EXPLORATION OF THE CAUSES OF POOR PERFORMANCE IN MATHEMATICS IN SECONDARY SCHOOLS AT THULAMAHASHE CIRCUIT

by

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FULL DISSERTATION

Submitted in fulfilment of the requirements of the degree of

MASTER OF EDUCATION

In

CURRICULUM STUDIES

In the

FACULTY OF HUMANITIES

(School of Education)

at the

UNIVERSITY OF LIMPOPO

SUPERVISOR: M.J THEMANE

2022

Abstract

This study investigated the poor performance of learners in mathematics in a rural secondary schools in Bohlabela District in Mpumalanga province. Mathematics is one of the most critical subjects globally and in Mpumalanga Province of South Africa, specifically. The purpose of this study was to explore the possible causes of poor performance of learners in mathematics in schools. In this study, non-probability sampling was used whereby a purposive sampling strategy was adopted. The participants in this study were secondary school teachers and learners. Twenty mathematics (20) learners participated in this research. These learners were sampled from a pool of 54 Grade 12 learners in one school. Learners were then grouped according to their level of understanding to the subject. The focus was on Grade 12 because it is the exit point of FET.

In this study, a case study approach was adopted whereby interviews, documents and observation were used to collect data. The choice of the research design was guided by the following research question: What are the causes of poor performance of Grade 12 learners in mathematics in rural secondary schools? The sub–questions were: What strategies do teachers use to address poor performance of learners in mathematics in Grade 12 in rural secondary schools? What is the role of the department of education in addressing poor performance of learners in mathematics in rural secondary schools? The data analysis involved the generating of themes related to the data collected. In this way, different parts of the narratives were grouped under identified categories. The study found that lack of resources, poor teaching methods, anxiety and attitude towards mathematics contribute to learners' poor performance in mathematics in Grade 12 in rural secondary schools. The research concludes that teachers should engage learners in more writing activities in order for them to learn effectively and to perform better in mathematics. The study also recommends that teachers should use a variety of teaching methods to teach mathematics and the schools should be well-resourced and teachers should address learners' anxiety in mathematics to develop the love for mathematics and also enhance positive attitude towards mathematics.

DECLARATION

I **MKATEKO VICTORIA MATHEBULA** declare that this work is mine, original and has not been previously submitted in any form by myself or anyone else in this university or any other institution for any degree or examination purpose.

All sources used in this study have been acknowledged.

…… ……

Signature Date

ACKNOWLEDGEMENTS

I wish to acknowledge, appreciate and thank the following people who helped me directly and indirectly in this research:

- My supervisor Prof. Themane M.J
- My husband Mathebula B.T
- Lumadi TZ (PhD student)
- My children Carol , Risima and Joy
- Mafumo G. (Admin clerk)
- My colleague Ubisi Tumelo
- Ezrom Primary school SMT

DEDICATION

I dedicate this research to my husband Pastor B.T Mathebula for the support that he gave me since the beginning of this journey and my mother Dhlamini M.E for her encouragement to conduct this research.

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CHAPTER 1: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1. INTRODUCTION

Poor performance of grade 12 learners in mathematics has become a trend around the world (European Commission, 2014).The Trends in International Mathematics and Science Study reveal that countries like Singapore, Hong Kong, Japan, Taiwan, Netherlands and England were the best performing in mathematics (TIMSS, 2015) has revealed that Singapore is the best performing country in the world in terms of mathematics and science. Singapore was followed by Japan, Taiwan, South Korea and Slovenia completed the top five. In Africa, Ghana was the best ranked country in terms of learner performance in mathematics (TIMSS, 2015). The majority of learners in Ghana are doing well in mathematics more especially in the intermediate and senior phase grades. Mathematics underperformance has shown prevalence in countries like Zimbabwe (Mupa, 2015) and Kenya (Simba, 2016)

Coming to South Africa, South Africa as compared to other African countries is the lowest ranked when it comes to mathematics performance(TIMSS,2015) In Mpumalanga Province, Bohlabela District,2018 Grade12 results indicates that two schools failed dismally where school A obtained 34.4% and school B obtained 38.3% (Mpumalanga Results Guide.:2017)This problem has raised concerns. Study by Hafiz and Hina (2016) reveals that high failure rate in mathematics is caused by lack of learner's interest ,lack of qualified teachers, shortage of mathematical equipment in the classroom and typical methodologies .Ashcraft and Ridley (2005) reveals that mathematics anxiety as one of the causes of poor performance in mathematics .Students with high levels of mathematics generally report feeling tense and apprehensive of mathematics(Zeidner & Matthews,2011)The list goes on and on but of this proposal is unable to cover all.

Regarding the problem at hand, the Department of Education came up with strategies which include 1+4 intervention in collaboration with National Education Collaboration Trust(NECT) to remedy the situation, but the problem persist(Mpumalanga Results Guide:2017).In light of these strategies, my assumptions is that the causes of poor performance from the context of rural areas like Bohlabela has not gotten much attention as such.(Tshabalala &Ncube, 2013) think basing focus on that angle will be helpful to educators as they will be able to tackle different teaching methods and techniques to be used to better the performance of learners in mathematics. Therefore this study will explore the causes of poor performance in grade12 Mathematics so as to come up with potential strategies that will improve mathematics learner performance.

Teachers and learners are doing their best to improve the performance of learners in mathematics. Various teaching strategies are used by teachers to improve the performance of learners in mathematics. One strategy that is being used to improve learner performance of mathematics in grade 12 is the use of writing. Wilcox & Monroe (2017), there are different ways in which learners learn mathematics and this includes writing. In mathematics classrooms, there are many times when students are called upon to write and this includes mathematical expressions or equations, representations such as tables, graphs or other images.

Heather Wolpert-Gawron (2015) argues that learners should be given an opportunity to learn mathematics and this includes a variety of activities. It is a fundamental skill of communication (as is speaking) and it can be a common skill that all classes require. Heather-Wolpert-Gawron (2015) further stresses that to understand the writing process, teachers have to write also. This study explored the use of a variety of activities as a pedagogical tool to learn mathematics. McIntosh (2014) stresses that students should be given ample opportunity to learn so that they can master the learning content as well as develop the love for the subject they are learning. This helps them to master the learning content as well as ignite the knowledge and skills of what they are learning about.

Learning should be perceived by learners as a way of acquiring knowledge of the subject content and in this instance, learners are giving opportunities to explore different mathematical concepts and sums through a variety of activities that and includes writing. When learners are engaged in the writing of mathematics, they are given an opportunity to enhance their knowledge and skills as well as developing the ability to understand what they are learning about (McIntosh, 2014:124). McIntosh (2014) stresses that when learners are engaged in the writing of mathematics, they learn a variety of mathematics skills and this helps them to develop the ability to know the mathematics subject.

The concept of writing according to Dodd (2018), entails teachers assigning tasks help learners to display their knowledge and skills as well as the opportunity to learn holistically. Learners should be encouraged to learn holistically so that they can develop the love for learning, master how to read and write, acquire knowledge and skills and also help them understand what they are being taught by their teachers. Learning according to Spika (2017) is a process that entails giving or according learners an opportunity to think creatively and objectively, to mingle and interact with their peers, to assist one another, to learn from each other and to listen to their teachers as well as an opportunity to explore the learning content that is being explored.

Drake & Amspaugh (2018) indicate that when learners are engaged in activities such as writing, they are exploring different concepts as well as enhancing content they are learning about. Teachers have an obligation to ensure that learners learn with understanding an d they are given the necessary guidance and assistance so that are able to pass and also do well in their studies and progress to the next grade. Learners' difficulties should be diagnosed and they should be assisted to overcome the challenges they are facing so that they can be able to understand what they are learning about and also develop the love for writing mathematics.

1.2 PROBLEM STATEMENT

It's a concise description of a condition to be improved upon or an issue to be addressed. Problem statement is used by project team to understand the problem and work towards developing a solution. It also identifies the gap between the current problem and desired goal of a process. The main purpose is to identify and explain the problem (Kush, Max, Shafter and David, 2015).In this study the problem is that learners are failing to attain level 3 and above in mathematics grade12 in Thulamahashe Circuit, and it becomes a challenge because level 3 is the entry requirement to tertiary institutions.

Failure to obtain level 3 and above in matric Mathematics becomes a deterrent to the learner's opportunity to pursue professions like engineering, health etc., since they require learners to have achieve at least level 5(60%) and above to pursue them (Hafiz&Hina,2016). Consequently, several concerns has been raised about learner performance in mathematics DOE (2012), to remedy the situation, the government suggested strategies and programs. The strategies include the 1+4 intervention in collaboration with National Education collaboration Trust (NECT), the strategy was meant to re-skill educators for the betterment of their mathematics teaching skills, and to also provide more effective teaching resources.

Alternatively, Grade12 mathematics teachers conducted extra lessons, holiday classes etc. trying to assist the learners to pass the subject (Mathematics), yet the problem persists. Therefore, there's a need to explore and understand the main causes for this problem in secondary schools in Thulamahashe Circuit, in order to generate solutions.

The lack of writing activities in the school has been cited as one of the challenges faced by learners in schools. Learners learn mathematics without using writing as the main tool for learning. Borasi and Rose (2019:59) argue that there are challenges that learners face when they learn. These challenges include anxiety, inability to read and write as well as the negative attitude towards mathematics and other subjects.

Learners are not given more writing tasks in mathematics and as a result, not enough is being done to teach mathematics effectively in schools. In order for learners to be able to understand mathematics, they should be engaged in mathematical activities that have a prolonged engagement with expressing their ideas in verbalisation and writing activities. Psychologists and educationists stress that teachers have an obligation to ensure that learners are given more activities that will enhance their knowledge and skills. Learners should write and read, count and spell so that they can be able to learn with understanding (Vygotsky, 1962, Bruner, 1986)

1.3. AIM AND OBJECTIVES OF THE STUDY

1.3.1. AIM

The aim of the study is to explore teachers and learners views about the factors that contribute to the poor performance of learners in rural secondary schools in Thulamahashe circuit, Bohlabela District in Mpumalanga Province.

1.3.2. OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- Explore the views of teachers and learners about the factors that contribute to poor performance of learners in mathematics in rural secondary schools in Thulamahashe circuit.
- Come up with possible strategies that will address the problem of poor learner- performance in mathematics.
- Explore the role the department of education has played in addressing the problem of poor-learner performance in rural secondary schools in Thulamahashe circuit.

1.4. THEORETICAL FRAMEWORK

Theory is a foundation of a study. A theory underscores a study. It's a particular perspective or position the researcher took on a particular matter, idea or study. In this study the researcher applied Vygotsky theory, The Zone of Proximal Development in the learning of Mathematics because it specifies that teachers may apply the theory to bridge the gap between what the learner can do without assistance and what they can do with help (Vygotsky,1978).

(Vygotsky, 1978) characterizes ZPD as the separation between the real formative level as dictated by free critical thinking and the degree of potential development as decided through critical thinking under adult guidance, or in a joint effort with increasingly skilled companions. Educators may use the zone of proximal improvement (ZPD) to cross over any barrier between what a learner can do without assistance and what a learner can do with assistance. This theory is relevant to my study because it will help educators to cross over barriers of what learners can do with or without their help and to close the gap also by employing strategies and approaches that will improve mathematics performance. The ZPD works in conjunction with the process known as scaffolding. Knowledge, skills and prior experience from an individual's general knowledge create the foundation of scaffolding. Scaffolding as a learning tool is effectively implemented through the use of language and shared experience (Phillips, 2015).

Maths is a subject that enhances learners understanding of numbers. In order for learners to learn effectively, they should be nurtured and motivated to learn. Teachers have an obligation to make sure that learners learn effectively and they are able to read and write as well as the ability to develop the love for learning (Tatira, Mutambara & Chagwiza, 2016).

1.4.1. Classification of students' reasoning and thinking capacity.

Vygotsky (1978) contends that learner's critical thinking and reasoning capacity fall into three classifications: those that can be autonomously carried out, those that can be carried out with help and those that can't be carried out even with help.

1.4.2. The ones that can't be carried out even with help

The ones that can't be carried out even with help are the ones that lie past the ZPD. Methods for practices motivate the understanding of learners. Study hall activities are done inside and outside study halls. Exercises are structured by the teacher to start from what the students can do autonomously referring from past information to interface the existing information with information that they can do with help. As students continue rehearsing, they can carry out specific responsibility autonomously in exercises recently performed with help.

1.4.3. Vygotsky theory stages

Vygotsky theory has four stages. The stages are outlined below:

Stage I: The main stage shows how students language comprehension that fits to their examination and the nuts and bolts of the subject being investigated is build up by relying on others to play out the errand.

Stage II: In the 2nd arrange earlier information to do the undertaking without direction. The ZPD takes place between the 1st and the 2nd arranges .Students practice alone, which infers that they play out some activities with no help. Be that as it may, they are not at phase of immaculate capability and need some help now and then.

Stage III: In the 3rd arrange execution is created, and it is going on without deduction and learning is fixed and it can't be overlooked .This implies that students arrive at the phase of freedom .In the 3rd arrange understudy doesn't need assistance from a grown up, nor to rehearse activities more to strengthen the effectively current learning (Gallimore and Tharp, 1990)

Stage IV: In the 4th stage students are in the de-atomization of execution to prompts a way toward rehashing a capacity, every time applying it to the consequences of the past stage through the ZPD.

1.5 ETHICAL CONSIDERATIONS

Ethics are defined as a standard of conduct that differentiates between good and bad, right and wrong etc. (Shammo, 2009).For my study, I sought for ethical

clearance from the University of Limpopo Ethics Committee. The following ethics were considered.

1.5.1 Protection from harm

The researcher got consent from the respondents before interviewing them and clarify the purpose of interviewing them and even how the information would be utilized. The researcher likewise kept the information confidential, and treat every one of the respondents equal. The researcher ensured that the participant were protected. Participants won't be exposed to unnecessary psychological or physical harm. (McMillan and Schumacher, 2006).

1.5.2 Confidentiality

The researcher adhered to the following ethical principles: Ensuring privacy of research information she guaranteed that the information got wasn't made public or divulged. Participants reserved the right to pull back from the study anytime without penalty .This implies the researcher didn't constrain the participants to proceed with the study in case they need to pull back. Ensuring that participants informed consent was appropriately documented (McMillan and Schumacher, 2006).

Consent forms were signed by participants and in case of minors consent was obtained from parents. To ensure that there was no discrimination among individuals in the population, the researcher did not choose participants based on gender, colour or creed.

1.5.3 Anonymity

The essence of anonymity is that information given by participants can in no way uncover their identity. (Cohen, Manion & Morrison, 2007). To guarantee anonymity the researcher utilized articulations like teacher A or learner A in data analysis.

1.5.4 Respect

The principle of equal respect, demands that we respect the equal worth of all people (Cohen, Manion & Morrison, 2007). The researcher promoted equality, humanness, public perspicuity, client- benefit and respect for autonomy.

1.6. RESEARCH DESIGN AND METHODOLOGY

1.6.1 Qualitative research

This study embraced a qualitative approach. Qualitative research centres on understanding individuals' convictions, experiences, conduct and interactions (Maree, 2007). The qualitative research technique was embraced in light that the researcher need to explore the participants views regarding the causes poor learner performance in mathematics .The participants' views assisted the researcher to recommend the strategies that might be valuable in teaching mathematics in schools.

1.6.2 Research Design

The researcher utilized the exploratory research design because this is a kind of research that is led for a problem that has not been concentrated upon more clearly, proposed to set up needs, create operational definitions and improve the final research design (Maree, 2007).Research design gives a general structure to the methodology pursued by the researcher, the information gathered and the analysis conducted by the researcher.

1.6.3 Population and Sampling

Sampling design means the part of the research that demonstrates how cases are to be chosen for observation. Sampling designs are commonly classified into two wide classes: likelihood and non-likelihood. (Singleton, Straits and Straits, 1993). A purposive sampling approach was employed in choosing the subjects to be utilized in the study. This approach was applied in consideration of (Struwig and Stead, 2003) disputes that sampling ought not to be for having sample, however ought to likewise be data rich. Purposive sampling was utilized in choosing the teachers or educators that participated in the study.

Sampling was done in two schools and two mathematics teachers in each school and 5 learners (grade12) in each school were sampled. This brings to the complete number of participants in the two schools to 14 in number. School A had an aggregate of 430 learners and 16 educators though School B had an all-out number of 384 learners and 12 educators. The total population of learners is 814 and the total population of educators from the schools remained at 28.

1.6.4 Data collection

The process of gathering and measuring information on variables of interest is data collection. The typical methods of data generation in the qualitative case study approach include interviews, observations and documents analysis (Lincoln and Guba, 1985). Data was gathered using interviews, observation and documents.

1.6.4.1 Interviews

The researcher conducted face to face interviews with participants utilizing semi-structured interview plan that expects to get perspectives and views from the participants (Cresswell, 2003). A semi-structured interview approach involved one on one meetings in which individual respondents are examined concerning matters and encounters experiences (Henn, Weinstein and Foard, 2006).

1.6.4.2 Observation

Observation was combined with interviews in this investigation. Observation assisted in the development of an image of what takes place during classroom practices (Henn et al 2006)The researcher observed the content being taught, teaching method utilized' and the learning and teaching support materials used.

1.6.4.3 Document study

The researcher examined the students' class and home-works, tests and assignments and likewise go through the test and examination question papers. Documents enabled me to have a clear picture of how learners responded to the tasks given to them by their teachers.

1.7 Data analysis

Thematic and narrative analysis was employed in this qualitative research. On qualitative research, data analysis depends vigorously on description even when

certain statistics are calculated; they tend to be used in descriptive rather than inferential sense as the case study with experimental research. The researcher will record data, transcribe it, organise it into meaningful unit, identify themes and patterns and present it narratively. Participants' responses will be effectively analysed by the researcher so as to make informed findings. Data analysis involves synthesizing the information the researcher got from different participants (Patton, 2010)

1.8 Quality Assurance

The tool for assessing the quality of findings in a research is quality criteria (Altmann, 2016).The criteria in which these findings were analysed are as follows:

1.8.1Transferability

To enhance transferability, the researcher made sure that the context of the research and the assumptions that are central to the research are described. Transferability is basically the responsibility of the one doing the generalizing that's from qualitative perspective.

1.8.2 Conformability

To enhance conformability I will document the procedures for checking and rechecking the information throughout the study. I will likewise effectively searched for and describe the negative occurrences that contradict prior observations and furthermore conduct data audit that analyses the collection of data and analysis techniques and makes judgement about the distortion or potential inclination.

1.8.3 Credibility

Credibility entails the validity of the findings drawn from data. To ensure that there are no discrepancies in the findings, triangulations was applied. To enhance credibility, I used the same interview questions to all the participants.

1.8.4 Dependability

The extent in which the audience is certain that the findings are true as the researcher professes them to be is referred to as dependability (Durrheim & Wessenar, 2002).To enhance dependability, I will ensure that the study is reliable

and trustworthy. Ethical considerations also played an important role in ensuring dependability.

1.9. SIGNIFICANCE OF THE STUDY

No research is declared to be complete if it lacks the element of significance. The study was significant because it benefitted the learners, teachers, parents and the community because they will be able to know the actual or possible causes of poor performance in mathematics. The study was beneficial to policy makers to ensure that the policies they design are meant to improve mathematics.

The study also benefited the researcher in the field of mathematics to further explore the causes of poor performances in mathematics in secondary schools. The study was conducted as a direct response to the Department of Education and the community cry-out about the need to explore the causes of mathematics poor performance in secondary schools.

1.10. LIMITATIONS OF THE STUDY

.Limitations are weaknesses and shortcomings of a research .Further researchers who will happen to access my research ,limitations are that the study was carried out within the Thulamahashe Circuit of the Bohlabela District in the Mpumalanga Province. Thulamahashe Circuit has 12 secondary schools of which three of them are regarded as maths and science schools. My sampling included only two secondary schools. The study included two secondary because they are not doing well in Mathematics in Grade 12 and the two schools have been declared “chronic” by the department of education in Mpumalanga province. Maybe if I have extended my sampling, my findings would have been different.

1.11. CHAPTER OUTLINE

The study is divided into five chapters.

Chapter One: This chapter forms the basis of the overall research study. It contains the background of the study, the problem statement, the aim of the study, a description of the methods of the study and definition of concepts.

Chapter Two: Contains a review of literature on factors contributing to poor performance of learners in mathematics and literature on possible strategies on how to teach mathematics effectively in secondary schools.

Chapter Three: Provides details of the methodology adopted in the study and the reasons for selecting that particular design.

Chapter Four: This chapter provides the presentation of results as well as an account of findings. This chapter also provides the analysis and discussion of the results.

Chapter Five: In this chapter the researcher presents a summary of the study, which comprises a summary of the findings, conclusions and recommendations for further studies.

1.12. CHAPTER SUMMARY

The performance of learners in mathematics in rural secondary schools is a cause for concern. Mathematics is one of the most failed subjects in the schools, the circuit and the district and various stakeholders are concerned about the subject. The performance of learners in mathematics affects their career choices at different institutions of higher learning. Learners end up studying for careers they were not prepared to study because of frustration of not having performed well in mathematics. Learners who want to be doctors, nurses and engineers dreams are shattered because of their performance in mathematics. Mathematics is used as a yard stick to select learners who can study medicine, pharmacy and engineering and if learners perform poorly, they dreams to become medical practitioners and engineers are doomed. The next chapter will present literature on the possible factors of poor performance in mathematics.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

Literature review is a survey of scholarly sources on a specific current knowledge that allows us to recognize relevant thesis, methods and gaps in the existing analysis (completed step by step guide, 2019).It is also the evaluation and search of the available written works in a given course of study or topic that is chosen. The chapter that we were focussing on before dealt with the aim of the study which was to find the reasons of less performance in grade 12 mathematics in Thulamahashe Circuit, research problem, the role of theory, significance of the this and ethical reflections. This chapter gives an account of the writings reviewed on lack of performance of grade12 learners in mathematics. The motive of the literature review is to point out the factors that influences the poor performance of grade12 learners in mathematics as researched internationally and within South Africa. Poor performance concept, Mathematics concepts, and factors that influence poor performance will be conceptualized. Historical overview of poor performance, theories and methodological perspectives will be discussed in this chapter. The literature review was researched and found in different sources mainly from journals, primary & secondary sources as well as policy documents, articles and newspapers.

2.2. CONCEPTUALISATION OF THE THEMES OF THE STUDY

According to Hoberg (2015) concepts results from the amplification they are trying together or link distinct sensory experience. In the study, the concepts that have been used are defied in order to avoid misinterpretation of their meaning.

2.2.1. Teachers and learners

Van Schalkwyk (2016:34) says that teachers are people who are “charged with the responsibility to educate and give directions while learners “are the ones who learn through purposeful and voluntary involvement in their education”. Serqueira (2012) defines a teacher as someone whose role is to facilitate the process of teaching and learning and also imparting children (learners) with knowledge and skills during the teaching process.

Cox (2020) argues that to deliver classroom instructions that helps students learn is the teachers role, and to accomplish this they need to prepare effective teachings, work of learners and offer review, the classroom materials must be reviewed and the curriculum must be productively navigated and collaborated with the staff. Chris (2016) defines teachers as people who help students to acquire knowledge competence or virtue and learners as children who should be assisted to acquire knowledge and skills in different fields of study. In the study, the ones to teach and give learners instructions in mathematics in school A school B are teachers whereas the ones to learn in are the learners and they are doing mathematics as one of the subjects.

2.2.2. Mathematics

According to the Oxford English Dictionary (2008), Mathematics is the abstract science which investigates deductively the conclusions implicit in the elementary of spatial and numerical relations, and which includes as its main divisions geometry, arithmetic, and algebra. According to Enclopaedia Britannica (2006), mathematics is the science of structure, order, and relation that has evolved from elementary practices of counting, measuring, and describing the shapes of objects. Mathematics is also a science that deals with the logic of shape, quantity and arrangement. Maths is all around us, in everything we do. It is the building blocks for everything in our

lives, including mobile devices ‘architecture(ancient and modern),art, money, engineering and even sports (Hom, 2020)..

Reuben (2009) defines mathematics as the science of skilful operations with concepts and rules invented just for this purpose. In this study, mathematics is one of the key subjects that are taught in school A and B and it entails the classification and study of all possible patterns as well as the manipulation of the meaningless symbols of a first-order language according to explicit, syntactical rules (Weisstein, 2019).

2.2.3. Educational performance

It is the extent to which a student, teacher or an institution has attained their short or long-term educational goals. Completion of educational benchmarks such as secondary school diplomas and bachelor's degrees represent academic achievement. Academic performance is affected by most of factors.

These include gender difference, age, travelling time to reach the university, income of father, combine study, sitting back in classroom, attendance, internet usage for study and previous qualification (Shanza, 2020).Bell (2018) stresses that performance in different subjects in schools is evaluated in a number of ways. For regular grading, students demonstrate their knowledge by taking written and oral tests, performing presentations, turning in homework and participating in class activities and discussions. Teachers evaluate in the form of letter or number grades and offer comments to describe how well a student has done or back up the specific grade that was given. The Collins English Dictionary (2014) defines performance as the act process or art of performing whereas performance is also defined by Merriam-Webster Dictionary (2008) as the execution of an action. In this study, performance entails how individual learners perform in mathematics in terms of their academic progress and their level of understanding of mathematics as a subject.

In this case, we deal with learner’s poor performance which is defined as a consistent failure to meet specified standards and levels following a period of sustained support, development and investigation. In subjective terms, poor performance is a judgement based on public and defined standards, so a judgement that a teacher's performance is in some way poor or unacceptable has to relate to explicit criteria and unambiguous evidence that leaves no room for doubt.

The factors than influences it includes; Socio-economic status, gender' prior Mathematics achievement, parental support, peer influence, class mean of prior mathematics achievement and of student perception of good classroom assessment and school mean of class climate (Strebler, 2020)

2.2.4. Factors that Influence

The features of target object affected by a factor are called influencing factors. These factors could be used as controlling variables so that key influencing factors of an object can be determined (Global, 2020)

2.2.4.1. Factors

According to Dictionay.com (2014), factors are elements that contribute to a particular result or situation. The Merriam –Webster Dictionary (2008), a circumstance, influence or facts that contribute to an outcome or result is called a factor.

In mathematics, according to MathsIsfun.com (2020), factors are numbers we can multiply together to get another number. In the study, factors are the elements or facts that give to the less academic performance of students in mathematics for examples, factors such as poor teaching ways, shortage of mathematics resources, lack of commitment, poverty and also the home environment.

2.2.4.2. Influence

The Cambridge Dictionary (2014) defines the term influence as a process of causing someone to change a behaviour, belief or opinion or to cause something to be changed. According to Merriam-Webster Dictionary (2008), to influence is the power or capacity to cause or causing an effect in indirect or intangible ways whereas according to 2020 Lexico.com, to influence is the capacity to have an effect on the character, development or behaviour of someone or something, or the effect itself. In this study, the concept influence entails the elements that have an effect on learners' academic performance in mathematics. They are the elements that are the possible causes of learners' poor response or less performance in maths in school A and school B.

2.2.5. School

According to Duminy (2012) a school is an organisation in a community with the specific purpose of doing informative teaching. Max and Oritz-Ospina (2019), define a school as an instructional institution made to provide studying spaces and studying environments for the education of learners (or “pupils”) under the instructions of educators. Liazat (2016) defines a school as organised spaces intended for educating and learning. In the study, schools refer to school A & school B in Thulamahashe circuit, Bohlabela district in Mpumalanga province of South Africa.

2.2.6. Teaching and learning

Chris (2018) defines the teaching process as a highly complex activity which entails a communal exercise that occurs in a specific circumstance (time, place, culture, socio-political-economic situation) and is formed by the worth of that particular circumstance. Gross (2015) defined studying as the exercise of obtaining new understanding, awareness, ways of acting, skills, morals and preferences.

In the study, teaching entails the process whereby teachers interact with learners to impart them with knowledge and skills and learning entails the process whereby learners interact with their teachers and their peers to acquire knowledge and skills of what they are learning about in school A and school B.

2.2.7 Thulamahashe circuit

The study was conducted at Thulamahashe circuit. Thulamahashe is one of the 16 circuits in Bohlabela District, Mpumalanga province. South Africa. The circuit has 12 secondary schools and 17primary schools. From the 12 secondary schools, only 5 has performed well in mathematics. The Mpumalanga provincial best learner in mathematics was from this circuit but still poor performance in mathematics in this circuit remains a challenge.

2.3. TOOLS FOR LEARNING MATHEMATICS

Cooper (2016) stresses that writing is an important tool for learning mathematics. This means that teachers should engage learners in writing tasks and they should make it a point that learners are exposed to writing activities. This will help learners to improve their performance in mathematics because they will master how to write different mathematical concepts and tasks and they will also get an opportunity to

improve on their difficulties and challenges in learning mathematics. Cooper (2016) further states that learners should be exposed to a variety of writing activities. Teachers should strive to teach learners how to spell and pronounce words as well as how to construct sentences and also master the important mathematics skills of addition, subtraction, multiplication and division. When learners are able to write mathematical concepts, they will learn with understanding and they will also be able to follow what they are being taught by their teachers.

The learning tools play a significant role in making sure that learners do well or perform poorly. There is a need to teach learners in a way but it will be easier for them to understand mathematics. According to Stake & Easly (2017:92) “Mathematics is commonly learned by rote, the student is told what to do and how to do it and that is about all that happens- that, plus a substantial amount of drill and practice”. Paik & Norris (2014:245) stress that writing is a powerful tool for organizing and thus for understanding.

A friend tells me that she takes her class notes in shot hand and, that night, transcribes them into a complete lecture. This provides her with time to recall the details and also with a mode to reflect on the lecture. Learning tools play a central role in making sure that learners excel in mathematics or not. There are different activities and teaching styles that should be implemented to make sure that learners learn best. Learners should be given a variety of activities including problem solving activities. Joyce et al stress that (2016), “ if a mathematics teacher challenges the curiosity of his students by setting them problems proportionate to their knowledge, and helps them to solve their problems with stimulating questions, he may give them a taste for, and some means of, independent thinking”. Reiner & Reiner (2016) many teachers are wisely trying to integrate more reading and writing into their mathematics teaching.

Mathematics history presents a perfect context for this. Students respond enthusiastically to simply hearing stories read aloud. Uncopyrighted illustrations may be enlarged and copied onto transparencies for display at appropriate times during the reading. Schools and libraries should contain a range of materials, including biographies, for students to read independently. Burns (2016:33) stresses that one should ensure that learners are engaged in different activities to enhance their

knowledge and skills. They should also be nurtured and be taught the basic literacy skills.

2.3.1. Learning practice

In order for learners to master how to learn mathematics effectively, Morris (2016) states that learners should be engaged in practicing activities. This means that teachers should give learners more opportunities to learn mathematics through practising mathematical sums and other concepts. Practising mathematics also accord learner's opportunity to interact with the teacher and their peers and in doing so, they get assistance which ultimately results in the improvement of their performance and understanding of mathematics. This according to Cooper (2016) is important in the learning of mathematics because learners should be exposed to different group work activities, pair work and individual activities. Group work activities according to Cooper (2016) helps learners to share knowledge and information on how to solve certain mathematical sums as well as how to approach certain mathematics topics.

Practicing mathematics also helps learners to develop more and thorough understanding of the different aspects of what they are learning about. It helps them master what they are being taught and it also exposes them to master the different aspects of the learning content such as fractions, algebra, geometry and other mathematical topics. Writing also helps learners' master spelling. When they are engaged in dictation activities, learners are exposed to vocabulary activities and they get to know how words are spelt as well as their meanings. Word meanings help learners to understand the subject content of what they are learning about.

2.3.2. Students performance in mathematics

The performance of learners in mathematics and other subjects is according to Cooper (2017) attributed to their level of understanding. This means that if learners have high level of understanding of mathematics, they will be able to learn effectively and also perform to the best of their ability. However, if they have low level of understanding mathematics, they will struggle to learn effectively and they will also struggle to achieve their set targets. Lack of writing has been cited by Probyn (2019) as one of the factors that contribute in the ineffective learning of mathematics in schools. Teachers do not engage learners in writing and as a result, learners

struggle to write effectively and they also struggle to master what they are learning about. In order for them to master the content and improve their performance in mathematics, Morris (2016) argues that learners should be engaged in regular writing activities and they should be encourage to be creative and innovative as well as learning and thinking out of the box.

International and national studies have revealed the poor mathematics skills of South African learners. The performance of Grade 12 learners in the Trends in International Mathematics and Science Study (TIMMS) of 2014 2015 and 2003(Howie, 2016, 2018; Reddy, 2016) revealed that South African learners had the lowest scores among 40 countries. Although there may have been criticism against some of the procedures followed in these studies (Dempster & Reddy, 2017, Vithal, 2018), the results remain a serious concern. The concern regarding this state of affair seems to be around one primary factor: education quality (Howie, 2016).

Essential tools can be used to improve the education quality and more specifically learners' mathematical skills are for teachers to use effective assessment feedback and for learners to be empowered to voice their experiences of this feedback. Bradbury & Miller (2017) differ in their argument in that the unequal schooling system produced various drawbacks that necessitated restoration but agreed on the factors such as lack of qualified teachers as part of the inequality amongst the others which they express as a "lack of excess to successive education levels". It is clear from the evidence that Maths and Science education failure is caused by various factors and that poor performance is characterized by inequities, scarce resource and strategy.

Morris (2016) argues that writing helps students to achieve more. When learners are able to write with understanding, they are able to master the subject content and this helps them enhance their performance and academic achievement. In order for learners to enhance their performance in mathematics, Gee (2011a) argues that learners should be able to write with understanding and they should also be able to write the basic mathematics concepts. Firstly in order to measure and gain understanding of the variances in student learning, there is a need for suitable and correct Maths and Science assessment tools.

South Africa's inability to participate in most Maths and Science assessments shows the countries inability to recognize the state of the problem or even a need to know how they fare in the global context so as to improve the performance of its student (Venkat, Adler, Rolinick, Setati & Vhurumuku, 2016). In South Africa, the performance of learners in mathematics is very low and according to Taylor (2019) the overall level of achievement amongst South African children is extremely low; this is not shocking as there are two educational systems in South Africa. The first covers 80-85% of the learners who experience the historically disadvantaged system with traits of low proficiency in reading, writing and numeracy, the second system covers the 15-20% of the students from the affluent groups who achieve world class results. The first system is further aggravated by poor school management, due to lack of resources such as textbooks, study materials and proper school facilities. Given the fact that most of the South African children come from the apartheid education and past, there is a need to ensure that they are taught effectively in order to master performance in Mathematics and other subjects.

Teachers who were qualified and experienced tended to flock towards the more urban and developed provinces to teach in schools with proper school management (Taylor & Derekyu, 2018), hence the situation in the first system is further disadvantaged by inadequate experienced teachers who lack the proper resources or support to elevate their skills. The majorities of the graduates who obtained university entrance were produced in the second system and further enjoyed a social mobility and performance advantage. Taylor (2019) further indicated that the socio economic status was still the core indicator of student achievement as supported by the results in performance in the different school systems.

The author noted the following results as conducted in a national socio-economic status, Schools which did not perform satisfactorily had not completed their curriculum coverage which in turn affected the learning capability of the students but this could be due to the learning shortfall from prior years which in turn slows the curriculum coverage. Math and Science teachers were tested in a simple maths test and the deficient teachers scored 40% or less, those with higher marks produced students who performed better in Maths and Science, these results showed the importance of teacher knowledge and experience to the student achievement. Taylor

(2019) noted that the more materials were available as well the better the student performed, which concludes the point that schools which are properly managed produces better student achievement.

2.3.3. Mathematics curriculum content

Although the change in curriculum by the Department of Education (2008) was an excellent initiative in terms of rendering Maths education non-negotiable, adding Maths Literacy as a mathematical wing has caused a nationwide debate The question is what is meant by mathematics in the concept of Maths literacy and the use of the word "Literacy" in conjunction with Maths (Vithal & Bishop, 2017). Looking at the factors that contributed to the poor performance in Maths and Science, the question that arose in regards to Maths literacy was whether Maths literacy was going to contribute to the knowledge required in a Maths economy or will this addition exert pressure on the system and subsequently on to the poor performance?

According to Simkins et al (2018) the alteration of the curriculum has added up to 60% to the mathematical instructional problem since Maths or Maths literacy have become compulsory with the new National Senior Certificate changes. Lack of writing activities has also been cited by Simkins et al (2018) as one of the factors that contributes to the poor performance of learners in mathematics. Learners according to Simkins et al (2018) are not given more written activities and they are not exposed to mathematics activities that help them learn effectively and also help them master what they are learning about. This curriculum is designed for those who intend to follow a career path requiring Maths, or those who are interested in the subject

2.4. THE RELATIONSHIP BETWEEN CONTRIBUTING FACTORS AND PERFORMANCE

This section looks at the relationship between contributing factors and educational performance. The section is divided as follows: Firstly, the section begins with the relationship between the teacher and the learner and the second section entails contributing factors and learning.

2.4.1. The teacher and the learner

The relationship between the teacher and the learner plays an important role in the effective teaching and learning of mathematics (Marchesi & Martin, 2013). This means that teachers should strive to have good relationships with their learners in order for the latter to overcome anxiety in mathematics and in other subjects. Teachers should make learning easy and they should also strive to ensure that learners are at ease in class. This will help learners to calm and to develop positive attitude towards mathematics. Marchesi & Martin (2013) found that the relationship between the teacher and the learner contributes to the latter's performance. Some teachers are harsh and they call learners names, more especially the struggling ones and this de-motivates learners to do well in mathematics.

Learners are not the same and the do not perform at the same pace. They are diverse, which means that in class, there are gifted learners, average learners and less-gifted learners. This means that teachers should accommodate the diverse learners are treat them equally. They should motivate the slow learners to be on par with their gifted counter-parts. They should spend more time assisting the less-gifted learners and also devote their time to ensure that each and every learner in class receives the necessary attention he or she deserves.

Castenjon & Perez (2014) argue that the relationship between teachers and learners is of paramount importance. This means that teachers should foster good relationships in class by ensuring that each and every learner feels accepted and accommodated and that each and every learner is assisted to learn effectively and also assisted to overcome his or her learning barriers. I concur with Marchesi & Martin (2013) that some learners don't do well in mathematics because they don't relate well with their educators. Educators turn to have negative attitude towards some of the learners and this affect the latter performance in mathematics and other subjects. This means that educators must have a good and positive relationship with their learners and this will help learners develop positive attitude towards the subject.

A study in By Mullins (2011) noted many factors that influence both the rate and enjoyment of learning. Once an individual has experienced something, and has stored that experience, he is able to refer to and use it at a later stage. As such, learning and memory are inextricably linked. The reward and punishment levelled at learners in the past will affect their motivation and attitude towards learning in the present. The expectations of others and climate which surround learners determine their readiness to learn, which in turn will result in learners behaving badly and also performing poorly academically (Mullins, 2011:39). I concur with Mullins (2011) that children should be motivated to learn. There are children who rely on the teachers to motivate them and children who motivate themselves to do well in class.

Another study that maintenance of high motivation influences psychological and social functioning and facilitates good level of discipline and academic performance as well as positive school perceptions (Gilman & Anderman, 2006: 375). This means that in order for learners to do well academically, they must be motivated to learn effectively. They should be motivated to love mathematics and to have positive attitude towards the subject. They must be motivated to think positively and to know the importance to learning mathematics and other subjects. This will help them develop a positive attitude towards mathematics and also assist them to do well in the subject.

2.5 CONTRIBUTING FACTORS AND LEARNING

Muema, Mulwa and Mailu (2018) argue that the teaching strategies used by teachers in the classroom have a central influence or impact on the learners understanding of the subject. This means that in order for learners to understand mathematics effectively, teachers have to ensure that they apply effective teaching strategies and strategies that will accommodate the different learners in class. This will help ensure that each and every learner gets an opportunity to learn and an opportunity to improve his or her academic performance.

Teachers should use a variety of teaching strategies to accommodate the diverse learners in class. They should use strategies such as the direct instruction i.e. explaining and demonstrating to the learners how to solve-problems and also how to complete mathematical sums. They should also use simple language and clear instructions to clarify the different mathematical concepts and terminologies. Teachers according to Cunningham (2015) should ensure that they plan and present lessons in a simple language, involve learners in the teaching of mathematics by giving them opportunities to demonstrate what they are learning about and also assess learners and give them feedback. This according to Cunningham (2015), will help learners to learn mathematics effectively and also get opportunities to interact with their peers' ad with the teachers.

I concur with Muema et, al (2018) that teaching strategies are key to understanding mathematics. Teachers should strive to use a variety of teaching strategies. They should focus on strategies that will encourage learner involvement and participation. The teaching strategies should be learner-centred and the lessons should be activity based. This means that teachers should make it a point that learners are also encouraged to work with their peers and also work independently. One also concurs with Cunningham (2015) that teachers should plan thoroughly and also ensure that they present effective lessons.

Learners fail to grasp what they are learning about because of poor teaching strategies. Some of the instructions from the teachers are not clear and instead of learners grasping what they are learning about, they end up being confused and as a result, they start to develop anxiety. Once learners develop anxiety in mathematics, according to Cunningham (2015), their performance drop to the lowest level. It is therefore of paramount importance that learners are taught effectively by being involved and also through the use of a variety of teaching aids that will make mathematics easy to learn.

In support of Cunningham (2015), teachers should use a variety of teaching aids and strategies for the teaching and learning of mathematics. They should use learner-centred approaches such as learners performing activities in groups, role-playing of activities, encouraging and capacitating learners to work independently as well as ensuring that learners are given opportunities to ask questions and to do self-discovery.

Based on the above, it is clear that good teaching strategies play a central role in the effective learning of mathematics. This means that learners also rely heavily on how they are taught by their teachers (Habib, Kuswanto & Yanti, 2017). As a result of poor teaching methods and poor planning, learners struggle to do well not only in mathematics but in other subjects as well.

2.6. STUDENTS PERCEPTIONS OF MATHEMATICS

Learners' perceptions of mathematics also contributes in them struggling to master mathematics content. Gee (2011a) argues that learners think that mathematics is a difficult subject and the anxiety in mathematics contribute in the high rate of failure in mathematics and also in lack of master and understanding mathematics. Cooper (2017) supports Gee (2011a) by stressing that teachers should work tirelessly to encourage and motivate learners to develop the love for mathematics.

Some teachers think that Mathematics is a difficult subject and they instil fear on the learners. As a result, most of the learners develop negative attitude towards the subject and they end up not doing well in Mathematics. According to Abelson (2016) the nature of teachers' beliefs about the subject matter and about its teaching and learning, as well as the influence of those beliefs on teachers' instructional practice are related. This clearly shows that the negative perceptions of teachers of mathematics as a difficult subject, plays a central role in making sure that learners perform poorly and as a result, they end up hating it.

Literature has revealed that writing is an important tool for learning mathematics. Learners learn mathematics effectively through writing mathematical concepts and also being engaged in problem-solving activities. Literature has also revealed that learners are able to master mathematics through being engaged or involved in continuous writing of tasks. This helps them to improve their spelling and also their vocabulary as well their understanding of the different mathematical tasks as revealed in the three stages that learners were involved in. According to Morris (2016), learners are able to master mathematical tasks when they continue to practice mathematics and they are hands-on in the writing activities. Literature has also revealed that mathematics anxiety is one of the root causes of learners' under-performance in mathematics. Learners who have negative attitudes towards mathematics find it difficult to perform well and as a result, they also find it difficult to understand what they are learning about (Gee, 2011a).

2.7. GRADE 12 MATHEMATICS PERFORMANCES AS COMPARED WITH DIFFERENT PERFORMANCES

2.7.1. Comparison with international standards

South Africa is rated by the Trends in International Mathematics and Science Study (TIMMS, 2015) as one of the lowest performing countries in mathematics and science in the world. The 2015 TIMMS study found that compared to countries such as Norway, Sweden, Denmark and Japan, South Africa was the least performed country in mathematics. The study found that grade 8 South African learners cannot define and explain mathematical concepts, perform dismally in mental and they are not in par with their counter-parts in other countries.

The 2015 grade 12 TIMMS results show South Africa performing dismally as compared to countries such as Singapore, Korea republic, Hong Kong SAR and Japan. South Africa found itself in the bottom five with other countries such as Botswana, Jordan, Morocco and Saudi Arabia.

2.7.2. Comparison at national standards

Grade 12 performance in mathematics is a cause for concern (Jojo, 2019). The national average of the grade 12s in mathematics from 2016 to 2019 is concerning.

Table 1: Grade 12 national averages from 2016-2019

Year	2016	2017	2018	2019
National average	33.1%	34.1%	32,3%	39.2%

Source: Department of Basic Education (2019). The above table depicts a sub-standard performance by grade 12 in mathematics by far. This shows that the performance of learners in mathematics in South Africa (as indicated by the grade 12 national averages)

Various factors have been attributed to the poor showing of grade 12 learners in mathematics (Department of Education, 2015). This includes the shortage of resources, the poor teaching methods, mathematics anxiety, negative attitude towards mathematics as well shortage of good mathematics teachers. In South Africa, the skills gap is still rife in schools. This means that there are teachers who are assigned to teach subjects like mathematics and science whilst they are not trained or qualified to teach those subjects. This leads to the ineffective teaching of mathematics and other subjects and as a result, also leads to the low performance in key subjects such as mathematics.

According to Motsamai (2017), the teaching of mathematics should be an effective process. This means that teachers should dedicate themselves to teach the subject and also ensure that learners are effectively taught. Motsamai (2017) further argues that the main problem in schools is that principals hire teachers who are not qualified for the subject and this causes a lot of problems to the learners.

I concur with Motsamai (2017) that teachers should be highly skilled and knowledgeable when it comes to planning and presenting lessons. The dismal performance of learners is not only attributed to learners' level of understanding, but

also to the teachers' knowledge and skills. This means that it is imperative to ensure that teachers are capacitated and developed to teach the subjects and also ensure that the skills audit is implemented in schools. the skills audit helps in identifying the gaps that are there in schools and also help ensure that schools come up with strategies that will help improve learner performance in all the subjects and not only in mathematics.

The performance of learners in mathematics should be improved not only in grade 12 but in all the other grades. This according to Spaull & Kotze (2014) should be done to ensure that learners understand mathematical concepts, are able to do mathematical sums, are able to work hand in glove with their colleagues, are engaged in mental activities and also encouraged to pay attention on what they are learning about.

Jojo (2019) further stresses that under performance is ascribed to the factors such as the quality of teachers, the state of resources in schools and other factors such as learner anxiety and teacher-learner relationship. According to George & Adu (2018), teachers should strive to ensure that there is a conducive climate of effective teaching and learning of mathematics in class. Teachers should ensure that the subject content is well taught and that learners are empowered and capacitated to focus on their work. This according to George & Adu will help improve the performance of learners and also ensure that learners are committed to their studies. This will also ensure that there is a positive climate of effective teaching and learning of mathematics in the classroom.

2.7.3. Comparison at provincial and districts level

Mpumalanga has not done well compared with other provinces. Provinces such as the Free State, Gauteng and Western Cape have done well not only in mathematics but in other subjects and also in other grades. This means that Mpumalanga still has a lot of catch up to do to be on par with the other provinces. There are four districts in Mpumalanga province. They are Bohlabela, Nkangala, Gert Sibande and

Ehlanzeni. Bohlabela district is the lowest performing district compared to the other 3 districts.

In 2018, the district performed at 31, 1% in mathematics in grade 12, as compared to Nkangala 36, 4%, Ehlanzeni 38, 2% and Gert Sibande at 41, and 3%. in 2019, the grade 12 learners in Bohlabela went down to 28, 2%, Nkangala 33, 2%, Ehlanzeni went up to 38.4% and Gert Sibande maintained their number 1 spot in grade 12 mathematics in the province by performing at 40.1% (Mpumalanga 2019 Results Guide). Compared to the other 3 districts in Mpumalanga province, a lot still needs to be done in Bohlabela district.

Bohlabela district has 16 circuits and Thulamahashe is one of the lowest performing circuits in Bohlabela district. The circuit has not done well in mathematics in grade 12 for the past five years. The highest performing circuits are Manyeleti, Sabie and Mashishing. In 2018, the grade 12s in Thulamahashe circuit scored 35,3% and in 2019, they performed at 37.7% which is an improvement from the 2018 performance but not good enough as compared to other circuits and as equated according to international and national standards.

The low performance of grade 12 learners in mathematics in Thulamahashe circuit is ascribed to factors such under-resourced schools, skills gap, mathematics anxiety and also lack of commitment by teachers and learners. Most of the schools in Thulamahashe are not well-resourced. There is only one secondary school that has a science laboratory and only two schools that have two fully fledged functional libraries. The rest of the schools have no libraries and no laboratories and this contributes to the lack of information and also low level of teaching of mathematics and other subjects. In order for learners to perform well at Thulamahashe and in South Africa in general, teachers need to be well versed with the curriculum and the schools should be well-resourced. Learners should be encouraged to love mathematics and other subjects and to be committed to their studies. Teachers should also go an extra-mile by ensuring that they organise extra-lessons and also use a variety of teaching methods to engage the learners.

2.8. LINKING MATHEMATICS PERFORMANCE TO CONTRIBUTING FACTORS

2.8.1. Countries with good mathematics performance

As indicated earlier, the performance of learners in different grades vary among countries. There are countries that are doing extremely well and those that are not doing well at all. South Africa is one of the lowest-performing countries in Mathematics and English. According to the TIMMS (2015) report. Countries such as Singapore, Chinese Taipei and Korea Republic have done well in mathematics whereas countries such as Jordan, South Africa, Morocco and Botswana have struggled to do well in mathematics.

According to Boyd, Ash & Mastery (2018), mathematics in Singapore is compulsory until one completes his or her secondary education. This means that children are encouraged to do maths at an early age and the government is doing its best to ensure that mathematics is taught effectively in the school. This includes ensuring that every school is well-resourced with mathematics equipment and also well-trained teachers. Teachers also focus on developing learners' individual needs. This means that learners with barriers to learning also receive the necessary attention.

The barriers to learning make it difficult for leaners to perform to the best of their abilities. Some of the learners have mental barriers whereas others have reading and writing barriers. In order to perform well in mathematics, children should be able to read and write and they should also be able to count and do mental activities. In Singapore, learners are encouraged to do mental activities on regular basis and they are also provided with resources such as textbooks and also effective use of educational media so that they can understand and master mathematics effectively.

Furthermore, the good performance of learners in mathematics in Singapore is attributed to many reasons (Ramelan & Wijavu, 2019).Classroom collaboration- this is encouraged amongst learners. This is a way of encouraging learners to work together and to assist each other to perform to the best of their ability. When learners collaborate, they learn from each other and they also ensure that they assist one another to understand what they are learning about. Collaboration entails that learner's work in groups and they don't work in isolation. The gifted learners assist their less gifted counterparts and the teachers act as the facilitators of the learning process. Collaboration according to Ramelan & Wijavu (2019) enhances

communication amongst the learners and also communication between the teacher and the learner. Collaboration also ensures that learners with barriers to learning are identified and given the necessary assistance. It also entails that learners are encouraged not to be selfish but to work together, to assist one another, to do group activities and to ensure that they role-play and also write and count together.

The recruitment of suitable teachers is another factor. In Singapore, teachers teach according to their areas of specialisation (Ramelan & Wijavu, 2019). This means that mathematics is taught by teachers who are well qualified to teach the subject. Unlike in most South African schools where teachers who are qualified to teach Xitsonga and Biblical Studies are assigned to teach key subjects such as mathematics and physical science.

I concur with Ramelan & Wijavu (2019) that the recruitment of teachers play a significant role in effective teaching of any subject. This means that schools should recruit quality teachers to teach the subject instead of hiring teachers because they are related with the principal or with the school governing body chairperson or they are politically connected.

This robs learners an opportunity to learn effectively because they are subjected to being taught by people who are not well-versed with the subject content and also not well qualified to offer mathematics and other subjects in the school. Teachers are not only there to maintain order and discipline in class, but they are there to impart learners with knowledge and skills. They are there to ensure that learners are well taught and well capacitated. They are there to ensure that different teaching strategies and methods are implemented and also ensure that learners perform to the best of their ability. They are there to ensure that learners are motivated to learn and to think out of the box.

Another factors that contributes to effective and good performance of learners in mathematics in Singapore is the teaching strategies used in the classroom for example, the mathematical approach to problem solving and also encouraging learners to work in pairs, as a group and individually. This strategy is hailed by O'Grady & Rodrigues (2016) as a positive strategy of encouraging learners to assist each other and also ensuring that they share the resources effectively. When learners work together, they get an opportunity to learn from each other and to assist

each other overcome the different learning barriers. When learners work with each other they get an opportunity to share knowledge and also gain skills. It also enhances their communication and also it builds self-confidence. In order for learners to do well academically, they should be able to communicate and to interact with their teachers and their peers.

They should also be able to assist each other to interpret the subject content and also help each other with activities. Teachers should also be hands-on when it comes to capacitating and helping learners to learn effectively. They should also encourage learners to work together and this in turn enhances team work and also working as a collective. Teaching in Singapore is focused on understanding than rote learning. This means that in order for learners to master what they are learning about, teachers should ensure that learners are encouraged to understand what they are being taught. They should be encouraged to ask questions and seek for clarity where necessary.

Another country that has performed well in mathematics according to TIMMS (2015) is Japan. In Japan, teachers are well capacitated to teach mathematics and they are also encouraged to plan and present their lessons effectively. They are encouraged to be hands on when it comes to involving learners in the process of teaching and learning. They also make sure that learners learn by doing. Mathematics in Japan is more practically done than theoretically done. This means that learners are given opportunities to display what they have learnt.

The mathematics activities are learner-centred and according to (Jojo, 2014), learners learn best when they are involved in the process of learning. I concur with Jojo (2014) that teachers should involve learners in the learning process and the teaching strategies should be learner-centred instead of being teacher-centred. Teachers should not be the only source of knowledge. Learners should not rely on teachers for knowledge building and construction. Instead, they should be capacitated and encouraged to gain knowledge and skills. Learners should also be encouraged to think creatively and innovatively. Teachers should ensure that the process of learning mathematics in class is full of fun and enjoyment. Teachers

should according to Jojo (2014) make sure that learners overcome their anxiety and they love mathematics and develop positive attitude towards the subject. They should also ensure that learners are motivated to do well and they are encouraged to spend more time equipping themselves instead of thinking that mathematics is a difficult subject.

Another factor that is contributing to the positive and effective teaching of mathematics in Japan is the group learner-centred approach that teachers use. Learners are encouraged to learn independently and this is called self-discovery. They are encouraged to think critically and not rely on their teachers for problem-solving activities and other mathematical sums.

2.8.2. Countries with poor performance in mathematics

Besides South Africa, countries like Morocco, Zimbabwe, Botswana and Nigeria as well as Jordan are not doing well in mathematics. As compared to other top countries, the following countries still battle with the performance of learners in mathematics:

2.8.2.1. Morocco

Morocco is one of the lowest performing countries in mathematics according to the TIMMS (2015). Morocco struggles to achieve good mathematics results and this is attributed to factors such as the country's approach in the teaching of mathematics. The direct-instruction approach is one of the most prevalence approaches used in Morocco. This approach entails the teacher being the centre of focus and as the one who is in charge of the teaching and learning process. This means that the teacher is viewed by learners as the source of knowledge and information and as the one who should provide answers. The lessons are teacher-centred and rote learning is encouraged. The problem of rote learning according to Bada (2015) is that learners learn without actually understanding what they are learning about. Rote learning encourages learners to memorise and they end up not able to interpret critically what they have learnt.

Rote learning also encourages learners to recite. When learners start to recite, they also tend to forget and once the forget how to solve problems and do mathematical sums, they end up struggling to perform to the best of their abilities. This means that learners should be encouraged to think critically and to ensure that they understand what they are learning about. They should be encouraged to work hand in glove with their peers and also ensure that they engage their teachers in order to get to the gist of what they are learning about.

Learners according to Borg, Hewitt & Jones (2016) should be encouraged to socialise. Socialisation encourages active participation and it builds self-confidence. In order for learners to learn effectively, they should be encouraged to work in collaboration with their peers and also be encouraged to ask questions and also seek for clarity where necessary. This will help them overcome the different barriers of learning and also help understand what they are learning about. It will help them understand mathematics better.

2.8.2.2. Zimbabwe

Zimbabwe is one of the poor countries in the world. The economy of Zimbabwe has been weakened due to economic sanctions by countries such as the US and the UK. This has direct impact on education as most of the Zimbabwean schools are not well-resourced and there is shortage of teachers due to the weak economy and also massive unemployment rate. As a result of the weak economy, Zimbabwe has not managed to provide schools with adequate resources for the provision of quality education. Teachers go for months without pay and this has demoralised teachers and in turn affect their morale to teach. According to Mupa & Chinnoneka (2015), factors contributing to ineffective teaching and learning are socio-economic and they have direct-bearing on learner performance.

Teachers instructional materials are confined to syllabuses and textbooks. Schools have shortages of those textbooks, revision books and resources books for learners' participatory learning enhancement (Mupa & Chinoonek, 2015).There are shortage of teachers. Some learners have to teach themselves because there are no enough teachers in schools. This is a problem that needs to be addressed in order to improve the performance of learners in Zimbabwe. This does not only apply to the performance of learners in mathematics, but the general performance of learners in schools. In order for learners to perform well in mathematics, Mupa (2015) argues that learners should be provided with adequate resources and also be taught effectively. There should be adequate classrooms and also adequate mathematical equipment such as mathematical instruments and textbooks and also laboratories and libraries. This will help ensure that learners get opportunities to learn and also ensure that they are able to interact with their peers and their teachers.

2.8.2.3. Nigeria

Nigeria is one of the underdeveloped countries that underperform in mathematics despite its prioritization of mathematics as a gate way subject into science, technology, engineering and mathematics careers(Awufala& Lawani,2020)It is claimed also that learners' academic performance in mathematics is influenced by teachers instructional strategies and learning materials(Abdulkarim&Baba,2019)These researchers further argue that teachers are glued to teacher-centred teaching method and neglect he novel techniques in teaching mathematics.

Similar observations are that Nigerian classes are dominated by teachers spoon feeding learners with information and facts disregarding their intellectual diversity (Awufali&Lawani, 2020) Again teachers are failing to embrace technology in their teaching and learning environment. This triggers negative attitude and anxiety towards mathematics making it difficult to uplift learners' performance in the subject (Abdulkarim & Baba, 2019).

2.9. THEORETICAL CONSIDERATIONS

The study entails the performance of learners in mathematics. The Zone of Proximal development theory by Vygotsky has been adopted. This means that in order for learners to learn effectively, they have to acquire knowledge and skills. They have to

be taught thoroughly and also ensure that they are engaged in activities that will enhance their performance. (Vygotsky, 1978) characterizes ZPD as a separation between the real formative level as determined by independent critical thinking and the degree of potential improvement as decided through critical thinking under grown-up guidance, or joint effort with increasingly skilled companions. Educators might use the ZPD to cross over barriers of what a learner can or cannot do without. This theory is relevant to my study because it will help educators to cross over barriers of what learners can do with or without their help and to close the gap also by employing strategies and approaches that will improve mathematics performance. Vygotsky (1978) entails that the reasoning and abstract thinking capacity can be classified into three parts: the ones that can be autonomously carried out, the ones that can be carried out with help and the ones that can't be carried out with help.

The ones that can't be carried out even with help are the ones that lie past the ZPD .Methods for practices motivate the understanding of learners. Study hall activities are done inside and outside study halls. Exercises are structured by the teacher to start from what the students can do autonomously referring from past information to interface the existing information with information that they can do with help as students continue rehearsing, they can carry out specific responsibilities autonomously in exercises recently performed with help.

2.9.1. Vygotsky theory stages

Vygotsky theory has four stages that are outlined below:

Stage I: The first stage shows how learners develop an understanding of language that is relevant to their examination and the basics of the topic under study is build up by relying upon others such as teachers to perform the task.

Stage II: In the second arrange students use earlier information to carry out the task-without being guided. The ZPD occurs between the first and second stages. Students practice alone, which implies that they perform some activities with no help.

Be that as it may, they are not at a phase of immaculate capability and need some help now and then.

Stage III: In the 3rd arrange execution is created, is going on without deduction and knowledge is fixed and it can't be overlooked. This implies that students arrive at the phase of independence. In the 3rd stage an understudy does not need assistance from an adult, nor to rehearse more activities to strengthen the existing knowledge (Phillips, 2015).

Stage IV: In the 4th stage students are at the de-atomization of execution to prompts the way towards rehashing a capacity, every time applying it to the consequences of the past stage via the ZPD (Hill & Hill, 2014).

2.10. CONCLUSION

In this chapter, literature review helped to share with the reader the results of the current study. It provided the framework for establishing the importance of the study and extends dialogue on the study. The reviewed literature clarified mathematics as a subject, education performance and factors that influence learner's performance. It was revealed that in order to improve performance, serious attention must be given to exploration of factors that influence it. Good performing countries practices were looked into for options to be considered when aiming to improve performance.

It is also imperative to stress that literature review described theoretical perspective and previous research findings related to the problem at hand. Its fundamental aim is to review what others have done in areas that are similar, though not necessary identical to one's own area of investigation. The next chapter will present the research design and methodology.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

Chapter two dealt with the literature study on the poor performance of learners in mathematics as well as the other factors which contribute to learners' poor performance. The literature revealed that there are steps to be followed and tasks to be carried out to ensure effective measures to address the poor performance of learners in mathematics. This chapter starts with the research paradigm, research approaches, research design, sampling, data collection, data analysis, quality assurance and ethical matters.

3.2. RESEARCH PARADIGM

A research paradigm is an approach, a research model or a world view about conducting a research (Lincoln, Lynham & Guba, 2011).It however, provides the student with an idea to choose methods and research design. Research paradigm covers the following:

- Ontology-deals with the reality e.g research into learning and teaching classroom setting(Gumba & Lincoln,1998)
- Epistemology-deals with how we come to learn or how do we know(Hesse-Beber&Leavy,2011)
- Methodology-deals with the methods being used when conducting a research(Leedy &Omrod,2010)

The study adopted the interpretivism approach. The interpretivists believe in socially constructed multiple realities. According to Guba and Lincoln (2005), the goal of the interpretive research is not to discover universal, context and value free knowledge and truth but to try to understand the interpretations of individuals about the social phenomena they interact with. Interpretive research is concerned with meaning and seeks to understand social members' definitions and understanding of situations. The study produced deep, interpretive understanding of the phenomenon of poor performance in a classroom context.

Thus, Tuckman (2017) describes an interpretive qualitative approach as learning how individuals experience and interact with their social world. Tuckman maintains that researchers who use the interpretive qualitative approach are interested in understanding what those interpretations are at a particular point in time and in a particular context.

3.3. RESEARCH APPROACHES

Each research approach has evolved to fulfil specific research aims and functions, and specific methodological styles. Furthermore, it should also be noted that conventions have developed within each tradition. Leedy and Omrod (2010) described research methodology as the general approach that that the researcher takes in carrying out the research project. To some extent, this dictates the particular tools the researcher selects. There are basically two approaches to doing a

research: quantitative and qualitative. However, it should be noted that there is also a mixed methodological approach where the two approaches can be used in one study.

In this study a qualitative approach was used. Qualitative research focuses on understanding people's beliefs, experiences, attitudes, behaviour and interaction. White (2017) argues that a qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives. Furthermore, the qualitative approach was used in order to understand the complex processes that precipitate human interaction, and it also provides opportunity to obtain information that is relevant to the field of study. This approach also helped the researcher to gain new sight about the phenomenon on the causes of poor performance of learners in mathematics in a rural secondary schools at Thulamahashe circuit.

According to Creswell (2014:233), the qualitative research has the following characteristics:

- The researcher as a key instrument. This means that the qualitative researcher is the one who gathers the information.
- Multiple sources of data. Qualitative researchers gather multiple forms of data through interviews, observations and documents, rather than rely on a single data source.
- Inductive data source. Qualitative researchers build their patterns, categories and themes by organising the data into increasingly more abstracts units of knowledge.
- Participants' meaning. In the entire qualitative research process, the researchers keep a focus on learning the meaning that the participants hold about the problem or issue, not the meaning that the researcher or writers from literature brings to the research.
- Emergent design. The researcher's initial plan for research cannot be tightly prescribed. All phases of the process may change or shift after the researcher has entered the field and begun to collect data.
- Theoretical lens. Qualitative researchers often use a lens to view their studies.
- Interpretive enquiry. Qualitative research is a form of enquiry in which researchers interpret what they see, hear and understand.

- Holistic account. Qualitative researchers try to develop a complex picture of the problem or issue under discussion, which leads to reporting multiple perspectives, identifying the many factors involved in a situation and sketching the larger picture that emerges.

3. 4. RESEARCH DESIGN

According to White (2017:42), a research design refers to the plan and structure of the investigation used to obtain certain evidence to answer research questions. The design described the procedures for conducting the study, including when, from whom and under what conditions data is to be obtained(Cresswell,2018:42)In other words, design indicates how the research is set up, what happens to the participants and what methods of data collection are used. A research design according to Maree (2007) is a plan or strategy which moves from the underlying philosophical assumptions to specifying the selection of respondents, the data gathering techniques to be used and the data analysis to be done. The choice of research designs is based on the researcher's assumptions about research skills and research practices, and influences the way in which she or he collects data. Bless and Higson-Smith (2017:46) define a research design as ''the plan of how to proceed in determining the nature of the relationship between variables''.

This study explores factors that inhibit learners from performing well in mathematics. There is a need to explore the relationship between the possible factors of poor learner performance in mathematics as well as the possible outcome as a result of the identified factors. In this study, the choice of the design was guided by the research question which is "What are the factors that contribute to the poor learner performance of learners in mathematics in secondary schools at Thulamahashe circuit? Furthermore, Leedy & Ormrod (2010) indicate that there are five common research designs in qualitative approach. They are outlined as Case study, Ethnography, Phenomenological study, narrative research and grounded theory.

Furthermore, the design helped the researcher to study in depth the factors that contribute to the poor performance by learners in mathematics. A case study approach was used because the researcher wanted to study the causes of poor performance of learners in mathematics in the two schools. The design also assisted

me gain understanding and also acquire knowledge regarding issues related to poor performance of learners in mathematics. Furthermore, it provided me with multiple sources of information and facilitated the process of exploring and describing the phenomenon clearly.

3.5. SAMPLING

According to Leedy and Ormrod (2010), in research terms a sample is a group of people, objects, or items that are taken from a larger population for measurement. The sample should be representative of the population to ensure that we can generalise the findings from the research sample to the population as a whole (Leedy & Ormrod, 2010).

3.5.1 Sample size

In this study, participants were selected following their participation in dealing with poor performance in a rural secondary school. In this study, five teachers and ten learners were purposively selected as participants in the study. They were selected because they are learners in secondary school and teachers teach at secondary school.

Teachers were sampled from the total population of 28 staff members and learners were sampled from the total population of 814 learners. School A had an aggregate of 430 learners and 16 teachers whereas school B had an all-out number of 384 learners and 12 teachers. The total number of participants was 14 (i.e. 10 learners and 4 teachers). School A has 5 teachers who teach mathematics. Out of the 5 teachers, only two teachers teach mathematics in Grade 12. Both hold Bachelor degrees in Education and both have specialised in Mathematics and Physical Science. School B has 4 mathematics teachers. There are two teachers who are teaching mathematics in Grade 12. Both teachers are fully qualified. One teacher holds a Bachelor’s Degree in Mathematics and another one holds an Honours Degree in Mathematics.

3.5.2. Research Sites

The research was conducted in Mpumalanga Province in a rural area of Mambumbu. Two secondary schools took part in research study. The two schools (School A and B) were sampled from a total of 12 secondary schools in Thulamahashe circuit. They were sampled because they are regarded as “chronic” schools due to their performance in mathematics in Grade 12. The “Chronic” schools are schools that need urgent attention and support.

3.5.3. Settings

School A is located at Mambumbu Trust, Thulamahashe in Mpumalanga Province. It is a secondary school and it offers mathematics from grade 8- 12. It is 125km from the city of Nelspruit. The school is found in the rural area. It is under-resourced and the buildings are dilapidated and it has no running water. School B is located at Rolle Trust, also in Thulamahashe, Mpumalanga Province. The school is well-resourced and compared to school A school B is better. School B has more learners and teachers than school A.

3.6 DATA COLLECTION

Data collection refers to a process on how data was collected, organised and summarised in a meaningful way (Salkind, 2018:177). In this study, data was collected through interviews, documents and observations. The sampled participants were interviewed and the researcher also played the role of being participant observer. These methods enabled the researcher to get first-hand information about using writing in learning mathematics.

Leedy and Ormrod (2010) stress that it is essential that data collection methods are consistent with the ethical principles. The people being studied must know the nature of the study and be willing participants in it (this is informed consent), and any data collected should not be traceable back to particular individuals (maintaining their right to privacy). One personal data confidential is to assign various pseudonyms to different participants and to use those pseudonyms both during data collection and in the final research report. In this study, participants were assigned various pseudonyms.

3.6.1 Interviews

Maree (2007:87) stresses that “an interview is a two-way conversation in which the interviewer asks the participant questions to collect data to learn about the ideas, beliefs, views, opinions and behaviours of the participants. Henning (2016:147) argues that “no matter how careful one would interview through questions, it comes to naught if the interviewer fails to capture the actual words of the person being interviewed”. In this study, the researcher used interviews to collect data from the sampled participants. Holstein and Gubrium (2015) describe interviewing in qualitative studies as a unique form of conversation, which provides the researcher with empirical data about the social world, simply by asking participants to speak about their lives.

A benefit of conducting face-to-face interviews is that it enables the researcher to gain participants’ cooperation by establishing a relationship with them, which therefore facilitates the production of high response rates (Leedy and Ormrod, 2010). The researcher was fully prepared to attend to several tasks simultaneously. The researcher made participants feel secured by assuring them that they were free to express their views. During the interview sessions, the researcher repeated questions to check if the participant was reliable, meaning that the participants gave similar answers to similar questions that were asked at different times. The researcher also ensured that the participants did more talking. One encouraged the flow of information by using probing questions, for example, why do you think are the possible causes of poor performance of learners in mathematics in this school ?

- **Access**

In this study, the researcher had access to the sampled participants i.e. teachers and learners in the school in order to engage them on factors that contribute to the poor performance of learners in mathematics in the school. Access to information was not denied as participants were interviewed and they cooperated fully with the researcher. The researcher was not denied access to the sampled participants because she knows the participants personally and they were also willing to express their views regarding the poor performance of learners. The researcher gained access to the sampled participants by requesting for permission from the school principal and the school governing body. After permission was granted, the

researcher also ensured that consent was sought from all the participants involved in the study.

- **Challenges**

The researcher experienced challenges of language usage and understanding with some of the participants especially learners. Some of the learners did not express themselves fully because they were sceptical of revealing their perceptions about the problems in the school whereas some were shy to express themselves. The researcher over -came the challenges by encouraging participants to use their mother tongue and to feel free to ask questions in case they did not understood me. Some of the participants were nervous to participate in the study because it was for the first time taking part in a research study.

The researcher also experienced the following challenges during the interview process. Two of the teachers were reluctant to participate in the research study. The teachers indicated that they viewed the whole process as time wasting and unimportant. Some of the learner participants (from school B) were also not free to give their views. The researcher met with the teacher participants and assured them that they were free to pull out of the research process and their views were not going to be used against them or against the school in any way. The researcher also met with the learner participants and assured them that their views were not going to put them in danger or to disadvantage them in any way. All the participants were convinced and they participated voluntarily and freely.

- **Relating with the participants**

The researcher related well with the participants. Participants were encouraged to use language of their choice and they were also encouraged to be fair and transparent in their expressions. The researcher respected the participants and adhered to the ethical principles of research i.e. ensuring that participants felt relaxed and not intimidated. I related with the participants well because I know them personally and they were also free to interact with me. I also advised them to ask any questions in case they needed to ask.

- **Selection of Interviewees**

The participants were selected by me i.e. teachers and learners in the school. Learners were selected because they are enrolled at the school and they are doing mathematics in grade 11 and 12, and teachers teach mathematics in the schools that were performing poorly. Teachers were selected because they are responsible for teaching learners and also ensuring that learners are taught mathematics effectively in the school.

- **Context**

Participants were interviewed individually at the school's principal's office. The principal of school gave the researcher time and space to interview the participants. A tape recorder was used to record the interviews (interaction) between the researcher and the interviewees. The participants were all tape recorded and the researcher transcribed their responses after the interviews. Interviews were conducted in English and an interpreter was used where two learner participants could not express themselves in English.

Follow-up sessions of about twenty minutes per participant took place to allow participants to verify the data captured by the researcher. The interviewer used handwritten notes to support the recordings. This assisted him with the transcriptions for analysis purposes. Observations were noted during the interviews, especially with regard to non-verbal cues.

- **Compilation of interview schedule**

According to Vockel (2017) interview schedule is a term that applies to written questions, which the interviewer uses to conduct interviews. The interview schedule was used to collect data from the participants directed to the sampled teachers and learners. In this study, a set of predetermined open-ended questions on an interview schedule were developed to guide the researcher during the interviews, and participants were guided and encouraged to share their experiences and views regarding using writing as a tool for learning mathematics. The researcher gathered additional information by means of the individual interview.

The interview schedule served as a guide while at the same being flexible to probe on issues that needed a follow-up. Section A focused on participants views of the possible factors that contribute to the poor performance of grade 12 learners in mathematics whereas section B focused on the methods that teachers use to teach mathematics and the possible strategies that should be used to improve grade 12 learner performance in mathematics.

- **Process of Interviewing**

The researcher interviewed teachers and learners from School A and school B. The researcher summarised the important parts of the interview and thanked the interviewees with a thank note that indicated how he valued their contributions. Tutty, Rothery and Grinnel (2016:82) stress that "prior to making the decision to stop interviewing, one must go over any information, one has already gathered to see if it is complete, makes sense and legible, audible or visible". In this study, the researcher asked the participants same questions in slight different ways to ascertain their responses.

3.6.2. Observation

According to Maree (2007) observation is an essential data gathering technique as it holds the possibility of providing us with an insider perspective of the group dynamics and behaviours in different settings. It allows us to hear, see and begin to experience reality as participants do.

The researcher observed the lesson presentations by teachers i.e. the strategies teachers used to teach learners in the school. Maree (2007) further says that observation is the systematic process of recording the behavioural patterns of participants, objects and occurrences without necessarily questioning or communicating with them.

Observation is an everyday activity whereby we use our senses (seeing, hearing, touching, smelling, tasting) - but also our intuition- to gather bits of data. As a qualitative technique, observation is used to enable the researcher to gain a deeper insight and understanding of the phenomenon being observed. In this study, the

phenomenon of learner performance was observed. In this research study, observer as participant type was preferred. This entails the researcher getting into the situation, but focusing mainly on his or her role as observer in the situation. The researcher may look for patterns of behaviour in a particular community to understand the assumptions, values and beliefs of the participants, and to make sense of the social dynamics- but the researcher remains uninvolved and does not influence the dynamics of the setting. Observation was coupled with interviews in this study. Observation helps in the construction of a picture of what transpires during the classroom practices (Henn et al 2016). The researcher personally observed the content taught, learning strategies used` and the teaching resources. All those were observed in relation to the poor performance of learners in schools.

This was done through participant observation. The reason was that the researcher regarded participant observation as appropriate since it helped him not to disturb and distract classroom interactions between the teachers and the learners. These observations totalled 20 visits ranging in length; the shortest was 25 minutes, and the longest, 40 minutes. The observation entailed the methods teachers use to teach mathematics, the activities given to the learners, the resources used during lessons, the interaction between the teacher and the learners, as well as the attitude of learners towards learning mathematics during mathematics periods.

- **Access**

Learners cooperated with the researcher and they gave the researcher enough access to observe the whole process of teaching and learning mathematics.

- **Challenges**

The teacher was not cooperative when presenting the lesson as he constantly stopped the lesson and talked about other stories such as the previous weekend soccer games.

- **How the challenges were resolved**

The researcher met with the teacher concerned in school A and another teacher from School B.

One also explained the purpose of this research study and also assured the concerned teachers that the findings were not going to be used against them in whatever way. The teachers understood and they then participated effectively through-out the research.

3.6.3 Documents

In this study, the researcher went through the learner's mathematics' scribblers, notes books, class and home- work and assignments. The researcher went through the tests and examination question papers to see how much of and reading learners are engaged in. Documents helped the researcher to have a picture of how learners responded to the tasks given to them by their teacher. Learners' work gave the researcher a picture of their performance academically. Maree (2007) argues that when you use documents as a data gathering technique you will focus on all types of written communications that may shed light on the phenomenon that you are investigating.

- **Access**

The researcher had access to learners' mathematics documents such as class and home- work books, learners' work books, tests and assignments. The researcher also had access to the teachers teaching plans, work schedules, time tables, lesson plans and lesson preparations. Other documents included learners' progress records and text books. The researcher went to different classes in School A and school B which kept the official records of the learners. One looked in each file to learn what one could about the learners 'grades and progress reports, along with the professional assessments and recommendations regarding the learners schooling.

The researcher took notes on learners work in class and from some learners work he found in the files, and collected samples of their work where possible.

- **Challenges**

The researcher experienced the following challenges in terms of documents. Some of the learners' class and homework books were missing. Learners used different text books but for the same grade and some of the learners did not cooperate when it comes to submitting their tests scripts.

- **How the challenges were addressed**

The researcher had a meeting with the teachers responsible for subjects like Physical Science, Life Sciences, Xitsonga and Mathematics. The teachers ensured that learners were issued with the prescribed text books and took the text books that were “wrongfully” distributed to the learners. The teachers also made the test scripts available to the researcher and as a result the challenges were resolved.

- **Relating with the participants**

The researcher had a good relationship with the participants guided by ethical principles. Participants were not coerced and they were also respected. In turn, participants also respected the researcher even though minor understandings (such as reluctant to submit test scripts by some participants) were experienced.

- **Criteria for selecting documents**

The following criteria were used by the researcher in selecting the documents to be included in this study:

- The types or kinds of documents e.g. primary or secondary sources
- The information contained on the documents.
- The relevance of the documents on the phenomena under study.

3.7. DATA ANALYSIS

Thematic and narrative analysis was employed in this qualitative research. The researcher recorded the data, transcribed it organised it into meaningful unit, identify themes and patterns and presented it narratively .The principal method of data analysis was through Interpretative Phenomenological Analysis (IPA) (Smith and Osborne, 2008). The IPA is a method used for systematic search of themes within data. The following was used when data was analysed:

- Open coding of data. This means building a set of themes by looking for patterns and meaning produced in the data, labelling and grouping them in connection with the theoretical framework of the research.

- Definition of thematic categories. Themes were defined across the transcribed text by reading through several times. These themes can be in the form of words, sentences or groups of sentences. By reading through the transcript, relevant information was highlighted.
- Sorting and linking of the materials into categories. Separate sentences and utterances across the narratives texts were assigned to relevant categories.(Smith and Osborne,2008)

This was followed by an extended description of what the categories tell about the phenomenon under investigation (Smith and Osborne, 2008).

3.8. QUALITY ASSURANCE MATTERS

3.8.1 Credibility

The researcher made sure that the research was credible by going back to the participants and verify their statements. This means that participants were given an opportunity to verify what they have said to ensure that the study was credible and to also ensure that the researcher did not add or subtract what the participants have said or did not say.

3.8.2. Transferability

According to Leedy and Ormrod (2010), transferability refers to the degree to which the results of qualitative research can be generalised or transferred to other contexts or settings. From a qualitative perspective, transferability is primarily the responsibility of the one doing the generalizing. To enhance transferability, the researcher made sure that the context of the research and assumptions that are

central to the research are described. Transferability is basically the responsibility of the one doing the generalising that's from qualitative perspective

3.8.3. Dependability

The researcher made sure that the study was accurate by evaluating dependability i.e. in two ways namely, stepwise replication and inquiry audit. To ensure dependability, the researcher ensured that the process within the research was documented at length in order to allow a future investigator to repeat the work, if not necessarily to obtain the identical results. The researcher ensured that the study was reliable and trustworthy.

3.8.4. Conformability

Conformability in qualitative research means the degree to which the outcomes could be confirmed or corroborated by other people. In this study, the researcher documented the procedures for checking and rechecking the data during the entire research study. The researcher effectively searched for and described the negative occurrences that contradict prior observations and furthermore conduct data audit that analyses the collection of data and analysis techniques and makes judgement about the distortion or potential inclination.

3.9. ETHICAL MATTERS

3.9.1. Ensuring participants have been given formal consent

Henning (2016) stresses that in ethical consideration, respondents need**.** Given informed consent to participate. They need to know that their privacy and sensitivity would be protected and the information is going to be recorded. In this study, participants were protected and their responses were treated confidentially. Furthermore, Salkind (2018) argue that ethics are considered to deal with belief about what is good or bad, right or wrong whereas Tuckman (2017) indicates that the matter of ethics is an important one for educational researchers since their subject study the learning of human beings. The principle of informed consent arises from the participant's right to freedom and self-determination. Consent thus protects and respects the right of self - determination and places some of the responsibility on the participant should anything go wrong in the research. As part of the right to

self-determination, a prospective participant has the right to refuse to take part, or to withdraw once the research has begun.

To comply with the requirements of this principle, all the participants were asked to sign a consent form and the following was done before the form was signed: a clear explanation of the procedures to be followed and their purposes; a description of the attendant discomforts and risks reasonably to be expected; a disclosure of appropriate alternative procedures that might be advantageous to the participants, an offer to answer any inquiries concerning the procedures; an instruction that the person was free to withdraw consent and to discontinue participation in the project at any time without prejudice. Leedy and Ormrod (2010) argue that when research involves public documents or records that human beings have previously created-birth certificates, newspaper articles, and so on-such documents and records are generally considered to be fair game for investigation by researchers.

3.9.2. Ensuring no harm to participants

The researcher made sure that participants were protected from harm. They were not exposed to any danger or risk. Leedy and Ormrod (2010) stress that researchers should not expose research participants to unnecessary physical or psychological harm. When a study involves human beings, the general rule of thumb is that the risk involved in participating in a study should not be appreciably greater than the normal risks of day-to-day living. Participants should not risk losing life or limb, nor should they be subjected to unusual stress, embarrassment, or loss of self-esteem.

3.9.3. Ensuring confidentiality and anonymity

Confidentiality means that although researchers know who has provided the information or able to identify participants from the information given, they will in no way make the connection known publicly; the boundaries surrounding the shared secret will be protected(Cohen,Manion, and Morrison,2007; McMillan and Schumacher,2006). To ensure confidentiality, the following were employed: deletion

of identifiers, crude report categories and micro-aggregation (that is, the construction of average persons' from data on individuals and the release of these data, rather than data from individuals). The researcher ensured that the information that was obtained from the participants was treated confidentially.

No information was disclosed without the permission of the participants. Participants were also not subjected to any form of disclosure. Every information was kept confidential. The essence of anonymity is that information provided by participants should in no way reveal their identity (Cohen, Manion and Morrison, 2007). A participant or subject is therefore considered anonymous when the researcher or another person cannot identify the participant or subject from the information provided. To ensure anonymity, the researcher used expressions like teacher A or learner A in data analysis. The researcher did not use information that directly or indirectly helped identify the participants. In general, a researcher must keep the nature and quality of participants' performance strictly confidential. For instance, the researcher might give each participant a unique, arbitrary code number and then label any written documents with that number rather than with the person's name. And if a particular person's behaviour is described in depth in the research report, he or she should be given a pseudonym- and other trivial, irrelevant details that might give away the person' s identity should be changed-to ensure anonymity .

In this study, the researcher ensured that participants were not known to the public and they were informed about this right to enable them to make the right choice. Salkind (2018) shares the same sentiments with other researchers that participants should not be identifiable in certain point. In this study, the researcher informed participants of the right to remain unknown and informed not to indicate their identities. They were also told about the researcher's aim of carrying out the research, their right to refuse to participate or withdraw at any time without penalty.

3.9.4. Ensuring permission is obtained

Permission to conduct the study was sought from Turfloop Research Committee, District offices of the Department of Education, the school principals, the learners, parents and the school governing body (SGB). The recruitment of the learners and the teachers who were the main participants in the research was conducted in an

open and democratic way. In this study, ethical issues namely: informed consent, confidentiality, respect, anonymity and discontinuance were also observed.

3.10. CONCLUSION

The chapter explained the research design and identified the study population. It described the sampling method and also the data collection and analysis methods. Data was collected through interviewees, documents and observations. The researcher interviewed teachers and learners and also observed the way teachers teach and the way learners learn in the school. Participants were sampled from two rural public secondary schools. They were interviewed about their perceptions regarding factors that contribute to the poor performance of learners in mathematics.

Interviews with the learners gave the researcher a picture of their feeling regarding their performance in mathematics. Writing, mental activities and counting are important aspects when it comes to the learning of mathematics and it is imperative for learners to be engaged in writing, mental, counting and other maths activities inorder to master mathematical concepts and to ensure that they also master different problem-solving activities and sums in mathematics. The next chapter entails the profile of the schools and the presentation of data.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

4.1. INTRODUCTION

In this Chapter, the researcher analysed and interpreted the data collected from the learners. Data analysis looks into the process of breaking down data into practical themes, patterns, inclinations and relationships (Mount, 2017). Luneta

(2016) defined data analyses as a process of noting and drawing out patterns in the data and making reviews about the discovered themes. This includes creating an opinion or a theory based on the data with respect to the research topic. This process is named inductive analysis (Luneta, 2016).

In this analysis, the researcher chose to use the inductive thematic data analysis method in order to allow themes to emerge from the data itself. The primary step in data analysis is the data interpretation (Creswell, 2014). This analysis in qualitative research is made up of looking into the data to get the general sense of the data, memorizing of concepts and thinking about the organization of data to be analysed and whether more data is needed or not (Creswell, 2014).

Agar (2018) suggested that read the transcripts in their entirety several times and immerse yourself in the details, trying to get a sense of the data before breaking it into parts. Further Lawrence and Tar (2016) explained the process of data analysis as involving working with data by sorting or arranging it, breaking it down and searching for themes to uncover what is important and to be learnt. Creating memos in the margins of transcripts, field notes and photographs assists in the primary steps of data interpretation and analysis.

The data was analysed with respect to the research questions, namely:

- What strategies do teachers use to address poor performance of learners in mathematics?
- What is the role of the department of education in addressing poor performance of learners in mathematics in rural secondary schools?

This chapter will deal with inductive thematic data analysis, profile of schools and participants, results from interviews, results from documents and results from observations.

4.2. INDUCTIVE THEMATIC DATA ANALYSIS

The researcher focused on the age group of the new theory resulting from the data collected (Creswell, 2012). The researcher examined existing theories in order to place his new theory within the discipline, this process required the

researcher to turn the constructed contexts of participants into the series of presentations, notes, conversations and provide meaning of the phenomenon under inquiry (Creswell, 2014). This process further enabled the researcher to create rich detailed descriptions using the task of the learners.

Krippendorff (2016) defined content analysis as a research technique for making replicable and valid inferences from texts or other material relevant to contexts of their use. As a research technique, content analysis provides new insights, increases the researcher understands of particular phenomena or inform practical actions. Bengtsson (2016) argues that content analysis is more than a counting process. The goal is to link the results to their context or to the environment in which they were produced. In this study, the researcher sought to understand factors that contribute to the poor performance of learners in mathematics. Makonye and Mashaba (2016) highlighted the importance of identifying factors that contribute to the poor performance of learners in mathematics.

The use of inductive approach helped me to allow the data to determine the themes for the study.

4.3. PROFILE OF THE SCHOOLS AND PARTICIPANTS

The schools are situated at Mambumbu village, Thulamahashe circuit, Bohlabela district in Mpumalanga province. School A has enrolment of 814 learners and 28 teachers and school B has 384 learners and 12 teachers. School A is not well-resourced and has no borehole and school B too is not well-resourced and it has no library and no laboratory. School A is known for poor performance of learners in grade 12 whereas school B too is also known for its poor level of learner discipline and poor results in grade 12 results for the past 5 years.

School A is found in rural areas and school B too is also found in a rural area. Both schools are electrified and they have functional school governing bodies and school management teams. School A has 8 members of the school management team whilst school B has 4 members of the school management team (SMT). School A has 3 teacher participants and 5 learner participants. The two teachers are all teaching Mathematics in grade 12. One of the teachers is between the ages of 40-50 and the other one is between the ages of 54-56. One of the teachers has Bachelor of

Honours degree whereas the other teacher, the one aged between the ages 54-56 has a diploma in Education.

4 learner participants are between the ages of 15-17 and one is 18 years of age. The five learners are all in grade 12 and they are doing mathematics as a subject. School B has 2 teacher participants and 5 learner participants. Both teachers are between the ages of 44-50 and they both have degrees in education. 3 learners from school B are between the ages of 15-17. 1 learner is 18 years of age and the other one is above 18.

4.4. CODING OF THE PARTICIPANTS

Charmaz (2006) described coding as “categorising segments of data with a sort label or name that simultaneously summarizes and accounts for each piece of data”. Saldana (2010) further defined coding in qualitative research as a word or phrase that assigns a summative, major attribute for a piece of language based or visual data. For this study, coding was done by assigning labels or tags for responses. Coding also assisted the researcher in identifying research participants without using their real names.

To protect the identity of the participants (teachers and learners) involved, codes were used. The participants’ responses were coded **L1 and T1** with **“L”** referring to Learner and “T” to teachers and the numbers **L1 to L10 and T1 to T4.** Participants’ responses relative to the types of errors made were also categorized using five labels, namely: No error, Simple mistake, conceptual error, procedural error and language error.

4.5. RESULTS FROM INTERVIEWS

Table 2: Teachers responses on their perception of possible factors that contribute to the poor performance of grade 12 learners in mathematics in a rural secondary school.

Participant	Response

T1	“ learners perform poorly in mathematics because the school is not well-resourced and the teaching methods are poor”
T2	“ learners lack understanding of mathematics and we are unable to teach mathematics effectively”
T3	“ we contribute to the low level of learners performance and understanding of mathematics”
T4	“ the school is not well-resourced and teachers have little knowledge of teaching learners mathematics and the teaching methods are poor”

With regard to the question: **Perception of possible factors that contribute to the poor performance of grade 12 learners in mathematics in a rural secondary school.**

Lack of resources

Teachers complained about the lack of resources in schools as a possible factor to the low performance of learners in mathematics. Teachers cited shortage of textbooks, lack of mathematical instruments and technological gadgets and other resources such as study-guides as a problem or a factor that contributes negatively to the performance of learners in Grade 12.

Lack of understanding of mathematics

Teachers also cited lack of understanding of mathematics as another possible factor to low performance of learners in mathematics. According to Hill & Hill (2014), teachers should be more knowledgeable and experienced in order to

plan and present quality lessons and to ensure that students learn to the best of their ability.

Table 2 below shows each teacher's response to the possible factors that contribute to the poor performance of learners in mathematics in grade 12. 5 out of 5 of the participants indicated that teachers' methods of teaching mathematics are not effective and they contribute to the poor performance of learners in mathematics. Participants also indicated that the school is not well-resourced and as a result, they found it difficult to teach and learners find it difficult to learn mathematics.

From the responses given by the teacher participants, the researcher found that the teaching methods used by the teachers to teach mathematics were ineffective and teachers themselves complain and took blame upon themselves that they were contributing to the low level of learner performance in mathematics. Teachers indicated that they were not able to teach effectively since the school is not well-resourced. This means that the school has a shortage of textbooks, mathematics equipment as well as furniture and classrooms. This contributes negatively to learners' performance in mathematics and teachers find it very difficult to offer effective lessons and to facilitate the learning process.

Table 3: Strategies to address poor performance of learners

Participant	Response

T1	“We should be re-trained in order to acquire more knowledge and skills. Lessons should be more practical and we should demonstrate when we teach.
T2	“ we need to be capacitated in order to be effective in the classroom and to teach mathematics effectively”
T3	“ we need knowledge and skills and also different teaching methods that will help us offer effective mathematics lessons”
T4	“we should make sure that we attend workshops on how to plan and present mathematics lessons” “we need to ensure that we demonstrate when we teach and the lessons should be learner-cantered and activity based”

With regard to the question: **Strategies to address poor performance of learners**

Lack of knowledge and skills

Participants indicated that they lack knowledge and skills and as a result, they find it challenging and difficult to plan and present quality lessons. In order for teachers to teach effectively, they should be capacitated and developed so that they can be competent in the classroom. Lack of workshops and training is a cause for concern for teachers because they do not have an opportunity to acquire more knowledge and skills and an opportunity to interact with their counter-parts from other schools.

Table 3 shows participants responses on the strategies to address poor performance of learners in mathematics. 5 out of 5 participants stressed that they needed to be capacitated with knowledge and skills in order to offer effective mathematics lessons. One of the participants T1 stressed that they should be “re-trained in order to acquire more knowledge and skills whereas T2 indicated that “teachers need to be capacitated in order to be effective in the classroom”.

T3 stressed that “teachers need knowledge and skills and also need to use a variety of teaching methods to help them, be effective in the classroom”. T4 stressed that “teachers should attend workshops on how to plan and present mathematics lessons” and further indicated that “teachers should demonstrate when they teach and the lessons should be learner-centred and activity based”. From the responses of the participants, the researcher found that teachers are not confident about the strategies they use to teach mathematics in grade 12 and they need to be capacitated and developed in order for them to plan and present effective mathematics lessons.

Teachers need to give learners more practical mathematics activities and also ensure that lessons are activity based and learner-centred. According to the teacher participants, they should attend workshops with the aim of imparting them with knowledge and skills and also help enhance their approach and strategies in the teaching of the grade 12 mathematics.

The researcher concurs with the teacher participants that teaching strategies play a significant role in the learning of mathematics. In order for learners to be taught mathematics effectively, teachers play a significant and meaningful role and they should make it a point that the lessons are activity –based and learner-centered and they should also demonstrate to the learners what the lesson entails or is all about. This means that learners should learn mathematics practically and the teacher should demonstrate when they teach so that learners attain knowledge and skills on how to solve mathematical sums and also solve problems.

Teachers also indicated the need to attend workshops that will help them attain knowledge and skills. This means that in order to address the problem of poor performance of learners in mathematics, teachers should make it a point that they are developed and capacitated and workshops will accord with strategies and skills on how to approach mathematics and how to offer quality and effective lessons in grade 12.

Table 4: The role of the department of education in addressing the problem of poor performance in mathematics in grade 12

Participant	**Response**
T1	" We only attend few workshops but they are not enough and the textbooks are not enough"
T2	"the curriculum specialists for mathematics sometimes assist us on how to approach mathematics lessons in grade 12"
T3	"the department is not doing enough to capacitate and develop us and as such as only attend few workshops in a year"

T4	“the department has done nothing to develop and capacitate mathematics teachers”
	“ we attend workshops once a quarter and this is not enough”

With regard to the question: **The role of the department of education in addressing the problem of poor performance in mathematics in grade 12, lack of workshops has been cited as a problem**

Mathematics workshops

Workshops are aimed at enhancing the performance of teachers and also empowering them with knowledge and skills. They are aimed at affording teachers opportunities to meet with their colleagues and tutors so that they can share knowledge and ideas that would help them to plan and present quality lessons. Lack of workshops is not helping teachers and in some schools were mathematics is taught by inexperienced teachers, lack of mathematics robs them an opportunity to meet with their more experienced counter-parts.

Based on participants’ responses from the table above, the department has not done enough to develop and capacitate teachers to plan and present effective mathematics lessons. According to T1, they only attend “few workshops and they are not enough” and T2 stressed that the curriculum specialists sometimes assist them on how to approach mathematics lessons. This according to T2 is not an on-going process because it is done sometimes.

T3 stressed that “the department is not doing enough to develop us” and this shows that the role of the department in capacitating and developing teachers is minimal and teachers are not well-equipped on how to offer effective mathematics lessons. T4 argues that “the department has done nothing to develop and assist us” and this shows that a lot still needs to be done in order to make sure that teachers are developed and capacitated to teach effectively and to have vast knowledge of mathematics.

T4 also stressed that “we attend workshops once a quarter” and this also shows that the role of the department of education in capacitating and developing teachers is minimal and it leads much to be desired.

Table 5: Learners responses about their views of the possible factors that contribute to their low performance in mathematics in grade 12

Participant	Response
L1	“We are not well-taught and the school has no mathematics resources”
L2	“ the teachers methods of teaching us mathematics are not effective”
L3	“our school is not well-resourced. We don’t have a library and laboratory”
L4	“ mathematics anxiety is a cause and the teaching strategies are bad”
L5	“we are not well taught and this is a cause for concern”
L6	“ we don’t have enough resources for learning mathematics”
L7	“our attitude towards mathematics is bad”
L8	“mathematics is a difficult subject”
L9	“our school is not well-resourced and this is a problem”
L10	“we are not well taught and teachers are failing us”

With regard to the question: **Possible factors that contribute to their low performance in mathematics in grade 12**

Participants raised a number of possible causes of the factors that contribute to the possible causes of low performance in mathematics in Grade 12.

Lack of resources

Participants indicated that lack of resources such as textbooks, mathematical instruments, lack of school laboratory and lack of technological gadgets such as laptops, computers, smart phones and tablets contributes to the poor. Gee (2017) argues that in order for learners to master mathematics effectively, schools should be well-resourced. Lack of resources in the sampled schools has been attributed as a one of the possible causes of low performance of learners in mathematics in Grade 12.

Teaching methods

Teaching methods have also been cited as a possible cause to the low performance of learners in mathematics. In order for learners to do well academically, Smith (2015) argues that teachers should use a variety of teaching methods and they should use the methods that cater the diverse needs of the learners in the classroom.

Learner perception of mathematics

Learners perceive mathematics as a difficult subject and this contributes negatively to their performance. Instead of gaining more confidence, learners end up develop mathematics anxiety and thus de-motivate them to learn mathematics with confidence.

From the above responses, participants indicated that the methods that are used by teachers are not effective. L1 stressed that “we are not well-taught and the school has no resources” and this according to L1, teachers contribute to the learners’ low or poor performance in mathematics.

L2 stressed that “teachers’ methods of teaching mathematics are not effective and this cost learners not to master the mathematics content. According to L3, the school is “not well-resourced and we don’t have a library and laboratory”. L3 supports the notion that lack of resources is costing them not to learn mathematics effectively. L4 indicated that they “have mathematics anxiety” and the fear of mathematics is not doing learners any good. L5 indicated that they “were not well taught and this is a cause for concern” and L6 indicated that “we don’t have enough resources” whereas L8 indicated that “our attitude towards mathematics is bad”. L9 stressed that “mathematics is a difficult subject and L10 indicated that “we are not well taught and teachers are failing us”.

5 out of 10 of the learner participants stressed that they were not well-taught and this was a concern for them. They stressed that the methods that are used by the teachers are not effective and as a result, they are failing to learn mathematics effectively. They indicated that the teaching methods contribute to their low level of performance in mathematics in grade 12, with one participant i.e. L5 saying, “we are not well taught and this is a cause for concern”.

From the learner participants’ responses, the researcher found that learners complain about not being well-taught and the teaching methods not being effective for the teaching and learning of mathematics. In order for learners to do well in mathematics, they should be well-taught and the teachers should make it a point that the lessons are well planned, well-presented and also activity based.

This means that learners should be taught to be creative, to think out of the box, to be innovative and also critical in order to solve problems and also ensure that they are able to do mathematical sums. Teachers should demonstrate when they teach learners. They should give examples and also empower learners to work on their own in order to improve their performance in mathematics and according to Ramlan (2016), teachers play a central role in the teaching and learning process and they should make it a point that learners learn and they are supported in their learning.

The problem of resources has been cited by learner participants as a cause for a concern and a possible cause for low level of learners' achievement in mathematics in grade 12. 4 out of 10 (40%) of the learner participants indicated that the school was not well-resourced and this affected their performance in mathematics. one of the learner participants i.e. L3 said that "our school is not well-resourced and we don't have a library and a laboratory".

This means that learners need resources in order to perform to the best of their abilities. According to Duke (2017), learners should be assisted to learn by providing them with the necessary tools and resources. In order for learners to learn mathematics effectively, the school should provide resources for the learners and teachers should make it a point that learners are well-equipped to make use of the resources and to learn effectively.

Table 6: Strategies to address poor performance of learners in mathematics in grade 12

Participants	Responses
L1	"The lessons are learner-centered and teachers do not give us opportunities to work on our own"
12	"there are no clear strategies to teach us mathematics"
L3	" the teachers just read the textbooks"
L4	"they just give us classwork and homework and they don't even give us feedback
L5	"they don't explain thoroughly what they are teaching about"
L6	"the strategies are not clear to us"

L7	“ I don’t understand what I am being taught in mathematics”
L8	“teachers are clueless on what to teach us”
L9	“the strategies are not helpful at all”
L10	“they are teacher-centered and they use teacher-centered approaches”

With regard to the question: **Strategies to address poor performance of learners in mathematics in grade 12**

Teacher-centred lessons

Learner stressed that mathematics lessons are teacher-centred and not learner centred. This means that the teacher dominates the lessons and as a result, they do not get opportunity to interact with their peers and in most instances they are obsevers of the learning process instead of being active participants. In order for learners to master the learning content, lessons should be learner-centred and activity based and they teacher should act as the facilitator of the learning process.

10 out of 10 of the learner-participants complained about the strategies that are used by the teachers to teach them mathematics. They complained that the strategies are not clear and not helpful at all. One of the learner participants, L1 stressed that “the lessons are learner- centred and teachers do not give us opportunities to work on our own” whereas L5 stressed that “they don’t explain thoroughly what they are teaching about”. L9 indicated that “the strategies are not helpful at all” and L10 stressed that “they are teacher-centred and they use teacher-centred approaches”. From the observation done by the researcher in 5 of the lessons observed, the lessons were teacher-centred and learners were given little opportunity to interact and to share ideas.

The researcher concurs with the learner-participants that teachers use teacher-centred approaches and the lessons are not learner-centred. Teachers dominate the learning process and is a problem for the learners because they become spectators during the process of learning instead of being given opportunities to participate in the lesson.

According to Phillip (2015), the teacher should act as the facilitator of the learning process. Teachers should empower learners to work independently and they should also empower them to share knowledge and ideas and to work as a group. This according to Phillip (2015) helps learners to enhance their communication skills, work hand in glove with each other and assist others to understand what the lesson entails. In order for learners to master mathematics and other subjects they should be empowered to work independently and to work on their own. They should work in groups so that they can assist each other to gain more understanding of the content of what they are learning about.

Group work about to Shutter & Shutter (2016), assists learners to share information, work hand in glove with each other, understand each other better, understand diversity, accept and accommodate one another. This means that in order for learners to master mathematics and other subjects, strategies such as group work should be implemented.

Table 7The role of the department of education in addressing the problem of poor performance of learners in mathematics in grade 12

Participant	**Response**
L1	“I am not sure how the department of education is addressing the problem of poor performance of learners in mathematics
L2	“teachers attend workshops for mathematics in order to gain more knowledge and skills”

L3	“I am not sure about the role of the department ”
L4	“I don’t know”
L5	“I am not sure “
L6	“I guess teachers are developed to teach mathematics”
L7	“I don’t know”
L8	“ I am not sure of the role “
L9	“I don’t know”
L10	“ I am not sure of what the department is doing”

With regard to the question: **The role of the department of education in addressing the problem of poor performance of learners in mathematics in grade 12**

The role of the department in addressing learner performance in mathematics in Grade 12

The majority of learners indicated that they were not sure about the role the department is playing to address the problem of learner performance in mathematics in Grade 12. One of the learner participants indicated that the department was providing training for the teachers in order to empower them with knowledge and skills. However, out of the 10 learner participants, 9 learner participants indicated that they were not sure or they didn’t know about the role the department was playing to enhance teachers knowledge and skills in the teaching of mathematics in Grade 12.

Furthermore, the responses of the learner participants, 5 out of 10 learners indicated that they were not sure of the role of the department in addressing poor performance of learners in mathematics whereas 3 out 10 of the learner participants indicated that they didn’t know what the department was doing to assist or address the problem of poor performance of learners in mathematics

in grade 12. One of the participants i.e. L2 stressed that “teachers attend workshops for mathematics whereas L6 indicated that “I guess teachers are well trained to teach mathematics”.

Teachers should be capacitated and developed to use a variety of teaching methods and to accommodate different learners in the classroom. They should be empowered to plan and present lessons and to make sure that learners are empowered to work on their own and to work with their peers.

They should engage learners in a variety of activities and also ensure that learners understand the need to master mathematical concepts and problem-solving activities. Teachers should also develop and help learners overcome anxiety. This can be achieved if learners are able to work as a collective, ensure that learners have enough resources and they also well capacitated to understand the subject content.

4.6. RESULTS FROM DOCUMENTS

From the results of the documents, the researcher found that there are 78 grade 12 learners in school A and they share 32 grade 12 mathematics textbooks. This means that there is a shortage of mathematics resources such as textbooks. The researcher has also found that the grade 12 class is overcrowded and some of the learners have no tables and chairs. It is difficult for the teacher to move around and to facilitate the learning process.

In school B, there are 34 learners and they share 12 grade 12 mathematics textbooks. This also shows that school B has a shortage of resources like school A. School B too has a shortage of tables and chairs and from the school records, the researcher has found that some of the learners have no tables and chair. In grade 12, there are 18 chairs and 9 tables and this is a problem because learners are not comfortable in class and there cannot be effective teaching and learning if learners are not well-arranged.

Documents in school A show that teachers have attended mathematics workshops twice since 2019 and this is a cause of concern. One of the workshops was conducted in March 2019 and the other one in January 2020. In school B, documents show that teachers have attended mathematics

workshops once i.e. in January 2020. This shows that teachers are not attending workshops and they are not getting opportunities to be developed and capacitated by the curriculum implementers.

Records in school A show that curriculum implementers last visited the school in July 2019 to support grade 12 mathematics teachers and in school B, documents show that curriculum implementers have never visited the school since May 2019.

Lack of support from curriculum implementers support the notion that the department of education is doing little to support schools and to develop and capacitate teachers. In order for teachers to be developed and be capacitated, they should be imparted with knowledge and skills. Education authorities should make it a point that teachers are imparted with knowledge and skills and they are capacitated to perform to the best of their abilities. They should be trained so that they can be able to use a variety of teaching methods and methods that will help accommodate the different types of learners in the classroom.

According to the Department of Education (2017), inclusive education should be implemented in schools and teachers should be able to work with learners with special educational needs as well as barriers to learning. This means that teachers should be developed and capacitated in order to acquire knowledge and skills that will help them to be effective in the classroom.

4.7. RESULTS FROM OBSERVATION

From the observation done in one of the lessons conducted in the school, the researcher found that the teacher didn't give learners chance to work in groups. The teacher indicated that in order for learners to understand and master mathematics, lessons should be teacher-centred and the teacher should dominate the learning process. This is according to Philip (2015) not fair to the learners because it gives them little if no opportunities to engage and to interact with each other.

Based on two of the lessons observed by the researcher, some of the learners complained to the teacher that they didn't understand what she was teaching

them about and one of the learners demanded the teacher to give examples and demonstrate to the learners what the lesson was all about. The learner also asked the teacher to give them opportunities to respond to some of the tasks in the lesson in order to gauge their understanding of the lesson and also measure their knowledge of the different mathematics concepts and topics.

From what one has observed, few workshops are organized by the department of education and curriculum implementers sometimes visit the school to support the teachers and this is not enough. According to Milner and Anita (2017), teachers should be continuously developed in order for them to be up to date with the curriculum and in order to gain knowledge and skills that will help them to be productive and effective in the classroom.

From what the researcher has observed, the majority of learner participants are not sure if teachers attend workshops organized by the department of education or not. They are not even aware of whether teachers are capacitated and developed to teach mathematics and other subjects effectively. Some of the learner participants do not even know if teachers do receive training and workshops from the department of education.

4.8. CONCLUSION

In chapter four, the profile of the school was presented followed by the presentation of data analysed. The analysed data gave a picture of how learners learn mathematics and the use of writing as a tool of mathematics learning in grade 12. The chapter outlines the views of teacher and learner participants with regard to the possible factors that contribute to the low or poor performance of learners in rural secondary schools in Bohlabela district, the strategies that are used to address the problem of poor performance in schools as well as the role of the department of education in addressing the problem of the performance of learners in mathematics in grade 12. The next chapter will be a discussion of results and recommendations.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. INTRODUCTION

This chapter presents the summary of findings, conclusions and recommendations based on the results of this study. The study was done focusing on exploring the causes of poor performance of learners in mathematics subject. This was done in Bohlabela district involving two secondary schools as the sample of study among 184 schools in the district. Bohlabela district was selected to represent other districts in Mpumalanga. It has schools located in rural and urban areas. The district has 184 secondary schools for which 2 schools were randomly selected. The participants of the study were the mathematics teachers and students from grade 12.

Specifically, the study sought to:

(i) Explore the causes of poor performance of learners in grade 12 in rural secondary schools.

(ii) To determine the nature of school environment where teaching is practiced in relation to student's performance in mathematics

(iii) To identify the influence of teacher- student relationship on students' performance in mathematics

(iv)To examine the influence of cultural backgrounds on students' performance in mathematics.

The study was done at Thulamahashe circuit, Bohlabela district. Interviews, observations and documents were used in determining the teacher participants'

instructional strategy preferences and extent of use on various instructional strategies as well as the students' instructional strategy preferences and perceived extent of use. Students' performance was found to be related with the teacher participants' instructional preference more especially on demonstration, problem-solving, project and inquiry approach. When teaching methods do not make students understand the lesson they end up failing.

Results of the study also revealed that there was a significant difference between the teacher participants' preference of instructional strategy and the student performance in mathematics. Though teachers claimed to apply participatory and student centred methods, it was not there in actual practice. Teachers were exposed to number of workshops and attended many seminars, yet they didn't bring any changes in students' performance in mathematics. The researcher found that if each student could have his/her own books, other supplementary learning materials and practical learning they could perform to great grades in mathematics.

The results of the study showed that there are numerous causes of poor academic performance of learners in mathematics. These range from those which are institutional and are teacher-learner centred to the general ones. The study showed that poor performance is also a product of mathophobia. Math phobic learners are generally poorly motivated to do the math and hence underperform. The study revealed that many learners believe that mathematics is a subject for those who are very bright. This kind of thinking is deeply rooted in the society from which these learners come. Therefore, math phobia is a social construct and society should change its attitude towards math if learners are to do better.

The findings of the study also revealed that lack of teaching experience causes poor academic performance in mathematics. Most experienced teachers left the department in search of greener pastures in the private sector and in institutions of higher learning. This lack of teaching experience contributed to poor academic performance. Coupled to inexperience, the study revealed that some learners fail mathematics because of poor teaching methods employed by the inexperienced mathematics teachers. Learners have indicated that some teachers do not explain well while others are too fast. This concurs with the findings of Stuart (2017) who

states that poor academic performance is traceable to ineffective teaching methods. Some teachers it has been noted did not vary their teaching methods which made the learners loose interest in mathematics.

The results of the study also showed there were a number of challenges teachers faced which contribute to poor academic performance in mathematics. Some learners it has been noted had poor memory generally. They fail to recall what they would have learnt. They were not able to make connections on what they will be learning. They could not build on prior knowledge. Also poor mathematics foundation poses a great challenge to the learners. The study also revealed that some learners were not taught well in mathematics at primary level, this spilled over to the secondary level.

In the study the findings showed that lack of resources results in poor academic performance in mathematics. Majority of learners share textbooks although 75% to 90% of classroom instruction is based on textbooks. Lack of textbooks render learners incapable of doing their homework which worsen the performance in mathematics. The study revealed that there is an acute shortage of text books in the selected schools and this has a negative effect on the performance of learners in mathematics.

5.2. IMPLICATIONS OF THE RESUTS TO TEACHERS, POLICY MAKERS AND RESEARCHERS

5.2.1. Implications to teachers

The low level of performance of learners in mathematics has implications to teachers. Teachers need to do self-introspection on the methods they use to teach mathematics. They need to self-introspect their role in teaching learners effectively and also ensuring that different teaching methods that should suit different learners should be implemented. The poor performance of learners in mathematics show that a lot still needs to be done on terms of teaching learners' mathematics and also

using different strategies that should also cater for the different needs of learners and different types of learners in the classroom. 10 out of 10 teacher-participants indicated that learners low performance of teachers implicate negatively on the teachers. Teachers also need to introspect on the activities they give learners and also formal and informal tasks such as tests, assignments and projects. They also need to explore and identify the different possible cause of the low –level of learner performance in mathematics. The need to introspect may help teachers to improve the methods and strategies to teach learners effectively and to ensure that they improve their performance in mathematics (Phillips, 2015).

Teachers need to review the way they relate with learners during mathematics lessons and also the way they plan and present lessons. They also need to review their participation in mathematics workshops that are aimed at capacitating and developing them as well as enhancing their performance in order to teach and assess learners effectively.

5.2.2. Implication on policy makers

The results of the low-level of performance of learners in mathematics has implications on policy makers. They need to design the curriculum that is learner-centred and also activity-based. Policy makers should make sure that they make sure that the different mathematical concepts are explained and also clarified and also make sure that instructions are clear and easy to understand. They should also make sure that programmes are put in place to train teachers and empower them with knowledge and skills that will help them plan, teach and assess learners effectively. They should also review the different topics and sub-topics and also make sure that enough time is given to cover the curriculum in order to be easy to understand as well as to be easy to implement. Policy makers should make sure that teacher's knowledge gap is addressed by empowering them with strategies that will help them teach mathematics and different ways and also in a manner that is understandable to the learners.

Mathematics policies should be in place and they should clearly outline the different strategies that teachers should use to improve learners understanding of mathematics as well as the way teachers plan and present lessons. The policies should also be aimed at ensuring that learners develop love for mathematics and

also understand the different mathematical concepts and problem-solving activities (Department of Education, 2015).

5.2.3. Implications on researchers

Researchers have a task to explore the different causes of factors that contribute to the low level of performance of learners in grade 12 in mathematics. They should also ensure that they explore the way teachers relate with the learners, the material conditions in different schools, the knowledge gap that teachers have and its implication on their performance in the classroom. Researchers have a role and responsibility to explore how learners fare in different subjects as well as the main cause of their low-level of performance and understanding in mathematics.

This will help them come up with a research study or studies that will explore the factors that contribute to the poor or low level of performance of grade 12 learners in mathematics in rural secondary schools and also come up with possible strategies that teachers should use to address the problem in the schools.

5.3. LIMITATIONS OF THE STUDY

Humans are diverse subjects and due to the low sample representation of participants and that this research study was only confined to one rural secondary school, careful consideration should be given to the generalisation of results to this area. The study only focused on two rural secondary schools in Bohlabela and therefore the results cannot generalise that all schools in Bohlabela District.

5.4. CONCLUSION

Based on the findings of the study, it can be concluded that:

(i) Majority of the mathematics teachers in selected secondary schools in Bohlabela district mostly were male. As to educational attainment and length of teaching experience, highest educational attainment of majority of the teachers were bachelor degrees with a very good experience in teaching mathematics.

(ii) Student centred methods, discussion, demonstration, problem-solving, project, inquiry approach, cooperative and use of audio-visual instructional strategies were highly preferred by the teacher participants. But this was hindered by the backgrounds of the students, nature of school environments, student's self-effort and

family economic status of the students. It end up teachers applying teacher centred methods due to that students have a poor background in mathematics.

(iii) Lecture methods, discussion, demonstration, problem-solving, project, inquiry approach, cooperative learning and the use of audio-visual media instructional strategies were highly preferred by the student participants. They said that they understand when taught using such teaching methods. This means that students were missing something in their learning process depending on their backgrounds in mathematics. The researcher had observed that such methods are not practised as teachers are few, not well paid and time pressure as they have to teach many periods as one of the teacher said in an interview.

(iv)There was no significant relationship between the instructional strategy preference of teacher participants and their teaching performance. The preference of teachers on particular instructional strategies does not affect the level of their teaching performance.

(v) There was a significant relationship between the teachers' use of the different instructional strategies and their students' performance in mathematics. For example, students doing problem-solving, self-practice, teachers demonstrating and students contributing in the teaching session what they know about the topic under study.

(vi)Teacher- student relationship has its motivation for both teachers and students. It motivates teachers to like attending classes as there is absence of hostility. Also it motivates students to like the subject as they don't have negative attitude towards their teacher.

(vii) Mathematics department has a lot to help in ensuring students perform well in mathematics. But this was hindered and it was not well functioning as there was no actual practice in division of power among principals and what mathematics head of departments do.

5.5. RECOMMENDATIONS

Based on the results of the study, the following recommendations were made:

5.5.1. Mathematics Teachers

The researcher recommends mathematics teachers to consider students cultural and learning backgrounds in choosing instructional strategies. It is suggested that they align teaching methods with the assessed learning needs and capabilities of students. Teachers may attempt to find a balance of teaching strategies rather than teaching student hence few understand the subject and at last many fail the subject. They may be able to realize the importance of recognising learning styles, identify students' differences, and adjust the teaching methods accordingly.

By doing that, teachers would be able to deliver content clearly, making every student understand mathematics, motivate students leading to better performance in mathematics subject. Lastly, it is also suggested for the teachers to learn to formulate their way of teaching especially if their school does not have available facilities to support their teaching activity. They may learn to develop their profession and innovativeness in teaching in order to maximise the use of available resources of the school to improve students' performance in mathematics subject. The results of the study showed that mathematics needs a lot of practice. Therefore, teachers should give adequate homework to the learners so as to keep them practising.

From the literature review done, the researcher recommends that teachers should fight mathophobia among learners so that they may have a positive attitude towards mathematics. The study observed that the mathematics syllabus is too loaded, thus, the researcher recommends that the Department of Education should revisit the mathematics syllabus to make it manageable. The researcher also observed that the mathematics class in one of the selected schools is overcrowded. Thus, it is recommended that the school should enrol a manageable number of learners so that individualised instruction becomes possible. Thus, the official teacher ratio of 1.35 should be considered.

5.5.2. Students

The study highly suggests that students take in hand their perception and feedback towards their teachers teaching methods in order for the teachers to effectively bring

into line their way of teaching to the students way of learning. It is recommended that for the students to learn effectively, they need to be flexible by using strategies outside their preferences in order to meet the demands of the challenging environment. Students must be ready to be guided in mathematics using learner centred methods, which is the very effective way of teaching. Students must not be lazy by not doing self -practice daily. They are also encouraged to actively participate in classroom activities in order to have an enjoyable and satisfying learning outcomes.

5.5.3. School Management

For school management, it is recommended to ensure availability of the instructional material and facilities for the execution of different teaching methods that are aligned with the teaching methods and students learning in the classrooms. Effective teaching and learning cannot be achieved in the absence of those instructional materials. It is also highly recommended that the department of education provide more in-service seminars, trainings and workshops for the teachers focusing more on how the teachers would enable them to align their instructional strategies they prefer and to use to the learning preferences and capacities of the students.

Furthermore, teachers should also be encouraged by the principals to pursue post graduate studies in order to upgrade their instructional competencies even if they have degrees in teaching profession. Lastly, head of departments for mathematics should be empowered to manage teaching and learning in mathematics. They must be provided with all guides and teaching resources. The researcher also recommends that in order for the selected schools and schools in the same situation to improve performance in mathematics, they should employ highly experienced teachers. Experienced teachers should induct the inexperienced teachers (novices) on how to employ effective teaching methods for selected topics in Mathematics.

In addition, it is recommended that mathematics teachers should use a variety of instructional materials and strategies for students to understand better. Staff

development workshops should be organised at regional, cluster and school level so that teachers can share the current teaching strategies. Enough textbooks and other teaching/ learning materials should be availed for learners to utilise in their learning endeavour.

5.5.4. Future Research

The researcher is recommending research to be done in future on identifying student individual factors that makes them fail mathematics while performing better in other subjects such as Physical Sciences and Life Sciences. The research must also be conducted on individual teacher factors that affect their teaching practice to the extent students are poorly performing in mathematics.

This is highly suggested in order to widen the scope of the current study and initiate the process of creating evidenced based teaching strategies that will enhance the quality of instruction and learning to enhance students' performance in mathematics. The learner centred approach need to be reinforced by all mathematics teachers and all educational stakeholders. All teachers, education officials and non-governmental organizations to be provided on the importance of this teaching approach. Therefore, research would be done on the assessment of the use of social media like Facebook, twitter, Instagram and WhatsApp to help in teaching and learning of mathematics subject. The reason behind is that this media has corrupted the mind of many students, good enough is that they are very interactive and familiar with such social media.

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APPENDICES

APENDIX A: THIS IS AN EXAMPLE OF AN OPEN-ENDED QUESTIONNAIRE THAT WILL BE USED BY THE PARTICIPANTS

SECTION A

PERSONAL INFORMATION

AGE……..

GENDER……..……

OCCUPATION……

SECTION B

Question 1

What is your experience regarding learners performance in mathematics in secondary schools?

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……
……

Question 2

What are the causes of poor performance in mathematics n secondary schools?

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……
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Question 3

What has been done by the Department of Education to address the problem of poor learner performance in mathematics in secondary schools?

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……
……

Question 4

What strategies can be implemented to improve the performance of learners in mathematics in secondary schools?

……
……
……

APPENDIX B: A: Letter to Mpumalanga Department of Education

P.O Box 1344

Bushbuckridge 1280

Cell number: 0834313859

ezromschool@gmail.com

15 April 2018

Dear Sir/Madam

RE: A REQUEST TO CONDUCT A RESEARCH IN YOUR PROVINCE

I hereby request permission to conduct a research study in your province. My name is Mkateko Victoria Mathebula (Persal Number 81066139). I am currently studying for a Masters degree (MEd) with the University of Limpopo under the supervision of Prof MJ Themane in the school of education. My research topic is**: Exploration of the causes of poor performance in Grade 12 Mathematics in Thulamahashe Circuit.**

Methods of data collection will be one-on-one interviews and observations. This will be done during working hours and will require the participation of both teachers and learners who have been purposively sampled for the research. The participation will be protected from any emotional or physical harm. Their participation will be voluntary and they are free to pull out at will.

I believe that this research will be beneficial to the Department of Education and will also be a source of reference for future scholars.

I await a favourable response from you

Thank you

Yours Sincerely

Mathebula M.V

_____

Masters Student

Appendix C: A letter to the Circuit Manager

Ezrom Primary School

P.O. Box 1244

Thulamahashe

1365

15 April 15

Circuit Manager

RE: A REQUEST FOR YOUR PERMISSION TO CONDUCT RESEARCH IN YOUR CIRCUIT

I hereby request permission to conduct a research study in your circuit. My name is Mkateko Victoria Mathebula (Persal number 81066139). I am currently studying for my Master's degree (MEd) with the University of Limpopo under the supervision of Prof M.J Themane in the School of Education. My research topic is: **Exploration of the causes of poor performance in Grade 12 in Secondary schools in Thulamahashe Circuit.**

Methods of data collection will be one-on-one interviews and observations. These will be done during working hours and will require the participation of both teachers and Heads of Departments who have been purposively sampled for research. The participants will be protected from any emotional or physical harm. Their participation will be voluntary and they are free to pull out will.

I believe that this research will be beneficial not only to the Department of Education as a whole. It will also be a source of reference for future scholars.

I await a favourable response from you

Thank you

Yours Sincerely

Mathebula M.V

Appendix D: A Letter to the Ethics Committee, University of Limpopo

Ezrom Primary School

P.O. Box 1244

Thulamahashe

1365

15 April 15

The Committee

RE: A REQUEST FOR YOUR PERMISSION TO CONDUCT RESEARCH UNDER THE SCHOOL OF EDUCATION

I hereby apply for permission to conduct a research study under the faculty of Education. My name is Mkateko Victoria Mathebula, a Masters student in your institute. (Student number 200209437) – under the supervision of Prof MJ Themane. My research topic reads as follows: **Exploration of the causes of poor performance in Grade 12 Mathematics in Secondary schools in Thulamahashe Circuit**

My research study will involve participants who will be sampled from Thulamahashe town in Mpumalanga Province. The researcher will abide by the Ethical norms enforced by the University of Limpopo. All participants' identification will be protected and will not be exposed to any shame, or physical or emotional harm. Their participation in this study will be totally voluntary and they can pull out at will

I hope the committee finds this request in order

Thank you

Yours Sincerely

Mathebula M.V

_____ _____

Student Prof MJ Themane

Appendix E: A letter to the Principals

Ezrom Primary School

P. O Box 1244

Thulamahashe 1365

15 April 15

The Principal

RE: A REQUEST FOR YOUR PERMISSION TO CONDUCT RESEARCH IN YOUR SCHOOL

I hereby apply for permission to conduct a research study in your school. I am a teacher at the above –mentioned school and am currently studying for a Masters Degree in Curriculum Studies with the University of Limpopo. I'm under the supervision of Prof M.J Themane (School of Education). My research topic reads as follows: **Exploration of the causes of poor performance in Grade 12 Mathematics in Secondary School in Thulamahashe Circuit**

I would like to sample participants from your school for my research. My research study will involve two mathematics teachers (Grade 12) and five grade 12 leaners. I will conduct interviews and observations that will take place during contact time. The researcher will abide by the ethical norms enforced by the University of Limpopo. All participants' identification will be protected and they will not be exposed to any shame, or physical or emotional harm. The input of participants in this study will be voluntary and they can pull out at will

Please feel free to contact the Deputy Principal Mrs. S. Mgiba for any verification (079430 3768). I hope my application will be considered.

Thank you

Yours Sincerely

Mathebula M.V

_____ _____

Principal Prof MJ Themane

Appendix F: INTERVIEW SHEDULE TEACHERS

1. How many learners do you have in your class and what is the impact of that number?
2. Briefly explain the difficulties you face daily in the grade?

3. What difficulties do you encounter in teaching mathematics?
4. Which teaching method is most effective and why?
5. How do you encourage learners to do their homework and what measures do you take towards those who do not?
6. Approximately how many learners struggle with mathematics in your classroom?
7. What interventions have been done with regards to the difficulties you meet?
8. What support do you get from the government and curriculum advisors?
9. What do you think can be done to enhance the pass rate in this grade?

Appendix G: OBSERVING SCHEDULES- CLASSROOM

1. Observing how the number of learners in the classroom impact on the teacher's creativity and the motivation of learners.
2. Observing how sitting arrangement in class the class are conducive for an effective lesson.
3. Observing teaching resources used and whether they are sufficient and effective for learning and teacher.
4. Observing the method of teaching in class and analysis whether it is well orchestrated to bring about positive results.
5. Observing the participation of learners as driven by the teacher's efforts.
6. Observing the duration that the teacher afford the learners to complete a certain task/activity.
7. Observing the relationship between the teacher and learners.
8. Observing the teacher sensibility toward the use of language in the classroom.
9. Observing how the classroom environment is utilized to enhance teaching and learning process.
10. Observing the records of struggling learners and their areas of difficulties.

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 3935, Fax: (015) 268 2306, Email: anastasia.ngobe@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE

ETHICS CLEARANCE CERTIFICATE

MEETING: **12 August 2020**

PROJECT NUMBER: **TREC/159/2020: PG**

PROJECT:

Title:	Exploration of causes of poor performance in Grade 12 Mathema Thulamahashe Circuit
Researcher:	MV Mathebula
Supervisor:	Prof MJ Themane
Co-Supervisor/s:	Prof K Chuene
School:	Education
Degree:	Master of Education in Curriculum Studies

PROF P MASOKO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

Note:

i) **This Ethics Clearance Certificate will be valid for one (1) year, as from the abovementioned date. Application for annual renewal (or annual review) need to be received by TREC one month before lapse of this period.**

ii) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee, together with the Application f Amendment form.**