EXPLORING FACTORS INFLUENCING STUDENTS LEARNING OF MATHEMATICS AT O’ LEVEL IN REIGATE DISTRICT OF BULAWAYO METROPOLITAN PROVINCE

BY

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JULY 2015
DECLARATION

I, Zandile Zanamwe declare that this project is my original work and affirm that it has not been submitted to this or any other University in support of any application for a degree or any other qualifications.

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

Witness: .......................................................... Date: ..........................................................

Supervisors

I, ................................................................. declare that I have supervised this thesis and am satisfied that it can be submitted to the faculty of Science Education of Bindura University of Science Education.

Date: ..............................................................

Signature: ...........................................................
DEDICATION.

I dedicate this piece of work to my husband and my three children Melissa, Mitchelle and Tinevimbo. You are the greatest blessing that I will always cherish.
Acknowledgements

Many thanks go to my project supervisor Mr Z Ndemo for the guidance that he rendered for the success of this dissertation. I would also like to thank staff and parents in Reigate District for all the help they gave me in acquiring the data for the research. Above all, I thank God for providing resources and empowerment to all who contributed to the success of this project.
ABSTRACT.
A study to explore factors affecting the learning of Mathematics at ‘O’ Level was carried out in Reigate District in Bulawayo. It aimed at evaluating how teachers and parents contribute in the learning of Mathematics at ‘O’ Level and the role played by administrators. Also key in this study was the availability of different resources that enhance the grasping of the concepts in ‘O’ Level Mathematics. The study looked at three groups of respondents, the administrators (The Heads), the teachers and the parents of the pupils undertaking ‘O’ level Mathematics from the Reigate District secondary schools. A mixed research design was employed in order to collect the required data effectively. Quantitative data were collected in the project and was complemented by qualitative data. Purposive sampling was used to select 4 schools from the 8 secondary schools in the district. 40 respondents amongst 115 parents were randomly selected to evaluate home environment and resources relevant to the study of Mathematics. In the four schools, 12 teachers were subjectively selected on the basis that there were teaching ‘O’ Level Mathematics at the time of the survey. A mixed approach design was adopted in order to gather data using both interviews and questionnaires. The questionnaire was sent to 40 respondents, 31 respondents completed and returned the questionnaire for final usable response rate of 77.5%. Four school heads and 12 teachers participated in the interview and all responded to the questionnaire giving a 100% response rate. Quantitative raw data from questionnaires were cleaned and post-coded and analysed using a statistical package for social sciences (SPSS version 21) and presented in form of tables, graphs and pie charts. Qualitative raw data from interviews and open-ended questions were also presented in form of tables, graphs and pie charts to complement the quantitative findings. The findings showed that there are quite a number of factors affecting students’ learning of mathematics. Teacher commitment, use of different learning aids and provision of learning resources ranked top as major factors influencing students’ learning of Mathematics. In addition, teachers, administrators and parents all concur that they have a role which they are not doing in improving students’ learning of Mathematics. Recommendations put forward included that schools should provide teachers with materials for making learning aids and parents should make available appropriate learning resources. The Mathematics Subject Advisory Committee should play a more visible role in staff development of Mathematics teachers to make them more effective.
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Chapter One

The Research Problem and Its Setting

1.0 Introduction
The chapter develops the background of the study on factors that influence students learning of mathematics. It gives a description of the theoretical framework used in the study. It also highlights the purpose of the study, statement of the problem, research objectives and significance of the study, delimitations, limitations and operational definitions of terms used in the study.

1.1 Background to the problem
Globally education has played a fundamental role in transforming societies hence it is a priority on social, economic and political agendas in different countries. The view emanates from the philosophy of Reconstructivism propounded by among others John Dewey (1916), Paulo Freire (1973) and Krishna (1995) which states that education and school provides individuals with skills and literacy as well as numeracy tools that enable them to initiate and bring solutions to the challenges within their communities through a solution driven critical approach. Thus social change is a result of collective transformation of individuals within that society. Freire (1973) states that education should liberate the creative power of students and enable them to develop critical thinking skills that are fundamental in facing and finding solutions to real life problems in societies.

In pursuit of the reconstructive role of education, the Government of Zimbabwe has since 1994 spent an average of 5% of the Gross Domestic Product in public expenditure on education to cater for the provision of basic teaching and learning resources, infrastructural development and remuneration and development of educators among other crucial expenditures. The above percent (5%) compares well with developed countries such as Brazil (5%) and Germany (4.4%) respectively (Saunders, 2011). In 2011/2012 National budget education further got a lion’s share. Despite huge expenditure, they are factors influencing the students’ learning of ‘O’ Level Mathematics. The poor national pass rates in Mathematics cascades to provinces and districts throughout the country. Metropolitan district of Bulawayo, where this study will be
conducted (the research district) has recorded an unpleasing pass rate in the last five years since 2009.

Despite the unpleasing results in the district, Sciences especially Mathematics, Physical sciences and Biology are continuously under achieving below the set targets of the district. In 2011 target for Mathematics pass rate was 40% and the district achieved 35.81% while in 2012 the set target was 43% and the achieved rate was 35.62 a difference of -7.38% below the district target. In 2012 the pass rate for Mathematics in the district is illustrated below:

![Figure 1.1: Mathematics 2012 pass rate in Metropolitan district](image)

Out of 8 secondary schools offering Mathematics in the district only 29% of the schools got a pass rate of 50% and above while 9.2% recorded percentages below 10%. Among the lowest performers 3.94% of the schools got 0% pass rates in the subject. The above dismal failure in Mathematics and the drop in the already low pass rate at Metropolitan district testify of the depth of the factors influencing students learning of Mathematics performance in Reigate district.
Mathematics examinations pass rates for the last four years as follows:

Table 1.1: Mathematics examinations pass rates for the last four years

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICS</td>
<td>26.36%</td>
<td>36.38%</td>
<td>35.81%</td>
<td>35.62%</td>
</tr>
</tbody>
</table>

The poor performance in Mathematics which have continued unabated despite numerous interventions such as weekend refresher courses and workshops have generated interest in the researcher to explore factors influencing students learning of ‘O’ Level Mathematics in the district. Improved Mathematics outcomes will in turn compliment huge public expenditures that are channeled into education.

The researcher identified the following as anomalies which need to be addressed and explained through in-depth research:

- Higher expenditures in education for the provision of teaching and learning materials do not match the output or performance at matriculation level.
- High numbers of qualified Mathematics educators teach the subject but the failure rates remain very high and embarrassing.
- Schools in the same clusters with same contextual factors perform differently in Mathematics.
- Despite interventions, in-service training, weekend courses for Mathematics educators the subject remain poorly performed and is declining in some schools.

The study therefore seeks to address the concerns articulated above provide answers to the above questions. Provision of answers to the above questions and suggested practical recommendations and interventions may ultimately improve factors influencing students learning of O’ level of Mathematics at Metropolitan district and Bulawayo province in
general. Mathematics, the research process will demonstrate how collaboration among stakeholders is

1.2 Purpose of the Study

The study seeks to explore the factors influencing students learning of O’Level Mathematics

1.3 Statement of the Problem

Exploring factors influencing students learning of Mathematics at O’Level.

1.4 Research Questions

1. What factors influence the learning of ‘O’ Level mathematics?
2. How do the challenges contribute to the learning of Mathematics?

1.5 Objectives

1. To explore possible factors that influence students’ learning of mathematics.
2. To evaluate how teachers and parents can contribute towards improving students’ learning of mathematics.
3. To determine the roles of administrators and their implication in improving the learning of mathematics.

1.6 Significance of the study

The study shall be of academic and professional value to several stakeholders as shown below:

❖ Curriculum planners and analysts

Findings of the research will be used as the foundation for Mathematics curriculum planning and analysis to intervene in improving factors influencing students learning of Mathematics in secondary schools in the district and province respectively.
Mathematics Teachers.
The study shall provide awareness on how to effectively engage pupils on teaching Mathematics in different classrooms. Teachers will also benefit from networking, team teaching and collaboration strategies to improve teaching and learning of Mathematics.

Policy makers
Findings on possible solutions to factors influencing students learning of O’ Level Mathematics will be of value to policy makers in that they will use them to provide school materially or through deploying suitably qualified Mathematics teachers.

Subject advisory in Mathematics
The research findings will empower subject advisors in Mathematics on the best practices in networking and creating platforms for staff development and capacitating mathematics educators through sharing resources, skills, and expertise learning of Mathematics.

1.7 Assumptions of the study
In carrying out the research, the researcher believed and hoped that the following conditions remained favourable:

- The respondents fully corporates and provided research data that contributes to the understanding of the research problem.
- The sample chosen is truly representative of the population it represents.
- The research instruments and analysis techniques valid and reliable to enable the researcher to make conclusions and recommendations on the study.

1.8 Limitations of the study
Conventional research studies are affected by numerous technical, professional, logistical and social constraints which may have negatively affected the validity and authenticity of the research findings of the study. These included the following:

- Financial constraints hindered the researcher from studying a much bigger and more representative sample. Thus the smaller the sample the less generalizable
was its findings. However the researcher carried out a case study approach which was small but was subjected to intensive, in-depth study confined to Metropolitan district.

- The self-made research instruments may not be absolutely reliable thereby affecting the quality of research data collected and subsequent conclusions and recommendations thereof.
- The research participants may not have been sufficiently informed on the research problem due to its complexity and elusiveness. Therefore some may have responded without adequate interest hence providing unreliable or predictable data for the study. The researcher however gave adequate background information to stakeholders and participants prior to the collection of data and assured them of their anonymity and confidentiality of the data they are providing which made them fully corporate.

1.9 The delimitations of the study

The study focused on the following physical, social and mental boundaries due to financial, time and capacity constraints.

- It was conducted mostly in Reigate district where the eight research sites are situated.
- The participants were Mathematics learners, educators, subject advisors, principals and Heads of Departments.
- The study confined itself with exploring factors influencing students learning of Mathematics of O’Level Mathematics.

1.10. Operational Definitions:

- **Explore**: to investigate, study, or analyze: look into—sometimes used with indirect questions
- **Factor**: one of the elements contributing to a particular result or situation:
- **Influence**: the capacity or power of persons or things to be a compelling force on or produce effects on the actions, behavior, opinions, etc., of others:

1.11 Summary
This chapter presented the factors influencing the learning of mathematics at ‘O’ Level. The theoretical framework within which this study was carried out was discussed. Also stated were the statement of the problem, purpose of study, research questions, significance of study, limitations, delimitations and operational definition of terms. The next chapter focuses on the review of related literature.
Chapter Two

Literature Review

2.0 Introduction
Learning of Mathematics in schools and colleges globally and Zimbabwe in particular is an area which has been investigated by many researchers in both developing and developed countries. Key reasons are that Mathematics is a gateway into scientific and technological world hence poor learning in this discipline means that the future of the country will be gloomy as scientifically trained professionals will be in short supply.

In this project the researcher shall extensively discuss from various perspectives, factors influencing students learning of ‘O’ Level Mathematics in Zimbabwe’s secondary schools. The model will be designed on the background of a comprehensive discussion on the factors that account for underperformance and therefore will seek to present an inclusive all stakeholders approach which will be a diversion from a single target single delivery approach to problem solving to a multi- target multi- delivery approach where all key players will have specific roles to play which will not only result in improving the factors influencing students learning of Mathematics and also the overall school improvement and effectiveness in curriculum implementation discourse. In this section the researcher will present factors influencing students learning of Mathematics under the following subheadings: social-economic.

2.1 Socio-economic factors
The provision of education within a specific socio- economic context undoubtedly exposes its delivery to a plethora of factors that militate against its effective and credible outcomes. Studies by Engelbrechtetal (1996) link poor academic performance of learners to socio- economic factors such as poverty, parents’ educational levels and parent’s employment status among others.

Poverty, parents’ educational levels, home resources and parents’ employment statuses contribute to Mathematics underperformance. Research studies show that Human development Indices for different provinces vary considerably and Bulawayo was found to be among the lowest at 0.531 and a 77% poverty rate. Human development Index is an economic indicator used to measure basic standards of living, life expectancy and literacy levels of a population. Lower educational levels correlates with higher unemployment levels. Typical example is
Bulawayo province whose unemployment levels were the highest at 49.5% perhaps due to low educational levels of the population. The study shall thus investigate if the current Human Development Index of Bulawayo correlates affects the home environments’ provisions of optimal contexts to develop self-concept, self-identity and provision of learning resources that compliments government’s efforts. Consequently home and school environments shall be described in detail and how they are determined by socio-economic factors

2.1.1 Home environment’s influence on Children’s Education
The socialization and nurturing role of the family plays an influential role in laying a firm foundation for educational proficiency of children brought up within its context. Research findings by Adell (2002) reveal that family background is the most important weighty factor influencing students learning of Mathematics.

Ultimately as expounded by Themane (1989) the education system has experienced secondary school dropouts and unimpressive ‘O’ Level results which consequently channel school leavers into the highly competitive but already flooded unemployment market. The study will seek to find out how the home environment, development of self-concept, parental educational levels, employment status and availability of learning resources at home influence students learning on the of Mathematics education in secondary schools of Reigate District in Bulawayo.

2.1.2 Unpredictable Home environment can be combined with the preceding factor
Unpredictable home environments comprise parental neglect of children, loss in the family through death, divorce, and substance abuse. Studies by Saiduddin (2003) in America show that poor academic performance was due to poverty, cultural differences, unstable homes, drug abuse and teenage pregnancy. This implies that children exposed to negative home environments are likely to poorly learn and may also drop out of school or repeat grades. This trend is contrary to supportive, intact families where children have positive role models, get parental support materially and emotionally resulting in proper learning of Mathematics.

Additional studies by Wilson and Black (1978) revealed that home environments that are supportive of children’s education result in developing positive self-esteem of children which in
turn positively influence educators’ perceptions of such learners. On the contrary learners from non-supportive environments develop low self-esteem and educators have low expectations of them which in turn make them struggle to adjust to the school environments ultimately affecting their learning of mathematics. This study shall find out if home environment is a factor that influence students learning of Mathematics in particular unstable home environments which are common in Bulawayo the heart of the research study.

2.1.3 Self-concept and Self identity
Learner performance in school directly links to development of a positive self-concept and identity within a nurturing environment which encompasses the home and the school as primary and secondary socialization agents of the child. Research studies conducted by Solo (1997) in America indicated that African American learners were not so confident in executing their school work as compared to other ethnic or racial groups. The study revealed that they had difficulty in establishing identity and pride in their African American identity. Consequently they felt despaired, disillusioned, alienated, frustrated, powerless and hopeless which in turn led to negative self-esteem.

In contrast to the above findings, positive conditions at home such as close family relationships that build positive self-concept, assisting children with home works, parental involvement in school, having high expectations for children’s schooling and having clear rules and standards for their behaviors encourage learners to be motivated to do their school work. The study shall use the above findings to compare home environments in Reigate district and their impact on self-esteem of learners and to what extent parental involvement impact factors influencing students learning of O’Level Mathematics.
2.1.4 Parental Educational levels
Studies conducted by Castejon and Peres (1998) in Spain on the impact of parental educational levels on factors that influence learning of ‘O’ Level mathematics showed that parents whose educational levels were low could not assist their children in home works, assignments and projects resulting in pupils demotivated to learn Mathematics in secondary education. This implies that learners’ perception of family support in education correlates with their levels of performance in school.

Findings by Marchesi and Martin (2002) also in Spain on social class impact on learner performance revealed that learners from higher social classes had higher expectations for their future as compared to those from lower social stratum. Cummius (1994) concurred on studies done in the United States of America that showed that there is a high correlation between low achievement and socio-economic background where learners from low socio-economic brackets under performed at school resulting in highest poverty and unemployment levels which became a cycle. Education failure thus becomes legitimized by inherent inferiority complexes where high illiteracy rates, poor hygiene and lack of inspiring child rearing practices dominate the nurturing contexts of most children. The study will therefore find out if parental educational levels of education is a factor influencing the learning of ‘O’ Level Mathematics in Reigate district.

2.1.5 Educational Resources at home
The role of the home as a primary socialization institution is paramount as it is the prime supplier of learning resources such as books, study rooms, tables, study time, electronic devices like computers, cell phones, radios and televisions as well as computers which play a pivotal role in modern education. According to Greenwood, Frigo and Hughes(2000) in Australia, learners provided with better resources performed better as compared to their counterparts from poor backgrounds. Kurkietal (2005) however despite the above by asserting that school variance and provision of experiences that ameliorate the effects of socio economic status could decrease the gap as determined by socio-economic status. This implies that despite poor socio-economic backgrounds of learners, interventions done at any stage of development to lessen the impact of poverty can result in positive outcomes never anticipated in the absence of interventions. Thus a
multi-target approach earlier cited intending to capacitate families and schools to have a positive impact on educating learners are fundamental if learners performances in Mathematics are to be improved. The study shall assess if provision and non-provision of home educational resources is a factor influencing the students’ learning of Mathematics.

2.1.6 School Environment influence on learning of Mathematics
Schools are user systems whose sole mandates from society is to implement the national curriculum policies usually disseminated from the central government. Thus like home environments their contextual differences impact on the quality of their educational delivery. Paradoxically some schools in the same geographical area and similar socio-economic statuses perform differently. The study shall therefore seek to account for the different factors that influence the learning of Mathematics in schools in the same cluster with similar resources and in the same catchment areas.

2.1.7 Impact of Resources on schools as a factor influencing students’ learning of Mathematics
Lack of resources in developing countries can sometimes prevent the delivery of a good education while in relatively rich countries it is difficult to attract qualified and good teachers to poor schools. Studies by Unesco Education For All (2004) found out that lack of educational resources in schools make learning extremely difficult. In 2001 an average of only 8.7 on a list of 22 desirable resources for teaching were available in 14 Southern and East African Consortium for Monitoring Educational Quality countries, and as many as 10% of children (45% in Zanzibar) had no place to sit in overcrowded schools. The above imply that absence of such basic resources as classrooms, desks, chairs, chalks and textbooks mean that other factors that are crucial for quality education (teacher subject knowledge) may not have much impact on improving factors influencing the learning of Mathematics. The study shall seek to find out if schools resource endowment affects the learning of Mathematics.

Other studies done by the World Bank (2004) found out that in many poorest countries, the right combination of resources impacted on performance of learners. Provision of good clearly
written and easy to understand textbooks or other quality classroom resources influences the teaching and learning quality as well. This implies that if teachers are not provided good textbooks no matter how good they are, they may not improve the quality of teaching and learning in schools. Equally related to resources is the distribution models in classrooms and schools in general. Borg (2008:9) expounds that, “Part of the resource constraint in poor schools may result from inequitable distribution of resources, often resources are more widely available in urban than in rural area or in rich than in poor neighborhoods within cities. “This means that inequitable distribution of resources among schools is an important variable which has to be courteously and equitably done lest it causes poor performance especially in critical subjects like Mathematics. The study will thus seek to find out the resource matrix in Reigate schools and the type and quality of textbooks used and whether they are a factor influencing students’ learning of Mathematics.

Deploying poorly trained, incompetent, lazy educators may have negative spinoffs on learning and teaching outcomes in Mathematics education. Borg (2008) further asserts that despite equitable distribution of resources in schools, good teachers may avoid poor schools because of the great difficult of teaching poor children in deprived circumstances. This means that good teacher may be selective of working environments as highlighted by the Hygiene Factor theory of Herzberg (1959) who pointed out that job dissatisfiers deal with the factors in the job context while satisfiers deal with factors involved in doing the job. Thus poor, under resourced schools provide more factors that push good teachers out of them which may result in a situation where poor, incompetent teachers are stuck in poor schools and channel a cycle of poor results thereby increasing the magnitude of poor performance especially in critical subjects like Mathematics. The study will seek to find out the quality of teachers through their highest qualifications and achievements in teaching the subject. Teacher perceptions on the challenges in teaching children from poor backgrounds will also be collected and interventions that they adopt to equalize learning opportunities in their classrooms. Impact of the efforts by the Department of education to attract and retain good teachers through incentives will be also studied and analyzed in the context of the research study.
2.2 Impact of Teacher challenges on Teaching and Learning of Mathematics

Research studies globally show that there is a positive correlation between learners’ achievements in Mathematics and teachers’ professional backgrounds and teaching practices. Darling-Hammond (2000), Rice (2003) and Ingvarson et al. (2004) concur that teachers’ backgrounds which include qualifications, subject majors, and experience, teacher professional development, and teaching practices play a pivotal role in determining students’ achievement in Mathematics education. This means that in the absence of good teachers, schools cannot achieve good Mathematics results regardless of material and infrastructural resources and good caliber of learners. The study seeks to establish whether Mathematics teachers’ qualifications, experiences, and professional development in Reigate influence the students’ learning of Mathematics.

Figure 2.1 Schema of Teacher Challenges and how they affect Students achievements
Research findings by Bretts, Zen and Rice (2003) found that there is a positive correlation between teacher qualifications and students achievements in Mathematics. They found out that teachers with high degrees in the subject taught with confidence and had better grasp of subject content compared to those with lower qualifications. Goldhaber and Brewer (1996) in related studies found that a teacher with an advanced degree in a subject he teaches is associated with higher student achievement as compared to one with a basic qualification in the subject. This reinforces that teachers command of the subject knowledge is a determinant of students’ success in the subject because he teaches with clarity and understanding of the matter hence learners learn Mathematics effectively.

On the contrary findings by Wenglinsky (2000) and Greenberg etal (2004) revealed that post graduate qualifications at Masters or higher grade were not significantly related to learner achievement. The study will evaluate if teachers qualifications have an influence on students’ learning of Mathematics in secondary schools.
2.2.1 Teachers subject Majors

Mathematics teachers the world over are identifiable by their subject major in Mathematics as evidenced by obtaining a three year or four year college or university Diploma or degree in the subject. Thomas and Raechelle (2000) in their research studies in America concluded that there is an important link between teachers’ subject majors and students achievements in the subject. Their conclusion is reinforced by leading education group such as Education Trust, The Education Leaders council, and the National Commission on Teaching and America’s Future who concur that Mathematics as a discipline should not be left to chance but should be taught by educators who really know the subject, failure to which learners will continuously under perform in the learning area.

Other studies by Wilson and Floden (2003) found that students of Mathematics teachers with Mathematics as a major demonstrate a higher level of academic achievement in Mathematics compared to their counterparts whose educators are not Mathematics majors. Goldhaber and Brewer (1996) and Darling-Hammond (2000) further concur that specialization in a teaching subject capacitate the teacher to teach competitively and is the most reliable predictor of students achievement in Mathematics. This implies that majoring in Mathematics by educators widen and increases their content grasp in the subject and their pedagogical skills in content delivery to learners in the classroom which positively results in good performances.

On the other hand studies by Ingvarson et al (2004) found that the correlation between teachers’ majors and students’ achievements in Mathematics was complex and inconsistent. This may imply that other contextual factors in the user systems could be responsible for the negative correlation between the two variables. Additional studies by Martin et al (2000) and Wenglinsky (2000) found that majoring in Mathematics was not related to teacher effectiveness. This means that teachers of Mathematics should inculcate positive Mathematics practices among pupils absence of which may result in learners’ poor achievement despite that they are taught by highly qualified educators. The study will seek to find out if there is a correlation between teachers’ majors in Mathematics and students’ learning of Mathematics. Such findings guided the research process and will account for contrary views on the relationship between the two variables.
2.2.2 Teachers teaching experience
Numerous global studies found that teachers’ years of experience positively correlates with students ‘achievements in Mathematical passes. Studies by Bretts, Zan and Rice (2003) found out that teachers with long years of experience in teaching Mathematics produced good results in learner performance in the subject. Studies by the Centre for Public Education (2005) in America found out that there is a strong correlation between teaching experience and excellent students’ learning of Mathematics. Teachers who had 5 years or more teaching experience performed better in students’ achievements as compared to inexperienced who had fewer years of teaching experience. This means teaching experience as a variable contributes to understanding syllabus demands and mastery of relevant, useful teaching strategies by teachers hence the longer years the teacher accumulates in the job the much better the teacher becomes in teaching the subject.

Similar studies by Rosenholtz(1996) in Darling- Hammond(2000) and Hawkins, Stancavage and Dossey(1998) found that although teaching experience correlates with learner achievements, the relationship is not linear, students taught by teachers with fewer years of experience had lower levels of Mathematics achievement compared to those with 5years or more whose achievements were good but not incremental. This implies that despite that experience is beneficial teachers are likely to get burn out over the years and may not bother working harder to attain their fullest potential in teaching Mathematics. Darling- Hammond (2000) attributes this to the burn out syndrome and getting tired of routine job activities.

Contrary findings by Hanushek (1997), Martin etal (2000) and Wenglinsky (2002) found that the number of years of teaching do not correlate with students learning of Mathematics. Highly experienced teachers produced very bad results in some cases while in some less experienced educators had good performances. The above scenario could be attributed to contextual factors or differences in schools which may militate against teachers’ experience and grasp of subject knowledge. Alternative explanation could be that newly qualified educators are more grounded in the subject knowledge and thus are effective in content grasp as compared to older experienced educator. The study will seek to find out if teaching experience influences the students’ learning of Mathematics in Reigate district secondary schools.
2.2.3 Teacher professional Development
Teacher professional development are the opportunities offered to practising teacher to develop and deepen new knowledge, skill, approaches and disposition to improve their effectiveness in their classrooms (Loucks-Horsley et al., 1998). The Professional Affairs Department (1999) concur that it is the enhancement of teachers knowledge of students, the subject matter, teaching practice and education related legislation. This means that professional development includes both formal and informal means of increasing the knowledge of educators in pedagogical and content skills with the aim of enhancing strategies that explore new and advanced understanding of subject matter and use of resources in the classroom. This comes in the form of workshops, weekend staff development courses and school based in service courses conducted by Heads of Development.

Loucks-Horsley et al (1998) expounds that professional development of teachers is an ongoing exercise that takes place in and outside the school where teachers can be taught by other teachers outside the school for example during meetings of professional associations and teacher unions. It can also be through numerous workshops and presentations in which teachers share their knowledge with other teachers or being formally taught by education experts in disciplines. The study shall measure and analyse teachers’ participation in professional development through nine indicators listed below. The indicators are amount of time spent on professional development in the last three years.

- Taking a short formal college or university course in teaching Mathematics.
- Taking a formal college or university Mathematics course.
- Observing other teachers teaching Mathematics.
- Meeting within a cluster to study or discuss Mathematics teaching and learning issues on a regular basis.
- Collaborating on Mathematics teaching and learning issues with a group of teachers at a distance using communication.
- Serving as a mentor or facilitator/peer coach in Mathematics teaching.
- Attending workshops or seminars on Mathematics teaching.
- Attending a Mathematics Association meeting.
The study shall seek to find out if professional development for Mathematics teachers in Reigate district is being done and measure if it has any effect on students’ learning of Mathematics.

2.3 Conditions necessary for effective learning of Mathematics in secondary schools

Schools as social institutions are essentially mandated to develop knowledge and skills in learners and prepare them for a life in a broader society endowed with skills and competencies to help their countries find solutions to emerging challenges. Mathematics learning is one of the key areas of concern to government, scientists, industrialists and academics globally and Zimbabwe in particular. Thus providing optimal conditions for Mathematics teaching and learning in high schools is of paramount importance to school managers, parents and educators as well as district officials.

Studies by Smit and Edwards (2008) in South Africa found that effective leadership was a very key condition to effective curriculum implementation in that it is able to deal with change and sustains the functioning of the school as an organization. School leadership ranks as a top priority in improving schools and making them effective organizations that are able to fulfill their social functions. Fullan (2004: 16) cautions, “………… only principals who are equipped to handle a complex, rapidly changing environment can implement the reform that leads to sustainable improvement in students’ achievement”. This means that leadership in school from the principals; Heads of Departments and educators need to be skilled to handle learner behaviors that can derail curriculum implementation in Mathematics. Leaders should possess high pedagogical experience and ability to motivate educators and learners in the face of challenges in implementing a Mathematics curriculum. The study shall examine the effectiveness of school leadership in implementing a Mathematics curriculum. Other finding by Southworth (2005) cites that schools must be led as business organizations whose sole purpose is to create and lead an environment that enhances and supports learning. Harris etal (2005) concurs that the current focus on leadership stems from the need to cope with discontinuous accelerating change. This implies that schools as part of the changing social contexts are continuously changing their curricular, human resources nature of learners and contextual factors. Thus school leaders
implementing a Mathematics curriculum should be able to innovate and propose solutions to improve the learning of Mathematics.

2.4 Summary
Literature on factors that affect the learning of mathematics at ‘O’ Level has been reviewed. Socio-economic factors that affect the learning of mathematics have been discussed at length including the school and home environment. Impact of Teacher challenges on Teaching and Learning of Mathematics has also been delved into. The next chapter focuses on methodology used to obtain data.
Chapter Three

Research Design and Methodology

3.0 Introduction
The chapter gives an in depth overall plan for obtaining answers to the research questions outlined in chapter one. Strategies and methodological decisions that will enhance validity and reliability of the research findings will be discussed. A description of the research participants, the research instruments to be used as well as the data analysis techniques shall also be highlighted.

3.1 Aim of the Study
The research study seeks to explore factors influencing students’ learning of ‘O’ Level mathematics placing the contribution of skills, expertise and commitment of stakeholders at the heart of exploring factors that influence the learning of mathematics at ‘O’ Level in secondary schools in Reigate District in particular and Bulawayo Province in general. The researcher will also establish how school heads, teachers, parents and learners may contribute to address the factors influencing students learning of mathematics.

3.2 Research Design
The study shall adopt a mixed methods research design which combines qualitative, non-experimental descriptive design with the quantitative design to compliment the collection and analysis of different forms research data from learners, educators, parents and other stakeholders on their views and opinions on the causative factors for poor learning in Mathematics in Reigate district and suggest a model of intervention which could be used in the learning of mathematics in the district and Bulawayo in general. Johnson and Onwuegbuzie (2004:17) define that, “Mixed methods research is the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” This implies that in using mixed methods design the researcher uses multiple, inclusive, complimentary and collaborative approaches in collecting, analyzing, displaying, and interpreting research data collected from a phenomenon that is studied. Methodical pragmatism or eclectism of mixed methods frequently provides superior results compared to mono-research approaches (Johnson and Onwuegbuzie, 2004). Therefore given the pragmatic perspectives of this study, arguably mixed methods is a fitting and appropriate approach. The mixed methods paradigm will be used to explore factors that influence students’ learning of mathematics.
The design will be appropriate to the study due to its methodological pluralism or eclecticism which frequently results in superior results as compared to mono method approach (Johnson and Onwuegbuzie (2004). Tashakkori and Teddlie (2003) postulate that in a mixed method design the researcher collects and analyses and reports both in quantitative and qualitative data and builds a study on the strengths of both research designs. This implies that in using the mixed methods design the researcher aims at getting a complete picture of the research problem through collecting all forms of data that will assist in answering the research questions.

The use of mixed methods design has multiple benefits, Bryman (2006) and Plano Clark (2010) concur that through mixed methods designs the researcher is able to view research problems from multiple perspectives so as to enrich the meaning of a singular perspective. Contextualization of information to clearly explain the whole picture of a system and adding information about individuals is also a key reason while at the same time data is merged to develop a more complete understanding of the problem, to compare, validate or triangulate results; to provide illustrative contexts for trends or to examine experiences along with outcomes. Additionally, Johnson and Onwuegbuzie (2004) summarises the following as the strengths of mixed methods designs:

1. A researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both in the study.
2. Can provide stronger evidence for a conclusion through convergence and corroboration of findings.
3. Can answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach.
4. Numbers can be used to add precision to words, pictures and narratives.

The above imply that through mixed methods design the research product emerges as a grounded and rich with wide and deep evidence from a multiplicity of findings that answer the research questions. Above all the presentation and analysis of data encompasses figures, pictorial presentations and qualitative, comprehensive explanations of a phenomena that is studied. Through the findings that are considered more complete, pragmatic application of
knowledge can be used to inform theory and practice of education resulting in effective teaching and learning of Mathematics in secondary schools.

On the contrary, Johnson and Onwugebuzie (2004) sum up the following as weaknesses of using mixed methods design:

1. It can be difficult for a single researcher to carry out both qualitative and quantitative research especially if two or more approaches are expected.
2. Researcher has to learn about multiple methods and approaches and understand how to mix them appropriately.
3. Using mixed methods is more time consuming and expensive since many research instruments are to be used.
4. Some of the details of mixed research remain to be worked out fully by research methodologists such as problems of paradigm mixing, how to qualitatively analyze quantitative data and interpreting conflicting results.

The above weaknesses despite challenging will be counteracted through the researcher collecting data from a not so big a sample in this case a cluster of eight schools that are within the same geographical context. The researcher will further allocate ample time for the collection of data and administration of instruments.

3.3 The Sample and the Sampling procedure
Reigate district has a total of 8 secondary schools of different socio-economic status and varied matriculation performance population of schools offering Mathematics and the learners are examined under Zimbabwe Schools Examinations Council (ZIMSEC). Borg and Gall (1989) defines a population as the members of a real hypothetical set of people, events and objects to which the results of the research process could be generalized. Thus all the secondary schools in Reigate will be targeted and from them a sample will be chosen for an in-depth study.

Reigate district is made up of two circuits namely North and South. The sample will be chosen from the 8 schools taking into consideration the common characteristics from the population. For comparative purposes the sample shall comprise both well performing and underperforming
schools. Macmillan and Schumacher (1989) define a sample as representative of population with approximately the same characteristics as the studied population. Sampling ensures isolation of a few numbers and conducting of in-depth study and scrutiny of a small representative group from the population to ensure adequate manipulation of key variables.

In determining the size of the sample the researcher was guided by the assumption that it should be 10 – 20% of the whole population in order for it to be representative enough. Leedy (1993) and Vengesayi (1995) concur that a sample that is more than 10% of the target population is representative enough to produce reliable credible information. Therefore the researcher targeted four schools with a total of four hundred and eighty students in Reigate due to their proximity to each other and the common characteristics contextually and geographically. Performance Mathematics in 2012 Examinations was used as the baseline evaluation for the sampled schools for sampled for in-depth study.

3.3.1 Sampling procedures
The study will use both purposive and stratified random sampling techniques, Vengesayi (1995:80) define purposive sampling as, ‘…a judgmental form of sampling in which a researcher purposely selects certain groups of individuals for their relevance to the issue being studied ‘This means that schools, communities and teachers learners in Reigate district which are Cowdray Park, Luveve, Entumbane, Sobukazi, Mzilikazi well as Emakhandeni will be participants in the research process. Specifically learners who study Mathematics at ‘O’ Level will be the target sample for the study.

Neuman (1997) reiterates that purposive sampling is an acceptable kind of sampling for special situations and uses the judgement of an expert in selecting cases or it selects cases with a specific purpose in mind. Bobbie(1992) re-affirms that it is a non-probability sampling method in which the researcher uses his or her discretion in selecting members of a sample to be studied. This is relevant to the Mzilikazi cluster where the researcher is based and that will enable the researcher to identify specific variables peculiar to the cluster for in-depth investigation.
3.4. Research Instruments.
Data for this study was collected using questionnaires and interviews. The instruments were used in triangulation to ensure validity and reliability of the research findings. An in-depth description of the instrument and their relevance to the study was outlined below.

In implementing the data collection plan, selection of respondents, sample size, handling contradictory results, and emerging potential bias in data collection were considered. Creswel (2006) states that despite the fact that there is no consensus on respondent selection, common practice among mixed methods researchers is to select the same individual for both qualitative and quantitative data collection.

3.4.1 Questionnaires
A questionnaire consists of set of content based written questions that are closed and some are open ended to capture responses on the problem studied. Chikoko and Muhlwayi (1995) explain that it is a document containing questions designed to solicit information from respondents on the problem being researched on and analyses to derive answers. In the study teachers, students and the Ministry of Primary and Secondary Education officials shall answer questions on their views on specific factors that influence students’ learning of mathematics in Reigate district. The questionnaire will be appropriate because it is cost effective in design and use unlike interviews and observations where the researcher has to be physically present. This implies that it cost less in terms of time and money to design and use a questionnaire in comparison to other instruments such interviews and observations where the researcher has to physically interact with research participant or setting where data is collect, Berdie and Anderson (1974) concur that questionnaires are easier to administer and from many respondents within a reasonable time. On the contrary,Borg and Gall (1994) posit that questionnaires have relatively a poor response rate and sometimes participants pass them on to subordinates who are likely or may thoughtlessly and hurriedly fill them and send them back this providing less authentic data. In this study the researcher will personally distribute the questionnaires and set a follow up date to collect them from participants and further triangulate using interviews and observations on the sample to ensure validity of the findings.
3.4.2 Interviews
An interview like a questionnaire is made up of questions on the problem under study, and the difference is that participants answer them verbally on a face to face basis or by telephone. Sykes (1992) define interviews as meeting persons face to face especially for the purpose of obtaining opinions about a research problem. In the study semi structured interviews will be used to triangulate questionnaires. In this semi structured interviews will be used to triangulate questionnaires and seek further clarifications and face to face opinions on the study. The participants that will be interviewed include mathematics teachers with the intention of seeking their opinions on interventions proposed in the model like team teaching and its impact on improving outcomes in Mathematics in secondary schools. Other participants will include school heads to solicit their views on whether resources and infrastructure as well as teachers employed in their schools could be factors that influence the learning of Mathematics.

Pattorn (1990) suggests that the advantages of semi structured interviews are that the main questions of the interviews can be listed before hand and also that during the interview the interviewer is able to re-arrange the listed questions according to the reactions of interviewees and the atmosphere of the interview. The interviews will be appropriate for this study because they will afford the researcher opportunities to rephrase and clarify some of the questions which may not have been clear to participants. Leedy (1980:11) postulates that, “The interviewer has access not only to what the people say but how they say it”. This means that apart from directly interacting with participants the researcher can also infer on the way participants respond to his questions especially those that are sensitive and personal. In the study the researcher will reiterate and give assurance to participants that their responses will be treated with confidentiality and thus will conduct the interviews in secluded, client convenient and quiet environment.
3.5. Data Collection
Data for this study shall be collected from a plethora of sources where triangulation will be used to enable the researcher to collect all forms of data that will result in authentic analysis. Both primary and secondary sources of data will be complimentarily used. Kelleher (1999) define primary sources as those closest to the individual conducting the research, first hand evidence from research participants. This means that all information collected directly from the research respondents through conducting interviews and administering questionnaires will constitute primary evidence that answers the research questions. This type of data will be useful to the study because it will provide first hand, raw data, direct evidence on the study hence its authentic and valid as compared to data from other sources.

Nordquest (2006) posits that it is the original appearance of data and relays new information and is the cornerstone of further research. Other sources of this type of data will be pupils work, mark books and teachers files which form undisputed evidence of the interaction that take place during teaching and learning. Additionally secondary sources of data will also be used and will play a complimentary role to validate primary sources of data. Nordquist (2006) and Jerry etal (2011) concur that secondary sources of data are other people’s work, materials that analyse and interpret information from primary sources and only provide comment on the original data. This implies that these sources of data may be sources found out of the settings or sites but are information that is related to the study. These sources were mainly analyzed through document analysis and they constituted provincial reports, circulars, national exams reports and examination question papers among others. Therefore for this study information from both sources of data will be equally treated and subjected to different analysis techniques aimed at unearthing answers to the research questions of the study.
3.6. Reliability and Validity
Globally intentions of a researcher are to provide new knowledge that is reliable, credible, dependable and confirmable in similar or different settings. Therefore a credible research provides precautions that can guard the research from being rendered unreliable, not authentic and biased. Thus a credible research provides precautions that can guard the research findings from being rendered unreliable and biased hence issues of validity and reliability are central in research discourse.

3.6.1 Reliability
Best and Kahn(1993) and Stenbacka (2001) view reliability as the extent of consistency that research instrument or procedures demonstrate, and those attributes ensures the standard of research process is of high acceptable quality. The research findings were tested on how dependable they are since they would be used to answer research questions which in turn provide new knowledge useful to solving societies’ problems in education systems. Neuman(1997) explains that reliability tells us about an indicator’s dependability and consistency. The research measures or findings were checked to see if they give the same result each time the same thing is measured even when using a different research instrument.

Subjectively and interference by the researcher during data collection was lessened through use of research notes, recorded conversations and direct quotations from research respondents. McMillan and Schumacher (2006) advise that recording of verbatim accounts of actual conversations and transcripts is an important aspect to ensure validity of collected data.
3.6.2 Validity
Validity like reliability is a central issue in research without which the findings could be disputed. Neuman (1997) explains that validity is whether the indicator actually captures the meaning of the construct in which the researcher is interested. Bohrnstedt (1992b: 2217) has argued that validity is a matter of degree; it cannot be determined directly. Validity is part of a dynamic process that grows by accumulating evidence over time and without it, all measurement becomes meaningless. In pursuit of validity of indicators which are the data collection instruments such as questionnaires and interviews, the researcher shall pilot test all the instruments to ensure they capture and adequately collect the data to answer the specific research questions. In further attempts to ensure credibility of the research, the researcher will accurately capture the actual views, thoughts, feelings and intentions of participants without alterations to ensure interpretive validity (Johnson and Christensen, 2000).

3.7. Data analysis and interpretation
The study is multi-dimensional that is it encompasses aspects of both qualitative and quantitative research paradigms hence both qualitative and quantitative data analysis approaches will be adopted to adequately capture the significance and diverse meaning of collected data and compliment the findings of the study.

3.7.1 Content analysis
Content analysis as systematic description of behavior asking who, what, where and how questions were used to analyse data from semi structured interviews and narrative data. Babbie(2009) defines content analysis as the study of recorded human communications such as books, websites, paintings and laws. It is a technique for describing of behavior by asking who, what where, why and how and with what effect. Collected data from semi-structured interviews and narrative data was summarized and analyzed using content analysis approaches. Data from interviews on team teaching, resources in schools and the conditions for effective learning of mathematics in schools was coded and analysed. In using content analysis technique the researcher will identified trends in institutions and factors influencing students’ learning of Mathematics in secondary schools in Reigate district.
3.8. Ethical Considerations
Conducting research in an academic and professional setting demands that the researcher be aware of the ethical issues surrounding research participants and the confidentiality of the collected data. Driscoll and Breeze (2010:1) highlight that the following are crucial ethical considerations:

1. The researcher should have the permission of the research participants to collect data. Thus the researcher will from the start seek permission from Circuit managers, principals and teachers before conducting research.
2. The researcher should guard against causing physical, emotional or mental harm to the subjects of the research. This will be done through using carefully worded approach when dealing with sensitive issues during interviews.
3. Accurately reporting results, the researcher will ensure that collected data is accurately represented and not altered by discussing interview and observation data in context and verifying through triangulation.

Walliman (2005:364) posits that anonymity is crucial in ensuring confidentiality of the participant and as such if it cannot be assured the participant should be informed. In the study the researcher will use pseudonyms or labeling settings as A, B, C or D respectively.

3.9 Summary
The chapter discussed the overall research plan detailing the target population, the sample as well as how data will be collected, presented and analyzed in answer to the research sub questions. The next chapter will use statistical calculations, textual descriptions, frequency distribution tables and percentages among others to present and discuss the data that will be collected in relation to the research sub questions.
CHAPTER 4

DATA PRESENTATION, ANALYSIS AND DISCUSSION.

4.0 Introduction
This section presents and analyses data obtained from the four secondary schools in Reigate district amongst teachers, parents and school heads on factors affecting students’ learning of mathematics at ‘O’ Level. The sample size consisted of 56 participants, 40 females and 16 males. Data was collected using questionnaires and interviews. Quantitative raw data from questionnaires was presented in form of frequency tables, graphs and pie charts. Qualitative raw data from interviews and open-ended questions was presented also in form of frequency tables, graphs and pie charts. The questionnaire was sent to 40 participants, 31 participants completed and returned the questionnaire for final usable response rate of 77.5%. Four school heads and 12 teachers participated in the interview.

Reliability of the Research Instruments
The Cronbach’s alpha test was used to measure the reliability of the questionnaires. Reliability measures internal consistency of a questionnaire. A reliable questionnaire is one that is able to produce consistent results if it were to be used by another researcher or on other respondents (Saunders, 2009). The questionnaire on parents had a Cronbach’s Alpha value of 0.618 while the questionnaire on the teachers had a Cronbach’s Alpha value of 0.636. Both questionnaires were therefore deemed to be reliable as data collection instruments.

Table 4.1: The age categories of the parents interviewed

<table>
<thead>
<tr>
<th>AGE</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>13</td>
<td>41.9</td>
<td>41.9</td>
<td>41.9</td>
</tr>
<tr>
<td>30-40</td>
<td>17</td>
<td>54.8</td>
<td>54.8</td>
<td>96.8</td>
</tr>
<tr>
<td>40-50</td>
<td>1</td>
<td>3.2</td>
<td>3.2</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.2: The different working and non-working age groups of the learners’ parents

<table>
<thead>
<tr>
<th>WORKING ACROSS AGE CATEGORIES</th>
<th>Total</th>
<th>20-30</th>
<th>30-40</th>
<th>40-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>100.0%</td>
<td>0.0%</td>
<td>87.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>ARE YOU WORKING</td>
<td></td>
<td>13</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>NO</td>
<td>100.0%</td>
<td>56.5%</td>
<td>43.5%</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.9%</td>
<td>54.8%</td>
<td>3.2%</td>
</tr>
</tbody>
</table>

Table 1.3: Parents’ level of education

| LEVEL OF EDUCATION |
|-------------------|-----------------|----------------|----------------|
| Frequency | Percent | Valid Percent | Cumulative Percent |
| PRIMARY       | 1| 3.2 | 3.2 | 3.2 |
| TERTIARY      | 30| 96.8| 96.8| 100.0 |
|                | 31| 100.0| 100.0|           |

Most of the parents interviewed (96.8%) were in the 30-40 age category. In addition, it is noted from the analysis that 96,8% of them attended tertiary education although some with secondary level thought it was tertiary. Most of these parents due to their educational level assist their children in their mathematics school work. However 3,2% attended primary education only so at times due to their level of education it becomes difficult to assist their children in mathematics considering that they never reached the ordinary level them thus O’ Level mathematical concepts become difficult to understand. These parents were having 0-4 children (96.8%), however it could have been better in the tool if actual numbers were recorded for other evaluations.
Most parents do provide pupils with different resources. However most parents could not say exactly how these resources help their children. 24.1% of parents provided all the listed learning materials. The lowest was 3.4% for parents who provided T.V. radio and cellphone. It seems most parents are against cellphones. The analysis also noted that 96.8% of parents encourage their children to learn mathematics while 3.2% sometimes assist their children in learning Mathematics.
Most of the parents 41.9% strongly agreed that available learning resources at home encourage their children to learn mathematics. 45.2% agreed while 12.9% disagreed. 51.6% of the parents strongly agreed that level of parents’ education negatively affects the level of assistance that parents give to learners in mathematics. 29% agreed while 16.1% disagreed and 3.2% strongly disagreed. Therefore according to the above results level of parents’ education affects pupils learning mathematics (Figure 4.1)
Pie Charts on Parents Responses.

Figure 4.2: Proportion of working and non-working parents

Figure 4.3: Proportion of parents who are in the formal and informal sectors
Most parents were not in the working class (74.19%). However, of the 25.81% working the majority 87.5% were in the formal sector.
66.7% strongly agreed that school resources compared to 36.4% who strongly agreed that quality of books should be a necessity in the learning of Mathematics. Only 9.1% strongly disagree that quality of books affect the learning of books. It was also noted that 54.1% agreed that quality of books should be taken into consideration if mathematics learning is to improve.

Figure 4.10: Resource availability and their quality influence Learning of Mathematics
All teachers were of the opinion that staff development programmes improve the learning of mathematics since 66.7% strongly agreed while 33.3% agreed. 75% of teachers strongly agreed that teacher commitment plays an important role in improving learning of mathematics while 25% agreed. Teachers who are members of the mathematics association had 33.3% strongly agreeing that being a member of a mathematics teachers’ association had helped them to become better mathematics teachers.

66.7% of teachers believed that trained teachers teach better than untrained teachers while 33.3% strongly agreed. Despite most schools being staffed with trained teachers, pupils perform badly in mathematics.

Figure 4.11: Teachers’ development has influence on Learning of Mathematics
Most teachers, 75% strongly believed that different learning methods can improve learning of mathematics although most of them did not practice that. 25% agreed. 75% agreed that subject advisory council plays a key role in the learning of mathematics although they have very little interaction with them. 16.7% strongly agreed and some of the teachers have once been helped by the mathematics advisory council while 8.3% disagreed.

Teachers above averaged, that was 58.3%, strongly agreed that team teaching in schools and networking with outside teachers can improve learning of mathematics. 25% agreed while 8.3% disagreed. More than average of teachers agreed that cluster initiated interventions such as weekend schools improve the learning of mathematics with 58.3% strongly agreeing. 33.3% agreed and only 8.3% disagreed. All teachers agreed that there is need to motivate learners 58.3% strongly agreeing and 41.7% agreeing.
Figure 4.20: Team teaching as factor influencing learning of Mathematics

Most teachers believe that team teaching and networking are essential ingredients in the learning and teaching of Mathematics. This is shown by the high frequency of those who strongly agree and those who agree.

Results from school Heads

To establish the role of administrators in improving the learning of mathematics, headmasters were interviewed to form part of key informants in the study and explore further the factors influencing the learning of Mathematics.
Team teaching was third with 63.6% strongly agreeing while 27.3% agreeing and 9.10% disagreeing. If teachers teach in teams they will share knowledge hence this will improve the learning of mathematics. Cluster initiated interventions and motivating learners was fourth with 58.30% strongly agreeing and 33.30% agreeing for initiated interventions while 41.70% agreed that learners should be motivated. 8.30% disagreed while 0% strongly disagreed respectively.

Quality of textbooks was fifth with 41.70% agreed and 8.30% disagreed and 8.30% strongly disagreed. If textbooks used by pupils are below standard, pupils’ learning of mathematics will be below standard. With 40% strongly agreeing if teachers are benefiting from being members of teachers’ association on position six, 50% agreed and 10% disagreed. If a teacher is a member of a teacher’s association he/she keeps up-to-date with new teaching methods and mathematics content hence if teacher has content knowledge, learning of mathematics is effective. Seventh is
qualification of teachers with 33.30% strongly agreeing and 66.70% agreeing. If teachers are qualified they have pedagogical knowledge which has a positive effect on the learning of mathematics.

Second from last is teachers’ membership of a Subject advisory Committee with 16.70% strongly agreeing, and 75% agreeing while 8.3% disagreeing. Subject advisory committee should advise as to how the learning of mathematics should be done. If they do not advise teachers without knowledge will not know how to make pupils learn mathematics effectively. Lastly was working in teams with 0% strongly agreeing that teachers should work in teams and 50% agreeing and 50% disagreeing. From the above analysis teacher commitment and learning resources provided by parents and the school are major factors influencing the learning of mathematics. If these factors could be addressed pupils would learn mathematics better.

100% of headmasters think environmental, parental educational levels and learning resources at home affect effective learning of mathematics. Therefore parents play an important role in the learning of mathematics. All headmasters acknowledged that staff development contributes to the effective learning of mathematics.

Table 4.11: Trained teachers contribute effectively to the learning of Mathematics

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>3</td>
<td>75.0</td>
<td>75.0</td>
<td>75.0</td>
</tr>
<tr>
<td>no</td>
<td>1</td>
<td>25.0</td>
<td>25.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Most schools at secondary school level have qualified teachers. 3 headmasters agreed that trained mathematics teachers teach more than temporary teachers while one headmaster testified that at his school temporary teachers do better than qualified teachers.

100% of the school headmasters agreed that they have a role to play in improving the learning of mathematics although from the interview the results showed that they are not playing the role.

Table 4.12: Leadership styles affect the learning of Mathematics

<table>
<thead>
<tr>
<th>Do you think leadership styles in schools affect learning of Mathematics?</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>2</td>
<td>50.0</td>
<td>66.7</td>
<td>66.7</td>
</tr>
<tr>
<td>no</td>
<td>1</td>
<td>25.0</td>
<td>33.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>75.0</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

50% of the headmasters think leadership styles in schools affect learning of mathematics. 25% disagreed while the other 25% had nothing to say. All headmasters advocated for team teaching although it’s not practiced in schools. All headmasters that is 100% of them agreed that parents and teachers should collaborate to improve the learning of mathematics.

50% of the headmasters agreed that schools offered a friendly environment while 50% did not respond to the question. 100% of the headmasters thought teachers, school heads and parents
should collaborate to improve the learning of mathematics. 100% of the schools heads agreed that there should be shared leadership in improving learning of mathematics.

4.1 Summary
Overally all the headmasters attribute the improvement of learning of mathematics role to the headmasters, teachers and parents. They all agreed that the above contribute a lot to the learning of mathematics. If the above stakeholders would be serious then the learning of mathematics would be effectively done in schools.
CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction.
This chapter presents the summary of the findings and conclusion of the study. It also states implications based on the findings. Recommendations for further research are also highlighted.

5.1 Summary of the findings.
This study has been concerned with exploring factors that influence students’ learning of mathematics. The main findings of the study are summarised around research questions as follows:

- Some factors influence the students’ learning of mathematics more than others.

- Teacher commitment and use of different learning aids were on top of the list as factors affecting students learning of mathematics.

- Teachers tend to blame parents and administrators as not doing their duty in improving students’ learning of mathematics and vice-versa.

- Teachers, administrators and parents all agree to a certain extent that they have a role which they are not doing in improving students’ learning of mathematics.

- Pupils have different learning styles so teachers should devise measures and strategies to cater for individual differences.

- Subject Advisory Committee is not visible enough.

- Most teachers prefer to work individually than in teams.

- Teachers don’t take motivation of learners as a major factor influencing students’ learning.
• Parents and administrators can improve students’ learning of mathematics.

5.2 Conclusion.
The aim of the study was to explore factors affecting students’ learning of mathematics. Findings of the study indicate the following conclusions;

The first research question aimed at exploring factors influencing students’ learning of mathematics. Basing on the findings, it can be concluded that some factors influence students’ learning of mathematics more than others. Teacher commitment and use of different learning aids are the major factors influencing students’ learning of mathematics. Most teachers, parents and administrators are not doing their duty fully in order to improve students learning of mathematics. Also subject advisory committee is invisible. Teachers don’t think working in teams is a significant factor which affects students’ learning of mathematics.

The aim of the second research question is to assess how the factors mentioned contributes to students’ learning of mathematics. Results showed that factors such as teacher commitment and provision of different learning aids contributes more to effective learning than other factors. If the teachers commit themselves to their work, they will motivate their learners, provide friendly environments, co-operate with parents and also motivate learners hence there will be effective learning.

5.3 Recommendations.
• Teachers should be encouraged to be committed to duty.

• The government should provide concrete learning aids to secondary school teachers so that teachers don’t teach without learning aids.

• Subject Advisory Committees should do their duty.

• Staff development should also cover topics such as motivation so that teachers realise the importance of motivation in the learning of mathematics.

• Teachers, parents and school heads should work together to improve students’ learning of mathematics.
5.4 Implications.

- In this global village, today’s learning situations have also become increasingly more global. Students are also different in the way they learn. Teachers, parents and administrators must continue to put maximum effort in order to improve students’ learning of mathematics.

- It is extremely important that teachers, parents and administrators recognise that they have an important part in contributing to the factors that affect students’ learning of mathematics.

- Results show that provision of learning aids is important in students learning of mathematics therefore teachers should marry theory with practice.

5.5 Areas for future study

- This is a limited study as the sample was drawn from Reigate district. Nevertheless, it would be interesting to replicate this study for different year groups. A larger sample will also enable analysis of how the results presented here differ according to year of study.

- A quantitative may be developed to ascertain the relationship of factors affecting the learning of mathematics.
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