the heads of the schools who later helped in the collection.

3.7.2 Interviews

Kvale (1983) defines interview as an interchange of views between two or more people on a topic of mutual interest, sees the centrality of human interaction for knowledge production and emphasises the social situations of research data. Interview is a data collection method that uses a personal contact between the interviewer and the interviewee either in a face to face basis or over the telephone. Semi structured interviews will be conducted with ZJC mathematics pupils at the selected secondary schools in Checheche cluster. Semi-structured questions were asked, focusing on teaching methods, teacher content knowledge and syllabus use to investigate how these factors affect mathematics performance. In order to ensure some validity the data from research interviews was triangulated with the data from other research instruments. Informal interviews were held with pupils to get their views on teacher content knowledge factors, teaching methods, syllabus interpretations which contribute to mathematics poor performance at Zimbabwe Junior Certificate. The researcher used an interview guide (see APPENDIX C) when interviewing pupils. The interviews were carried out when the researcher visited each of the schools. The interview were used in this study because the instrument provides direct feedback from respondents and the researcher is assured that the responses are from the person intended (Kvale,
Furthermore the use of interviews ensured that follow up questions can be used to clarify issues. However interviews compromise reliability as a result of the presence of researcher.

### 3.7.3 Observation

Observation is a systematic data collection approach in which all the researchers use all their senses to examine people in natural settings or naturally occurring situations (Fetterman, 1998). There are two types of observation, participant observation and non-participant observation. In this study the participant observation was used. This type of observation required the researcher to reveal his identity and the purpose to the group and ask for permission to observe (Mcleod, 2015). Participant observation combines participation in the lives of the people being studied with maintenance of a professional distance that allows adequate observation and recording of data (Fetterman, 1998). While relying largely on questionnaires, the researcher also observed lessons to triangulate data. To understand fully the complexities of many situations, direct participation in, and observation of, the phenomenon of interest may be the best research method (Patton, 1980). The researcher observed teachers conducting some mathematics lessons. A key advantage of conducting observations is that you can observe what people actually do or say, rather than what they say they do (Patton, 1980). Another advantage is that observations can be made in real life situations, allowing the researcher access to the context and meaning surrounding what people say and do. However observations have some limitations and one of them is that they are often conducted on a small scale and may lack a representative sample (biased in relation to age, gender, social class or ethnicity). This may result in the findings lacking the ability to be generalized to a wider population (Mcleod, 2015). It was important that the learners understood the function of the observer and are pre-warmed about him so that the presence of the observer was not intimidating the class. This was done to make sure that the data gathered might be accurate. In this study an observation guide (see APPENDIX D) was used. The observation guide contained the things that the observer was going to look at when observing the lesson.
3.7.4 Document analysis

Documentary research is the use of outside sources or documents to support the viewpoint or argument of an academic work (Scott, 2006). Institutions such as schools and colleges produce a constant stream of reports (Love, 2003). The researcher analysed supervision reports on teachers prepared by mathematics heads of departments when they supervise them. This helped in the triangulation data. Love (2003) notes that one of the most common sources of data collection in qualitative research is through the review of documents. In this study the researcher collected information from supervision reports prepared by mathematics heads of departments when they supervise teachers. This assisted the researcher to verify the teachers’ qualifications and teaching experience. This also helped the researcher to verify the teaching methods that teachers claim to be using in the questionnaires thereby increasing the depth and accuracy of the results. One of the key advantages in conducting documentary research was that you can get access to information that would be difficult to get in any other way, such as people who might not be willing to talk in a formal research interview or might be difficult to track down (Love, 2003). Nevertheless, documents are usually not designed with research in mind.

3.8 Issues of Reliability and Validity

Reliability and validity are important ideas in this research because a survey questionnaire will be used. The tendency toward consistency found in repeated measurements is referred to as reliability (Carmines and Zeller, 1979). Research instrument has to be reliable. The reliability of a research instrument is the extent to which it yields the same results on repeated trials. The reliability of a questionnaire is seen if same results are obtained when the questionnaire is repeatedly administered to the same people (Carmines and Zeller, 1979). In this study an appropriate sample size was used to achieve statistically significant and reliable results. Validity refers to whether the researcher actually measured what he or she wanted to measure. For the researcher to achieve this there should be content validity, construct validity and criterion validity in the questionnaire.
3.8.1 Triangulation

Triangulation is a procedure that involves a search for convergence among multiple sources of data to form themes or categories in a study (Yin, 2003). Triangulation is a method of checking data from multiple sources to search for regularities in the research data (O’Donoghue and Punch, 2003). In this study triangulation was taken as a method of collecting data using more than one instrument from different people. Triangulation involves the application and combination of several research methodologies in one study to make sure accurate results are obtained. The purpose of triangulation was to increase credibility and validity of the results. Denzin (1978) identified four basic types of triangulation which are data triangulation, investigator triangulation, theory triangulation and methodological triangulation. The methods selected in triangulation to test the validity and reliability depends on the criterion of the research (Golafshani, 2003). In this study data triangulation and methodological triangulation was used. Data collected from different people was compared with data collected using more than one method. One of the commonest forms of triangulation is to combine interviews with observation. This is a methodological triangulation. Observation tested and filled out accounts given in interviews, and vice versa. In this study triangulation was used to combine and compare data from questionnaires, interviews, observations and documents.

3.9 Ethical considerations

Ethics are norms for conduct that distinguish between acceptable and unacceptable behavior (Resnik, 1998). Ethics are rules that distinguishing between right or wrong. Ethics are taken into consideration in research to protect the rights and interest of the participants. Research ethics promotes the aims of research, such as knowledge, truth, and avoidance of error. It involves ensuring that the participant gives informed consent for the research (Smith, 2003). In this research human harm and risk was not considered a relevant issue. Instead, an informed consent (APPENDIX E) was necessary for the researcher to tell the participant issues related the purpose of the study, confidentiality, voluntary participation, payment and withdrawal. The participation in this study was on voluntary basis. To ensure that the respondents give information freely and willingly anonymity and confidentiality were assured before the respondents started providing information.
3.10 Research Procedure of Collecting Data

Before data collection begun, approval to initiate this study was obtained from the Bindura University of Science Education, Curriculum Studies Department (See APPENDIX E). The researcher first sought permission to collect data in the targeted schools from the permanent secretary of the Ministry of primary and secondary education (See APPENDIX E). The researcher then sought permission from the Provincial Education director of Manicaland Province (See APPENDIX E). The researcher then sought permission to go into schools from the District Education Officer of Chipinge District (See APPENDIX E). At the selected schools the researcher sought permission from the school heads. The researcher administered most of the questionnaires in person. To ensure that true and unbiased information was provided the questionnaires were not numbered and participants did not write their names. The researcher interviewed the ZJC mathematics pupils. The interviews were carried out when the researcher visited the schools to observe a lesson. The researcher first explained issues on the consent form (APPENDIX E) to the interviewees before interviewing them. The participants were first told what they were going to be involved in, the purpose, risks and anticipated benefits. The researcher told the participants that the information gathered would be private and confidential and was not to be divulged to anyone. To ensure participant cooperation and understanding the questionnaires were delivered to the respondents through the heads of schools. The participants were assisted to fill in the questionnaires.

3.11 Data presentation and analysis procedures

Data was presented using graphs, pie charts and tables. Data obtained from questionnaires and interviews was analysed question by question. Findings on how teaching methods and syllabus factors contribute to mathematics poor performance were compared with related findings from Review of Related Literature. For quantitative data, Pearson’s correlation coefficient was used to find the relationships between variables and sub-items in each of the instruments administered to the different types of respondents. After computing statistics from quantitative data inferential implications from them were deduced and recorded.
3.12 Summary

This chapter managed to show that mixed-method research design was used in the study. The population, sample and sampling techniques used in the study were also highlighted in this chapter. The research instruments used to collect data from respondents were the questionnaire, interviews and observations. The advantages and disadvantages of the research instruments used were shown in this chapter. The data collection procedures used before and during the collection of data from participants were highlighted in this chapter. Finally, the chapter managed to show how data would be presented and analysed in chapter four. In the next chapter the collected data was presented and analysed.
CHAPTER 4

4.0 DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

In this chapter, data collected through questionnaires, semi-structured interviews, observation and documents as described in chapter 3 is presented, analysed and discussed. The chapter is divided into two parts, namely the presentation of data and analysis then the discussion of the presented data. Findings from ZICMTQ are presented and analysed question by question. The data gathered using MHODQ are also presented and analysed. The data from the two questionnaires produced descriptive statistics. Information collected using interviews, observations and documentary was also presented and analysed. Finally, a discussion on the findings would be made.

4.2 Data Presentation and Analysis

4.2.1.0 Demographic characteristics of the ZJC mathematics teachers

4.2.1.1 Distribution by sex

Table 4.1: Sex of respondents n = 20

<table>
<thead>
<tr>
<th>Sex</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Respondents (%)</td>
<td>10</td>
<td>90</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4.1 above shows that 90% (18) of the respondents were males and 10% (2) were females. This shows that more males teach ZJC mathematics.
4.2.1.2 Distribution by age

Table 4.2 Age of respondents n = 20

<table>
<thead>
<tr>
<th>Age range</th>
<th>Female</th>
<th>Male</th>
<th>Frequency</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18- 30 Years</td>
<td>2</td>
<td>8</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>31- 40 Years</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>41- 50 Years</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>51 and above</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>18</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.2 above shows that 50% (10) of the teachers were in age range 18-30 years, 20% (4) in the age range 31-40 years, 30% (6) in the age range 41-50 years and 0% of the respondents were 51 years and above. Table 4.2 also shows that 70% (14) of the teachers were below 41 years of age.

4.2.1.3 Distribution by qualifications

Table 4.3: Qualifications of respondents n = 20

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Female</th>
<th>Male</th>
<th>Frequency</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate in Education</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Diploma in Education</td>
<td>2</td>
<td>9</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>Bsc</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Bed</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>PGDE</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>18</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.3 above shows that 5% (1) of the teachers had Certificate in Education, 55% (11) had Diploma in Education, 15% (3) had Bsc, 5% (1) had Bed, 5% (1) had done PGDE, no teacher
had Masters Degree and 15% (3) had other qualifications. These other qualifications were Bachelor of commerce, B-tech and Journeyman class one. The respondent with journey had done PGDE. One of the respondents with Bsc had a diploma in education.

4.2.1.4 Distribution by teaching experience

Table 4.4 Teaching experience of respondents n = 20

<table>
<thead>
<tr>
<th>Years range</th>
<th>Female</th>
<th>Male</th>
<th>Frequency</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 Years</td>
<td>2</td>
<td>8</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>6-10 Years</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>11-20 Years</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>21 or More</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>18</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.4 above shows that 50% (10) of the respondents were had a teaching experience which ranges from 0-5 years, 25% (5) of the respondents had teaching experience which ranges from 6-10 years. 20% (4) of the respondents had teaching experience which ranges from 11-20 years. Only 5% (1) of the respondents had teaching experience which was 21 years and above.
4.2.2 Responses from ZJC mathematics teachers

4.2.2.1 Teachers use various methods (Question 5)

The graph (Figure 4.1) shows that 95% (19) of the respondents confirmed that they use various methods to teach mathematics. 5% of the respondents were not sure whether various methods were used or not.

Figure 4.1:  Graph showing variety of teaching methods

The graph (Figure 4.1) shows that 95% (19) of the respondents confirmed that they use various methods to teach mathematics. 5% of the respondents were not sure whether various methods were used or not.
4.2.2.2 Student centered-methods (Question 6).

![Pie Chart showing use of student-centered methods](image)

**Figure 4.2 Pie Chart showing use of student-centered methods**

The pie chart (Figure 4.2) indicates that 75% (15) of the respondents stated that the student-centered methods are used frequently by teachers. 20% (4) of the respondents said that the student-centered methods were not used frequently by teachers. The diagram (Figure 4.2) also indicates that 5% (1) of the respondents was not sure whether teachers use student-centered methods or not.

4.2.2.3. Challenges faced when using student-centered methods (Question 7).

**Table 4.5:** Student-centered methods. n = 20

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>13</td>
<td>3</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Percentage</td>
<td>65</td>
<td>15</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.5 shows that 65% (13) of the respondents stated that mathematics teachers have challenges in using the student-methods. This is quite a strong point and a useful input to end the low performance in mathematics. 20% (4) said that teachers do not have challenges in using student-centered methods. 15% (3) of the respondents said that they were not sure whether teachers have challenges in using student-centered methods.

4.2.2.4 Electronic media in teaching mathematics. (Question 8)

![Bar graph showing use of electronic media](image)

**Figure 4.3:** Bar graph showing use of electronic media

The information on the bar graph (Figure 4.3) indicates that 55% (11) of the respondents confirmed that teachers do not use electronic media in teaching mathematics. This is quite a strong point and a useful input to end the low performance in mathematics. 25% (5) of the respondents stated that teachers use electronic media in their lessons. 20% (4) of the respondents stated that there were not sure whether teachers use electronic media.
4.2.2.5 The use of prior knowledge (Question 9).

**Figure 4.4: Column graph showing the use of prior knowledge**

The above graph (Figure 4.4) shows that 90% (18) of the respondents stated that teachers use prior knowledge when teaching mathematics whilst 10% (2) of the respondents indicated that they were not sure whether teachers make use of prior knowledge when teaching mathematics.

4.2.2.6 Motivation of students (Question 10).

**Table 4.6: Motivation in mathematics lessons n = 20.**

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>18</td>
<td>2</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Percentage</td>
<td>90</td>
<td>10</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.6 shows that 90% (18) of the respondents stated that they motivate students during mathematics lesson. Only 10% (2) of the respondents indicated that they were not sure whether teachers motivate students or not during mathematics lesson.
4.2.2.7 Scheming using the syllabus (Question 11)

Table 4.7: Syllabus use in mathematics n = 20

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>19</td>
<td>0</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Percentage</td>
<td>95</td>
<td>0</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.7 shows that 95% (19) of the respondents stated that teachers use the syllabus to scheme their lessons. 5% (1) of the respondents indicated that teachers do not use syllabus when scheming their lessons.

4.2.2.8 Syllabus interpretation staff development workshops (Question 12)

Figure 4.5: Graph showing staff development workshops in mathematics

The graph (Figure 4.4) shows that 55% (11) of the respondents stated that schools do not hold staff development workshops on syllabus interpretation. This is quite a strong point and a useful input to end the low performance in mathematics. 35 % (7) of the respondents indicated that
schools hold staff development workshop on syllabus interpretation. 10% (2) of the respondents stated that they were no sure whether the schools hold staff development workshops on syllabus interpretation.

4.2.2.9 Sequencing mathematics topics when scheming (Question 13)

![Pie Chart: Do you sequence syllabus topics? n =20](image)

**Figure 4.6: Pie Chart showing the sequencing of topics by teachers**

The pie chart (Figure 4.6) shows that 50% (10) of the respondents indicated that ZJC mathematics teachers sequence the topics when scheming. 35% (7) of the respondents stated that teachers do not sequence the syllabus topics when scheming. 15% (3) of the respondents indicated that they were not sure whether teachers sequence syllabus topics when scheming.
4.3.0 Demographic characteristics of the mathematics HOD.

4.3.1 Distribution by gender

![Distribution of HODs by sex n = 10](image.png)

**Figure 4.7: Pie Chart showing sex composition of HODs**

The pie chart (Figure 4.7) shows that 90% (9) of the mathematics participants were males and 10% (1) were females.

4.3.2 Distribution by age

**Table 4.8: Age range of HODs. n = 10**

<table>
<thead>
<tr>
<th>Age range</th>
<th>Female</th>
<th>Male</th>
<th>Frequency</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18- 30 Years</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>31- 40 Years</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>41- 50 Years</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>51 and above</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>9</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.8 shows that 20% (2) of the mathematics respondents were of the age range 18-30 years. 30% (3), which comprised one female and two males, of the respondents were of the age range 31-40 years. 50% of the respondents (all males) were in the age range 41-50 years. No respondents were in the age range 51 years and above.
4.3.3 Distribution by qualifications

Table 4.9: Qualifications of HODs  n = 10

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Female</th>
<th>Male</th>
<th>Frequency</th>
<th>Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate in Education</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Diploma in Education</td>
<td>1</td>
<td>8</td>
<td>9</td>
<td>90</td>
</tr>
<tr>
<td>Bsc</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PGDE</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>9</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.9 shows 10% (1) of the respondents had a Certificate in Education and was a male. 90% (9), which comprise of 1 female and 8 male, of the respondents e had Diploma in Education. No respondents had qualifications higher than the Diploma in Education.

4.3.4. Mathematics HOD Experience

Figure 4.8: Column graph showing HOD experiences
Graph (Figure 4.8) shows that 30% (3) of the mathematics respondents, which comprise 1 female and 2 males who had been mathematics HODs for 0-5 years. The graph also indicates that another 30% (3) of the mathematics respondents had three years’ experience as mathematics HODs for between 6 and 10 years. The graph shows that 30% (3) of the mathematics respondents had been mathematics HODs for 11 to 20 years.

4.3.5 Responses from mathematics HODs

4.3.5.1 Methods used in the mathematics department (Question 5).

![Column graph showing the methods used in the department](image)

**Figure 4.9:** Column graph showing the methods used in the department

The graph (Figure 4.9) shows that 100% (10) of the respondents stated that teachers in the mathematics department use various teaching methods.
4.3.5.2 Student-centered methods in mathematics (Question 6).

![Pie chart showing use of student-centered methods](image)

**Figure 4.10: Pie chart showing use of student-centered methods**

The pie chart in Figure 4.10 indicates that 90% (9) of the respondents stated that teachers in the mathematics department use student-centered methods. 10% (1) of the respondents stated that student-centered methods were not used in the mathematics department by the teachers.

4.3.5.3 Challenges face when using student-centered methods (Question 7).

![Column graph showing responses for student-centered challenges](image)

**Figure 4.11: Column graph showing responses for student-centered challenges**

The graph (Figure 4.11) shows that 60% (6) of the respondents stated that teachers in the mathematics departments do not have challenges in using the student-centered methods. 10% (1)
of the respondents indicated that teachers in the mathematics department face challenges when using student-centered methods. 30% (3) of the respondents stated that teachers in the mathematics department were not sure whether there are challenges faced when student-centered methods are used.

4.3.5.4 Electronic media in mathematics department (Question 8)

Table 4.10 Electronic media in mathematics department n = 10

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Percentage</td>
<td>20</td>
<td>0</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.10 shows that 20% (2) of the respondents stated that teachers in mathematics department use electronic media. 80% (8) of the respondent indicated that teachers in mathematics department do not use electronic media.

4.3.5.5 Prior knowledge in mathematics (Question 9)

Table 4.11 Prior knowledge in mathematics department n = 10

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Percentage</td>
<td>90</td>
<td>0</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.11 shows that 90% (9) of the respondents stated that teachers in the mathematics department use prior knowledge. 10% (1) of the respondents indicated that teachers in the mathematics department do not use prior knowledge.
4.3.5.6 Motivation of pupils in the mathematics (Question 10)

Table 4.12: Motivation in the mathematics department n = 10

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Percentage</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.12 shows that 100% (10) of the respondents stated that teachers in the mathematics department motivate pupils in their lessons.

4.3.5.7 Syllabus use in mathematics (Question 11)

Table 4.13: Syllabus usage in mathematics department n = 10

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Percentage</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.13 shows that 100% (10) of the respondents stated that teachers in the mathematics department use the syllabus when scheming.
4.3.5.8 Mathematics staff development workshops (Question 12)

The bar graph (Figure 4.12) shows that 50% (5) of the respondents stated that schools do not hold staff development workshops on syllabus interpretation. This is quite a strong point and a useful input to end the low performance in mathematics. 30% (3) of the respondents indicated that schools hold staff development workshops on syllabus interpretation. 20% (2) of the respondents stated that they were not sure whether schools hold staff development workshops on syllabus interpretation.

**Figure 4.12: Bar graph showing HODs responses on workshops on syllabus interpretation**

4.3.5.9 Sequencing of topics in the syllabus (Question 13)

<table>
<thead>
<tr>
<th>Response</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Percentage</td>
<td>90</td>
<td>10</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4.14 shows that 90% (9) of the respondents stated that teachers in mathematics departments sequence the topics in the syllabus when scheming. 10% (1) of the respondents indicated that they were not sure whether teachers in the mathematics departments sequence the topics in the syllabus when scheming.

Table 4.15 Summary of results from questionnaire data in Section C

<table>
<thead>
<tr>
<th>Question</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teachers</td>
<td>HODs</td>
<td>Teacher</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.16: Questionnaire Agree responses from teachers and HODs using Pearson’s product moment correlation coefficient

<table>
<thead>
<tr>
<th>Question</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>0</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>HODs</td>
<td>0</td>
<td>9</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>10</td>
<td>0</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

The correlation coefficient 0.001 shows that there is a weak correlation between the agree responses of the teachers and HODs. This suggests that teacher methodology is not the only variables that cause low performance. This shows that the teacher’s and HODs hold different
views as the possible sources of poor performance in mathematics. These other sources would be revealed by student interviews, observations and documentary analysis.

4.4.0. Data collected student interviews

The researcher interviewed 20 students who were either form one or form two using the same question which were asked in the questionnaire. This enabled the researcher to triangulate the data by comparing the information that was collected in the questionnaire and the information collected in these interviews. Some of the results that were obtained from the interviews are below.

Even though both the teachers and HODs said they use a variety of methods to teach mathematics the students disagreed with them. The students said that the teachers do not use various methods. One pupil said

*Mathematics lessons are boring because teachers do not use several methods to cater for students with different learning styles. They use the lecture method, demonstration and question and answer. Methods such as drama, project and discovery methods are not used in our lessons.*

This response from the students tallies with what the teacher and the HODs stated on the section of open-ended sections of both the MTQ and MHODQ. They stated that they frequently use demonstration and group work.

On the issue of electronic media the students said that teachers do not use them in their lessons. This response tallies with what both the teachers and HODs said in Figure 4.3 and table 4.10 respectively. The students said that the time allocated for mathematics on the timetable was not adequate. The students said they needed more time so that they could be assisted by the teachers. On this issue the students agreed with the teachers and HODs who indicated on the questionnaire that one of the challenges they face when implementing student-centered methods is that these methods needed a lot of time.
4.5.0 Observations data

The researcher observed four mathematics lessons. This enabled the researcher to carry out a triangulation exercise by comparing information that was gathered using the questionnaires and interviews with information from the observations. Below is the information that was gathered from the observations.

The teachers who were observed teaching, only used the group work, demonstration and pair work. This information agreed with responses from mathematics teachers collected using the questionnaire (Table 4.5). The teachers said that they have challenges in using the student-centered methods. The challenges stated on the questionnaire include noisy students during group work, shortage of resources and large classes. The information collected through observation tallies with this information. During lesson observations the researcher saw large classes, very big groups during group work and shortage of resources such teaching aids.

During lesson observations the researcher did not see electronic media being used in the lesson. This data tallies with responses in Figure 4.3, which was collected using the questionnaire and what the students said during the interviews.

4.5.0 Data from document analysis

The researcher collected data from supervision reports of teachers prepared by mathematics HODs from the ten sampled schools. This enabled the researcher to triangulate the information with information gathered using the questionnaires. The results of the documentary analysis are shown below.
Figure 4.13: Bar graph showing supervision reports collected

The graph Figure 4.13 shows that only 30% (3) of the supervision reports were collected and analysed by the researcher. 70% (7) of the supervision reports were not collected and analysed. This is quite a strong point and a useful input to end the low performance in mathematics.

4.6.0 Research Findings

The following are the major research findings which emerged from the study.

4.6.1 From the findings, the researcher noted that the majority of the mathematics teachers were males (See Table 4.1 and Figure 4.7). Only 10% of the respondents were female mathematics teachers. All the female mathematics teachers were below forty years of age. The researcher noted that more female needed to train as mathematics teachers.

4.6.2 The researcher noted that 57% of the respondents were qualified teachers with diploma in Education. Only 17% of the respondents were qualified teachers with educational degrees. 26% of the respondents were teachers with other degrees. The researcher noted that teachers with Diploma in education needed to further their education and attain educational mathematics degrees.
4.6.3 The researcher found out that 70% of the respondents were mathematics teachers with ten and less of teaching experience. Only 30% of the respondent had more than ten years of teaching experience.

4.6.4 The researcher found out that the teachers used various methods in teaching mathematics (See Figure 4.1). The researcher noted that the common methods used were group work, pair work and the lecture method. This agrees with what the students said on this issue. The interviewed students pointed out that their teachers talk the most in the mathematics lessons. The researcher found out that teachers were not using the constructivist methods. Methods such as the discovery method, project and drama were not part of the list stated on the open-ended section of the questionnaires. These methods would enable students to connect mathematics with their daily lives (Leung and Yeping, 2015).

4.6.5 The researcher found out that the majority of the respondents have problems in using the student centered methods (See Table 4.5). This agrees with the students’ observation that teachers do not use various methods to cater for students’ different learning styles. The researcher also observed that some teachers have problems of managing the classes during group work. It was noted that the teachers needed to further their education and attain degrees in education, master’s degree in education and PGDE for those who not have pedagogy. The teachers would learn the student-centered methods and how they are applied to a class situation. This would provide them with opportunities to learn the 21st century methods such as collaboration, cooperative learning and peer assessment. Mathematics concepts are learnt through interaction, negotiation and collaboration (Cobb, 1994)

4.6.6 The researcher noted that electronic media is not used in teaching mathematics at ZJC (See Figure 4.3 and Table 4.10). 80% of the respondents indicated that they do not use electronic media. This tie in with the views of the interviewed students who pointed out that their teachers does not use electronic media. The researcher noted that the teachers needed upgrade themselves by enrolling at universities and do educational degrees so as to improve their PCK. This would give the teachers opportunities to learn how to teach using computers and projectors. The researcher observed that students develop interest in the subject when electronic media is used.
4.6.7 The researcher found out that mathematics teachers made use of the prior knowledge (See Figure 4.4). The information tallies with the findings from the HODs who stated that students’ prior knowledge was used in mathematics lessons (Table 4.11). 90% of the respondent stated that they use prior knowledge in teaching mathematics. The researcher observed that prior knowledge was used in the lessons introductions.

4.6.8 The researcher found out that the mathematics teachers motivate their students during mathematics lesson (See Table 4.6). During the lesson observation the researcher noted that most students were not motivated. This agrees with what the students said during interviews. The students pointed out that they were not motivated to work out mathematics problems during mathematics lessons.

4.6.9 The researcher found out that teachers use the syllabus to scheme their lessons (Table 4.7). This agrees with the findings from the findings from the HODs (Table 4.13) who stated that mathematics teachers in their departments use the syllabus when scheming. The researcher, during lesson observations found out that the teachers had cited the syllabus.

4.6.9 The researcher noted that schools do not hold staff development workshops on syllabus interpretation. This was indicated by the teachers on the ZJCMTQ (Figure 4.5). This agrees with what was collected from the HODs using the MHODQ, who also indicated that they do not organize staff development workshops on syllabus interpretation (Figure 4.12). The researcher found out that creating time for staff development workshops on syllabus interpretation to be held in schools.

4.6.10 The researcher found out that the majority of HODs were not supervising the teachers. This was revealed by their failure to produce the supervision reports when the researcher requested for one. 70% of the HODs did not have supervision reports on teachers (Figure 4.13). The researcher found out that school heads did not check if HODs were supervising teachers. The researcher found out that new teachers were not inducted by the HODs.

4.6.11 The researcher found out that the majority of HODs had Diploma in education and they were leading some teachers with higher qualifications such as Bed and PGDE (Table 4.9). 100% of the schools had HODs with Diploma in Education. This situation might have contributed to the non-availability of the supervision reports at the majority of the schools visited since it is
difficult to assess someone with a qualification higher than yours or with the same qualification with yours.

4.6.12 The researcher found out that most teachers suggested on the open-ended part of the questionnaire if there could be simplified mathematics textbooks.

4.7 Discussions

Below is the discussion of research findings in conjunction with the research sub-questions.

4.7.1 Teaching methods which contribute to poor performance in mathematics.

Results on the item in figure 4.1 which wanted to find out if teachers use a variety of methods in teaching mathematics; it was found out that the majority of the teachers use various methods in their lessons. This was also confirmed by the HODs in figure 4.9 on which all the respondents agreed that the teachers use a variety of teaching methods. However this contradicted with the information which was gathered from the students during the interviews. The students said that teachers do not use a variety of methods to cater for different learning styles. The study also revealed that the majority of the teachers indicated that they use group work, lecture, demonstrations and pair work. Very few teachers indicated that they use the discovery method. The teachers use limited methods. Few teachers are using discovery method and methods such as the project method and the drama are not being used by the teachers yet these are the methods which give the opportunity to develop structures required for the development of higher order cognitive competences in mathematics Naidoo and Naidoo (2010). Differences in mathematics performances do exist (Shroyer, Borche, Smith and Wright, 1994), so methods that cater for different learning styles should be used in the teaching of mathematics. Although the teachers are using various methods, the types of methods used are not catering for all students with different learning style in their classes. Probably this might be a contributing to poor performance in mathematics at ZJC.

Responses made on the item in figure 4.2 shows that majority of the teachers use student-centered methods. This is confirmed by mathematics HODs in figure 4.10 in which the majority of them says teachers in their departments do use student-centered methods. The use of the
student-centered methods by teachers confirms the importance of the constructivist theory in the teaching of mathematics. Learning mathematics concepts is more effective when a student is actively engaged in the process (Gary, 2015). The use of the student-centered methods is not one of the major problems when it comes to poor performance in mathematics.

The study also reveals that the majority of the respondent indicated that have challenges in using the student-centered methods (See Table 4.5). The information from the study revealed that most respondents were having large groups which are difficult to manage and do not know their roles when using the student-centered methods.

### 4.7.2 Teacher content knowledge

The findings from this study revealed that the majority of the ZJC mathematics teachers had professional qualifications of Certificate and Diploma in Education. Table 4.3 shows that 65% of the respondent had Diploma in Education. This indicates that the ZJC mathematics teachers have shallow content for the subject they teach. Students are bound to fail mathematics if teachers’ content knowledge is not adequate (Silva, Tadeo, Reyes and Dadigan, 2006). This echoes one of the reasons why ZJC students perform poorly in mathematics as discussed in the literature review. The vast number of teachers with lower level of qualifications who teach ZJC might be a contributing factor of poor performance in mathematics.

The study reveals that the majority of the HODs were not supervising the teachers in the mathematics departments. The failure by most HODs to supervise might be because of the lower level qualifications that most of them have. Yet supervision help is important in the development of the teacher content knowledge. As Miles (2008) states, effective leaders visit classrooms to discover what is happening in classrooms. This would help in seeing the methods the teachers are using in their teaching.

Evidence from the study reveals that majority of respondents indicated that teachers do not use electronic media in teaching mathematics. This means that the teacher knowledge is limited. The teacher knowledge is not consistent with constructivist theory. The theory advocates for the use of physical environments and objects. The Diploma in Education which is the qualification with the majority of the ZJC mathematics teachers might be contributing factor for teachers to fail to
use electronic media. Students learn through manipulation of objects which include computers. The failure by the teachers to use the electronic media might be the contributing factor students’ poor performance in mathematics.

The study also revealed the majority of the respondents had teaching experience of less than ten years. An experienced mathematics knows how to assist students in learning specific concepts. This tallies with Shulman (1986) observations that new teachers lack the pedagogical content knowledge, which is highly specific to the concepts being taught and develops over time as a result of teaching experience. The limited teaching experience might be a contributing factor in the mathematics poor performance of students.

The information from the study revealed that most of the respondents were using prior knowledge when teaching mathematics. As Zindi et al, (1997) state, learning happens when students incorporate new experiences into the old experiences and accommodation is reframing the world and new experiences into mental capacity already present.

4.7.3 Syllabus interpretation

The information from the study revealed that majority of the respondents use the syllabus when planning their lessons. The study also revealed that the majority of the respondents indicated that schools do not hold staff development workshops on ZJC syllabus interpretation. As Mbugua, et al (2012) indicate, the syllabus is an important factor affecting student performance. The failure by the schools to hold staff development workshops might mean that the school heads were not creating opportunities for the workshops to be conducted or the school heads were not supervising their HODs. This might be a contributing factor to poor performance in mathematics.

The study revealed that teachers needed staff development workshops on syllabus interpretation. The ZJCMTQ had four open-ended questions and one of the questions required them to indicate strategies used to assist teachers who have problems in using the syllabus.
4.8 Summary

In this chapter data collected using questionnaires, interviews, observations and documentary analysis was presented and analysed. Information from questionnaires was presented using tables and graphs and data from interviews was presented using texts. Data triangulation was done on information collected using questionnaires and other sources of information. Research findings were highlighted and discussed in this chapter. Conclusions and recommendations based on these research findings and discussions will made in chapter five.
CHAPTER 5

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introductions

This chapter summarizes the whole research, looking at association, knowledge gaps, implications which derived from the findings and concludes by linking the objectives identified in Chapter one to the data collected in Chapter three and analysed in Chapter four and some recommendations will also be given.

5.2 Summary

The research is made up of five chapters. Chapter one dealt with background to the study, statement of the problem, research question, research sub-question, and aim of the study, research objectives, and the purpose of the study, significance of the study, assumptions and definition of terms, limitations to the study and delimitations to the study.

The second chapter dealt with the literature review. In this chapter the researcher looked at views of previous researchers and what they said on the causes of poor performance in mathematics. The researcher mostly, used the constructivist and the socio-cultural theory.

Chapter three dealt with the research methodology. The research design and sampling procedures used were outlined. The research employed the mixed-method research design to collect data. The research instruments used were the questionnaire, interviews, observations and documentary analysis. The population was form one and two students of secondary schools in Checheche cluster. The sample was made up of 20 mathematics teachers, 10 mathematics HODs and 20 students. To select the respondents the researcher used the purposive and random sampling methods. Pilot study was also carried out.
In chapter four, data presentation and analysis was done together with the discussion of research findings. Data was presented using tables, graphs and texts. Data was discussed according to the research questions.

There were some challenges that the researcher faced when he was carrying out this research. Some respondents were not cooperative. They refused to give responses and some questionnaires returned with some unanswered questions.

5.3 Conclusions

The research findings indicate that there are more male ZJC mathematics teachers than females.

The findings of the study indicate that the teaching methods mostly used by teachers are group work and pair work. Other methods such as the discovery, project, problem solving and drama were not being used to teach mathematics at ZJC.

The researcher concluded that, although teachers indicated that they use student-centered methods, the research findings shows that most teachers use group work, pair work and the lecture methods to teach mathematics. Other methods such as the discovery method, project method, problem solving and drama are not used to teach mathematics. This also led to the conclusion that teachers do not know how to use these methods in teaching mathematics.

The researcher noted that the teachers have challenges in using the student-centered methods due to their lower level qualifications. This led to a conclusion that teachers do not use methods, such as the problem solving and discovery method, which gives the students chances to develop structures needed for the development of higher order cognitive competences because they are having challenges in using student centered methods.

It has been noted in this research that teachers do not use electronic media to teach mathematics. This led to the conclusion that teachers need to upgrade themselves, by making sure those teachers with Diploma in Education attaining degrees in education and that those with degrees...
attain masters. This will give them opportunities to learn how electronic media is used in teaching mathematics.

The researcher noted that most of the teachers under study are in possession of lower level professional qualifications.

The researcher also found out that schools do not hold staff development workshops on syllabus interpretation.

The researcher also noted that mathematics HODs is not supervising teachers in their departments.

Evidence from the study also reveals that school heads are not checking whether the HODs are supervising teachers in their department.

The research findings indicate that the Mathematics departments are being led by teachers with Diploma in Education.

5.4 Recommendations

The following are recommendations which the researcher made on the basis of the research findings.

5.4.1 Mathematics teachers should use all student-centered methods that include discovery method, project method and drama which give the learners an opportunity to develop structures required for the development of higher order cognitive competences.

5.4.2 The government should put a policy that compels colleges and universities to have more female students that do mathematics so that more female mathematics teachers are channeled into secondary schools.
5.4.3 The government through the ministry of primary and secondary education should come up with a policy that forces teachers with lower level qualifications to upgrade themselves and attain degrees and masters degrees.

5.4.4 Schools should make teachers with the highest qualifications in the department HODs of those departments so as to ensure effective supervision.

5.4.5 Schools should hold staff development workshops on syllabus interpretation and teaching methodologies so as to capacitate and empower the mathematics teacher.

5.4.6 Schools should provide resources so that electronic media is used in mathematics.

5.4.7 Mathematics heads of department should supervise teachers in their department so as to improve the methods used in their departments and to develop the teachers professionally.

5.4.8 School heads should check if mathematics heads of departments are supervising teachers in their departments.

5.4.9 Teachers need to be resourceful and come up with simple and readable materials in form of modules based on the syllabus. Gone are the days when teachers used to rely on text books.
REFERENCES


Tobin, K and Tippins, D (1993), *Constructivism as a Referent for teaching and learning*. In: K, Tobin (Ed) *The Practice of Constructivism in Science Education* pp 3-21, Lawrence- Eribaum, Hilldale, NJ.


APPENDICES

APPENDIX A: ZJC MATHEMATICS TEACHER QUESTIONNAIRE

The researcher is a Master of Science Education Degree student at Bindura University of Science Education and is conducting a study on teacher methodology and students’ poor performance in the teaching and learning of mathematics in Zimbabwe Junior classes in Checheche cluster. Anonymity and confidentiality are assured. Please feel free to add comments or clarifications to any of the questions. Thank you for responding.

SECTION A.

DATE……………………………………………………………………………………………………

SCHOOL…………………………………………………………………………………………

SECTION B (use a tick to show your response)

1. Gender: I am:

   Male……………………………………………………  ☐

   Female………………………………………………… ☐

2. Age (use a tick to show your response)

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30 Years</td>
<td></td>
</tr>
<tr>
<td>31-40 Years</td>
<td></td>
</tr>
<tr>
<td>41-50 Years</td>
<td></td>
</tr>
<tr>
<td>51 and above</td>
<td></td>
</tr>
</tbody>
</table>

3. What is your qualification?

   Certificate in Education………………………………… ☐
Diploma in Education ...........................................  □
Bsc ...........................................................................  □
Bed ...........................................................................  □
PGDE .................................................................  □
Masters Degree...................................................  □
Other (specify)...........................................................................................................

4. ZJC teaching experience. *(use a tick to show your response)*

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 Years</td>
<td></td>
</tr>
<tr>
<td>6-10 Years</td>
<td></td>
</tr>
<tr>
<td>11-20 Years</td>
<td></td>
</tr>
<tr>
<td>21 or More</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION C (Use a tick to s your response in the space provided).**

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>Agree</th>
<th>Not sure</th>
<th>Dis agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. ZJC mathematics teachers do not use a variety of methods when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. ZJC mathematics teachers use student-centered methods frequently when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. ZJC mathematics teachers have challenges in using student-centered methods.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. ZJC mathematics teachers do not use electronic media in teaching mathematics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. ZJC mathematics teachers do not use the pupils’ prior knowledge when teaching.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. ZJC mathematics teachers motivate pupils when teaching.

11. Teachers do not use the syllabus when scheming mathematics at ZJC.

12. Schools do not hold ZJC mathematics staff development workshops on syllabus interpretation.

13. Teachers who are teaching ZJC mathematics sequence the topics in the syllabus when scheming.

SECTION D.

14. State methods that you frequently use to teach ZJC mathematics.

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………
APPENDIX B: MATHEMATICS HOD QUESTIONNAIRE

The researcher is a Master of Science Education Degree student at Bindura University of Science Education and is conducting a study on teacher methodology and students’ poor performance in Zimbabwe Junior classes in Checheche cluster in the teaching and learning of ZJC mathematics. Anonymity and confidentiality are assured. Please feel free to add comments or clarifications to any of the questions. Thank you for responding.

SECTION A
DATE……………………………………………………………………………………………………
SCHOOL……………………………………………………………………………………………

SECTION B (use a tick to show your response)

1. Gender: I am :
   Male……………………………………………………
   Female…………………………………………………

2. Age (use a tick to show your response)

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30 Years</td>
<td></td>
</tr>
<tr>
<td>31-40 Years</td>
<td></td>
</tr>
<tr>
<td>41-50 Years</td>
<td></td>
</tr>
<tr>
<td>51 nd above</td>
<td></td>
</tr>
</tbody>
</table>

3. What is your qualification?
   Certificate in Education………………………………
   Diploma in Education .................................
   BSc ....................................................
   Bed ....................................................
   PGDE...................................................
   Masters Degree.......................................
Other (Specify)…………………………………………………………………………………

4. HOD experience. (*use a tick to show your response*)

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Years</td>
<td></td>
</tr>
<tr>
<td>6-10 Years</td>
<td></td>
</tr>
<tr>
<td>11-20 Years</td>
<td></td>
</tr>
<tr>
<td>21 or More</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION C** (*Use a tick to s your response in the space provided*).

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>Agree</th>
<th>Not sure</th>
<th>Dis agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. ZJC mathematics teachers in your department do not use a variety of methods when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. ZJC mathematics teachers in your department use student-centered methods frequently when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. ZJC mathematics teachers in your department have challenges in using student-centered methods.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. ZJC mathematics teachers in your department do not use electronic media in teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. ZJC mathematics teachers in your department do not use the pupils’ prior knowledge when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. ZJC mathematics teachers in your department motivate pupils when teaching mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. ZJC mathematics teachers in your department do not use the syllabus when scheming.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Schools do not hold ZJC mathematics staff development workshops on syllabus interpretation.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

76
13. ZJC mathematics teachers in your department sequence the topics in the syllabus when scheming mathematics.

SECTION D

14. State methods frequently used by ZJC mathematics teachers in your department

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

15. With specific examples, give challenges faced by ZJC mathematics teachers when using child-centered methods.

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

16. How do ZJC mathematics teachers motivate students in their lessons?

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

17. State strategies used in your department to assist teachers ZJC mathematics teachers who have problems in using the syllabus.

……………………………………………………………………………………………………………………
……………………………………………………………………………………………………………………

THANK YOU

APPENDIX C: PUPILS’ INTERVIEW GUIDE AND QUESTIONS

Introduction (5 minutes)
a) Thank participant for consent.
b) Explain the purpose of the research.
c) Provide assurance regarding confidentiality and non-attribution of data.
d) Request Permission to record.

**Interview questions (10 minutes)**

1. Which methods do teachers use to teach mathematics?
2. Which methods make you understand mathematics concepts?
3. Which media do teachers use when teaching mathematics?
4. Do teachers make use of pupils’ prior knowledge when teaching mathematics?
5. Do teachers sequence their topics when teaching mathematics?

**APPENDIX D: OBSERVATION GUIDE**

Date:…………………………….                                      Time……………………………….
PART I: OBSERVING TEACHING METHODS.

1. What teaching method(s) does the teacher use in the lesson?

2. Are the teaching methods child-centered?

3. What challenges does the teacher face when using the child-centered methods?

PART II: OBSERVING TEACHER CONTENT KNOWLEDGE

1. Does the teacher use electronic media in teaching mathematics?

2. Does the teacher motivate the students during the lesson?

3. Does the teacher use the students’ prior knowledge in the lesson?

PART III: OBSERVING SYLLABUS INTERPRETATION

1. Did the teacher use the syllabus to plan the lesson?

APPENDIX E: LETTERS OF APPROVAL

Attached are the following
1. Confirmation letter from Bindura University of Science Education.
2. Approval letter from Permanent Secretary in the Ministry of Primary and Secondary Education.
3. Approval letter from Provincial Education Director of Manicaland.