

**GRADE 12 LEARNERS' PERFORMANCE IN MATHEMATICS: A CASE OF TWO
SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST
DISTRICT, LIMPOPO PROVINCE.**

by

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DECLARATION

I, **NALEDZANI MARGARET RAMABULANA**, declare that:

“GRADE 12 LEARNERS’ PERFORMANCE IN MATHEMATICS: A CASE OF TWO SECONDARY SCHOOLS IN OF NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT, LIMPOPO PROVINCE”

...is my work and has not been previously submitted in any form whatsoever, by myself or anyone else, to this University or any other educational institution for any degree or examination purposes. All sources that were used or quoted have been indicated and duly acknowledged using complete references.

Ramabulana N.M

23/01/2023

.....
RAMABULANA N.M

.....
DATE

DEDICATION

- Firstly, I dedicate this dissertation to my husband Ramabulana A.A whose efforts nurtured me to such an extent that I can achieve higher goals.
- Secondly, I dedicate this study to my sister's husband Pastor Nemaungani Isaac who passed on last year (2021), he was a comforter to my strengthless journey.
- Thirdly, my dedication goes to my daughters: Tshifhiwa, Lufuno, Thendo, and Phuluso for their love, support, and understanding.
- Finally, I dedicate it to Pastor Maake N.S who encouraged me when I faced those bleak moments and wanted to quit.

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ABSTRACT

The National Senior Certificate Examination results for Mathematics have recently declined, particularly in the Province of Limpopo. The purpose of this study is to investigate factors that contribute to Grade 12 learners' performance in secondary schools in Nzhelele West Circuit. The study adopted a qualitative research design to unearth participants' experiences regarding the topic under investigation. The populations of the study were the learners, educators, departmental heads, and principals of two secondary schools in Nzhelele West Circuit. The sample size of twenty-eight participants was purposively selected from two secondary schools. The unstructured questions were used to collect data from the participants in which interviews (individual and focus-group) would be conducted. Collected data from interviews were analysed through themes and coding.

Key concepts: Cognitive Development, Constructivism, Learners' Performance, Poor Performance and Social Development.

LIST OF ACRONYMS

CAPS	:	Curriculum and Assessment Policy Statement
CSEE	:	Certificate of Secondary Education Examination
DoBE	:	Department of Basic Education
DoE	:	Department of Education
E	:	Educator
FET	:	Further Education and Training
HL Effect	:	Heyneman – Loxley Effect
HoDs	:	Heads of Department
IT	:	Information Technology
L	:	Learner
LCS	:	Large Class Size
MCO	:	More Competent Others
MKO	:	More Knowledgeable Others
NCS	:	National Curriculum Statement
NCS	:	Normal Class Size
OBE	:	Outcome-Based Education
OCS	:	Overcrowded class
P	:	Principal
RNCS	:	Revised National Curriculum Statement
SES	:	Socio-economic Status
TIMSS	:	Trends in International Mathematics and Science Study
WHO	:	World Health Organisation
ZPD	:	Zone of Proximal Development

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CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 INTRODUCTORY BACKGROUND

Mathematics is seen globally as the foundation of technological and scientific knowledge that is critical in the socio-economic development of any country. In recognition of the value of Mathematics, the Department of Basic Education in the Republic of South Africa has made Mathematics to be offered both in primary and secondary schools. Despite the vital role that Mathematics plays in our education system, there has been poor performance in the subject at a national level. Results from the Department of Education in South Africa have shown that learners' performance in Mathematics has been steadily going down in many schools (DoE, 2012a). The 4th Industrial Revolution is fast approaching and will need learners who should have done Mathematics. Various tertiary institutions require Mathematics as a prerequisite for admission and registration in different departments e.g., Actuarial Sciences, Nuclear Sciences, Accountancy, and many more. Some learners view Mathematics as a monster hence they generally score low marks. On the other hand, some are optimistic and see Mathematics as a ladder to a bright future. Statistically, Vhembe District is one of the districts that produced good results in the whole of Limpopo Province. However, these results are often affected by the poor performance of Grade 12 learners, particularly in Mathematics. In 2017 the circuit in which this study will take place obtained 51 percent in Mathematics at the end of the year results. From 2019 learners' results were ranging from 35,5 percent to 39,2 percent in 2021, except in 2020 when the learners' achieved 40,5 percent what happened was that the results were showing no sign of improvement. From the preceding data discussion presented, is evident that indeed learners' performance in Mathematics needs to be investigated. Against this backdrop, this study wants to explore some of the factors that contribute to Grade 12 learners' poor performance in Mathematics with special

reference to Nzhelele West Circuit, Vhembe West District of the Limpopo Province, South Africa.

1.2 PROBLEM STATEMENT

The former MEC of Education in Limpopo Province, Edgar Mushwana, on the occasion of 2000, Grade 12 results announcement stated that poor performance is caused by ill-disciplined teachers who bunk classes to attend to their personal engagement. Mushwana argued that teachers establish sexual relationships with learners, and this contributes negatively to the academic performance of learners (DoE, 2000). Mushwana states that in most schools, educators display a negative role such as late coming, absenteeism, and substance abuse. He further stated that some of the educators would go to the class, without having prepared for the lessons and fail to report their periods. These practices lead to learners' poor performance.

In July 2009, the minister of Basic Education appointed a panel of experts to establish the problems and challenges experienced in implementing the National Curriculum Statement (NCS). In 2011, the NCS was reviewed again, amendments were made, and the amended NCS was named Curriculum and Assessment Policy Statement (CAPS) (Department of Basic Education, 2009; 2011b). Change involves much more than just implementing a new policy. Continuous change in curricula affects the lives, relationships, and working patterns of teachers and the educational experiences of the learners. The amendments were affected to deal with the four major concerns regarding the NCS, which were highlighted by a task team in the report to the Minister of Education (Department of Basic Education, 2009). These four issues were about complaints pertaining to the implementation of the NCS, teachers that were overburdened with administrative issues, varied interpretations of the requirements of the curriculum and the low performance of learners.

The recently introduced Curriculum and Assessment Policy Statement (CAPS) of FET Phase is said to be bringing about sweeping and widespread changes in education, yet, its implementation is not in any way improving the pass rate in Mathematics Grade 12 (DoE, 2011). This study grew out of a concern by parents and other stakeholders that South African Grade 12 learners' results are not improving, particularly in Mathematics, especially when compared with other countries around the world. If learners are not doing well in Mathematics, chances are that they cannot become medical doctors, engineers, scientists, land surveyors, actuaries, etc. Many high school graduates who enter higher education institutions with gaps in their mathematical knowledge often struggle to cope with mathematically related subjects at the tertiary level. Despite noticeable unsatisfactory performance in Grade 12 Mathematics, not much has been done to address this problem. It is, therefore, the purpose of this research to investigate factors that contribute to grade 12 learners' poor performance in Mathematics of Nzhelele West Circuit, Vhembe West District, Limpopo Province.

1.3 AIM OR PURPOSE OF THE STUDY

The main purpose of this study is to investigate factors that contribute to Grade 12 learners' performance in Mathematics of Nzhelele West Circuit, Vhembe West District, Limpopo Province.

1.4 RESEARCH OBJECTIVES

The objectives of this study are:

- To identify factors that contribute to Grade 12 learners' poor performance in Mathematics.
- To suggest strategies that can be used to improve Grade 12 learners' performance in Mathematics.

1.5 RESEARCH QUESTIONS

The study was underpinned by the following main research questions:

- What factors are responsible for Grade 12 learners' performance in Mathematics in selected schools in Limpopo Province?
- What measures could be put in place to improve Grade 12 learners' performance in Mathematics in these schools?

Sub-questions

- What is the attitude of educators and learners towards Mathematics?
- How the teaching of Mathematics is generally conducted in schools?
- How available are teaching and learning materials and the prescribed texts for mathematics?

1.6 PRELIMINARY LITERATURE REVIEW

Several studies have been conducted regarding learners' poor performance. Ramaala (2009) conducted a qualitative study and the findings indicated that poor performance of Grade 12 learners is caused by parents' low levels of education, high unemployment rate, English as the medium of instruction, lack of facilities, implementation of the curriculum, heavy workload of educators, as well as overcrowded classes. Mbugua's (2012) quantitative study showed that factors contributing to poor performance include among others the following- inadequate teaching and learning materials, students' parents' education, learners' parents' income, methods of teaching Mathematics and lack of learner motivation. Mosibudi (2012) investigated factors affecting the academic performance of Grade 12 learners using a qualitative approach. His research identified absenteeism, lack of parental involvement, low commitment of educators, poor management of schools and inappropriate educators training as the leading factors. Dhurumraj (2013) conducted a study on learners' poor performance in Mathematics in secondary schools using mixed research methods. The results of his study revealed some

factors that contribute to Grade 12 learners' poor performance. For example, poor performance was found to be exacerbated by factors such as - a lack of resources, language of teaching and learning, learners' socioeconomic status, parental involvement, large classes, and the curriculum. Both Rammala (2009) and Dhurumraj (2013) had a similar view concerning large classes, English and learners' socio-economic status as factors that contribute to poor performance in mathematics. Another study conducted by King'aru's (2014) using a mixed research method identified - poor teaching methodology, and negative attitudes towards Mathematics among learners and educators as some of the factors contributing to poor performance of Grade 12 learners.

Asikhia (2010), Edukugho (2010), Davies and Hersh (2012) pointed out strategies to improve the performance of learners in Mathematics. Asikhia (2010) conducted a study in which he looked at how educators can improve if there is adequate provision of instructional materials, libraries, and other physical facilities. In addition, the study also recommended that the situation can be improved by developing a good rapport with parents, and head teachers and by reducing students' teachers' ratio to a manageable size.

In his qualitative study, Edukugho (2010) claimed that the mathematics performance of learners can be improved by the provision of proper staffing, adequate teaching and learning materials, changes in the curriculum, and improvement in the motivation and attitude of learners and educators. Davies and Hersh (2012) believed that ways of improving the performance of learners in Mathematics include the creation of a positive attitude towards Mathematics, administering of more examinations and quizzes, provision of adequate teaching and learning materials, increasing motivation of learners and teachers, completion of the syllabus in time, provision of adequately trained Mathematics teachers, using a variety of teaching methods as well as monitoring of Mathematics' lessons by the school administration. Based on the literature review, it is evident that there is poor performance in Mathematics, particularly in secondary schools. It is, therefore, hoped that through this study, more knowledge will be shared that will ultimately lead to

the improvement of Grade 12 learners' performance in Mathematics, particularly in the Nzhelele West Circuit.

1.7 THEORETICAL FRAMEWORK

The study used constructivism as its theoretical framework. Constructivism is a paradigm shift from teacher-dominated learning. It is a contextualized and active process of constructing knowledge instead of just acquiring it. Constructivism is a view that emphasizes the active role of the learner in building understanding and making meaning of information (Kanselaar, De Jong, Andriessen & Goodyear, 2000). Maphalala (2016:44) supported Kanselaar et al. 's (2000) definition when he describes constructivism as a notion based on the belief that during the instructional process learners construct their knowledge through their interpretation of the world.

Constructivism as a paradigm contends that learning is a constructive process whereby learners use what they have from their social environment and infuse it with that which they have as individuals and as groups, to produce new knowledge (Maphalala, 2016). The learner is considered the constructor of information (Cooper, 1993:12). During the teaching and learning process, the new information is linked to prior knowledge. This shows that mental representations are subjective (Bentley, Ebert & Ebert, 2007). This paradigm holds that the conceptions of learners concerning knowledge are derived from a meaning-making search. This is a situation in which learners engage in a process of constructing individual interpretations of that which they would have experienced (Copper, 1993:12). Piaget (1992) and Vygotsky (1978) are two prominent figures in the development of the theory of constructivism. They have the same view that the classroom must be constructivist but differ concerning how construction must be conducted in a classroom context. There are different types of constructivism, namely, cognitive, social, and radical constructivism. This study will discuss cognitive and social constructivism.

1.7.1 Cognitive Constructivism Learning

The cognitive learning theory by Piaget's (1968) offers a solid framework for understanding how children do things and think at different levels of their development milestones. Piaget (1968) postulated that children progress through four stages of development that are well-sequenced. At each stage, the child is capable of learning only certain cognitive tasks. A child goes through a series of maturational stages and the child's ability to think and learn changes with age (Maphalala, 2016:29).

Piaget (1968) claimed that learning is a dynamic process that comprises stages of adaptation to the reality that is successive. This is the process where learners actively construct knowledge (Piaget, 1968). Piaget's cognitive theory advocates that learning takes place through discovery. The key learning concepts are assimilation, accommodation, equilibrium, and schemata. Assimilation takes place when learners perceive new objects or events concerning the existing operations or schemes. Accommodation is a cognitive moment when new information or experiences, because of the learning process, must be fitted into the existing mental structure. Equilibration occurs when learners are satisfied with their mode of thought which comes through assimilation and accommodation. They scheme mental representations of an associated set of perceptions, ideas and actions (Maphalala, 2016:45). The individual needs to modify or reorganize his or her schemata via adaptation to form a comfortable state of equilibrium in the cognitive structure.

1.7.2 Social Constructivism Learning Theory

One of the fathers of social constructivism is Levy Vygotsky (1978). According to Vygotsky (1978), learning is a social process. This process involves cultural symbols and signs which help to develop concepts as children construct new ideas. The interactions and socialization of children with other individuals in the environment assist in total human development, particularly cognitive development. Vygotsky (1978) rejected Piaget's

(1970) assumption which indicates that it is feasible to distinguish learning from its social context. Vygotsky (1978) states that “every function in the child’s cultural development appears twice” first, on the social event (between people) and later the individual level (inside the child) (Maphalala, 2016:49). Vygotsky (1978) believes that learning is a collaborative activity. Learners are cognitively developed in the context of socialization and education. On the topic of stages of development, Piaget (1970) believes that development precedes learning, while Vygotsky believed the opposite. On the development of speech, Piaget (1968) argues that the egocentric speech of children goes away with maturity when it is transferred into social speech. On the contrary, for Vygotsky (1978) the child’s mind is inherently social in nature and so speech moves from communicative social to inner egocentric. Therefore, since the development of thought follows that of speech, Vygotsky (1978) claims that thought develops from society to the individual.

According to Vygotsky (1978), emphasis is on the role of language and culture in cognitive development and how individuals perceive the world around them. He reiterated that these offer frameworks through which people communicate, understand and experience reality. Fresh connections are established through scaffolding, interaction and mediation. Language in the culture of children can be used to facilitate cognition and learning (Feldman, 2010; Vygotsky, 1978). Children construct or acquire most of the content of their knowledge. The culture that surrounds children provides them with the means of thinking. This is what Vygotsky (1978) calls tools of adaption (Durajaiye, 2006). He proposed that cultural symbols and signs were critical in initiating progress toward complex thinking. In this regard, Vygotsky (1978) proposed that for learners to develop the related tools of reasoning, individuals in society must apply the symbol system of their culture. Good reasoning is essential as the learner tries to assimilate and accommodate new knowledge. Symbols serve as carriers of both meaning and social-cultural patterns (Donald et al., 2010). These symbols include written language, human speech, and algebraic and Mathematical symbols. According to Vygotsky (1978), the role of signs and symbols is to assist individuals to master complex functions that are not fully developed in the mind.

Scaffolding helps to extend understanding of concepts (Vygotsky, 1978). With scaffolding, learners can develop and progress in understanding. Therefore, learners will complete successfully the tasks that they would not have been able to complete independently (Brooks, 2008; Cole, Cole & Lightfoot, 2009; Donald et al., 2010). Scaffolding process requires recasting, elaboration and repetition of the concepts being taught (Maphalala, 2016). Learners are assisted by the tutor to solve problems that are beyond their level of cognition (Papalia et al., 2004). In addition, scaffolding can be explained as a process through which a competent peer or teacher gives aid to the learner. Atherton (2011) and Brooks (2008) perceive scaffolding as how an adult guides the learning of a child through focused questions and interaction that is positive. The more competent others can provide scaffolding that eventually provides the learner with a better understanding of the task, process and concept. This process occurs within the Zone of Proximal Development (ZPD). ZPD resembles the distance between what learners know and what they can achieve with some scaffolding from more competent others (Vygotsky, 1978).

The performance of our learners in Mathematics will be improved when teachers provide a constructivist learning environment in which the teacher acts as a learning facilitator. These constructivist learning environments provide multiple representations of reality, emphasize knowledge construction instead of knowledge reproduction, encourage thoughtful reflection on experience and support collaborative construction of knowledge through social negotiation (Jonassen, 1994).

1.8 DEFINITIONS OF OPERATIONAL CONCEPTS

The researcher discussed the terms that are employed in this study.

1.8.1 Cognitive Development

According to Piaget (1968) (cited by Maphalala, 2016) cognitive development refers to knowledge that can be constructed throughout the four stages that are the sensory-motor, preoperational, concrete, and formal operation stages.

1.8.2 Constructivism

Constructivism is a notion based on the belief that during the teaching and learning process learners construct their own knowledge and meaning process through active learning and mental processes of development (Maphalala, 2016).

1.8.3 Learner Performance

Learner performance describes the ability of the learner to demonstrate understanding. The learner has to show that learning has taken place through the performance of an activity or task (Woolfolk, 2007:562-563).

1.8.4 Poor Performance

Poor performance denotes learners that obtain marks that are below 30% in the National Senior Certificate Examination. This means that the learner will have failed the subject (Department of Education, 2003).

1.8.5 Social Development

According to Vygotsky (1978), social development is a particular view of knowledge construction, where learning is constructed through interactions with others that take place within a specific socio-cultural context.

1.9 STUDY PARADIGM

This study employed an interpretive paradigm trying to interpret and understand the participants' responses. In the interpretive paradigm, the researcher used different ways to find out about and understand reality or the social world. This is reality as a social construction that individuals experience and construct. To interpret, understand and represent perceptions of this reality, the researcher must be positioned in it as in a natural setting, and to use a variety of methods to uncover it in the least disruptive way. The objective is to develop a shared understanding of this reality that is together created by the researcher and participants. The researcher made sense of the meanings that participants attributed to their world. It is called the interpretive paradigm because it argues that facts do not make sense on their own but need to be interpreted in the context of people's lives.

1.10 RESEARCH DESIGN AND METHODOLOGY

There are various research designs which include narrative, phenomenology, ethnography, case study and grounded theory (Creswell and Creswell, 2018).

1.10.1 Research Design

Punch (2011: 62) is of the view that research design is all the issues involved in planning and the results. According to Maree (2014: 70) a research design is a plan that specifies the selection of participants, the data gathering techniques and the data analysis of research study.

This study employed qualitative narrative design to investigate Grade 12 learners' performance in mathematics. The qualitative narrative design is used because it involves the description of the lives of individuals and collects individuals' stories of their experiences.

1.10.2 Research Methodology

The study used a narrative qualitative research approach in which individual and focus-group interviews were employed as data collection strategies. Unstructured face-to-face individual interviews were used in this study because they allow the researcher to talk to one person only and the researcher had more time to discuss the topic in detail. The rationale for setting the use of individual and focus-group interviews was that the researcher wants to understand participants' experiences and the only way to get this information was through the word of mouth (interviews). Lewis (1995) talked about putting individuals in a nurturing environment so that they disclosed their own views while at the same time being influenced by their interactions with others.

Participants shared what they knew and had learned and added a dimension to the understanding of the situation that questionnaires data did not reveal. Interview best suits this study as individuals revealed their feelings, intentions, meanings, sub-contexts, or thoughts on what affects learners' performance in Mathematics. Furthermore, the researcher used a protocol to record data and a video recorder to capture the group discussion as well as the non-verbal elements that may slip her attention.

1.11 SAMPLING

The researcher addressed the following aspects: population, sample size and sampling procedure.

1.11.1 Population

The population for this study were principals, mathematics educators who were responsible for teaching mathematics, Heads of Department who supervise, control and manage departments of mathematics as well as grade 12 learners who had registered for

mathematics. The population consists of male and female learners, teachers, departmental heads and principals from government secondary schools of Nzhelele West Circuit. The learners were between the age of 16-20 and were from different economic backgrounds. Educators, departmental heads and principals were between the ages of 25-55, different in number of years teaching mathematics and level of qualification.

1.11.2 Sample Size and Sampling Procedure

Participants were drawn from one underperforming government and one performing secondary schools from Nzhelele West Circuit. These included one Mathematics educator currently teaching the subject, one Mathematics departmental head and one principal from each school. Eight learners from each of the two selected secondary schools, translating to sixteen learners in total were used in this study. Overall, there were twenty-two participants. The participants of this study were purposefully selected from two secondary schools in the Nzhelele West Circuit of Vhembe District in Limpopo Province. The researcher selected participants who have ideas regarding learners' performance in Mathematics. Furthermore, the researcher adopted inclusion and exclusion criteria in constituting the sample. For example, only Grade 12 educators who are currently teaching Mathematics took part in the study. Again, the study included Grade 12 learners doing Mathematics.

1.12 DATA ANALYSIS

Data collected through individual and focus-group interviews was analysed by using thematic data analysis. The framework was chosen because it had a step-by-step procedure that understand participants' experiences regarding the topic being investigated. The researcher's first analysis was on data collected from the individual interviews conducted with educators, departmental heads and school principals. The second analysis was done on data from the focus-group discussions involving the Grade

12 Mathematics learners. The analysis of data involved three steps, indexing, management and interpretation. The researcher read the transcript to familiarise with the data and allocate codes to each piece of data, e.g., on the margins. The researcher collected and brought together extracts with the same assigned code. To execute the management of data, the researcher would manually cut up individual responses and cluster similar extracts, opt for a word processor to cut and paste extracts, or use the software designed for qualitative data analysis, e.g., Atlas. Lastly, the researcher turned the statements into themes to be reported during the write-up of the findings.

1.13 STUDY TRUSTWORTHINESS

Guba and Lincoln (2005) claimed that the strategy to ensure the trustworthiness of qualitative research findings covered dependability, credibility, confirmability and transferability. To achieve rigor in this research study, the following criteria were employed:

1.13.1 Credibility

Credibility concerns the truthfulness of the data collected. In this view, it describes the degree to which findings of a study present the meanings attached to the experiences of the participants in research (Lincoln & Guba, 1985:15). To achieve credibility in this study, the researcher employed member checking. This included going back to the participants to obtain the much-needed feedback on the data, interpretations and conclusions drawn. Additionally, the researcher had debriefing sessions regularly with peer reviewers to discuss and consider opinions that could be misinterpreted when using phone calls and e-mails (Lincoln & Guba, 1985). In this study, the researcher also used the services of experienced researchers to establish the relevance of the interview data collected.

1.13.2 Transferability

Transferability refers to the generalisability of the study and whether there is sufficient information about the study to allow the reader to establish a degree of similarity between it and other cases to which the findings might be transferred (Schwartz, 2001). In this study, transferability was achieved by keeping detailed notes and analysis of data collected from interviews. Additionally, an analysis of any emerging theories relating to learning was also kept.

1.13.3 Dependability

Dependability pertains to the rigor associated with the process of inquiry (Schwartz, 2001). Lincoln and Guba (1985) advocated the use of an audit trail as a means of ensuring dependability. An audit trail is a technique whereby the reader is taken through the process of the study, step by step so that he/she can determine whether the process and conclusions of the study are trustworthy. In this study, the reasons and processes taken in collecting and analysing data were made explicit. This enabled the reader to understand the path taken by the researcher and to decide if those actions taken were dependable.

1.13.4 Confirmability

This is the degree to which the data and interpretations of the study are based firmly on evidence collected rather than the personal construction of the researcher (Lincoln & Guba, 1985). To satisfy this criterion, Lincoln and Guba (1985) specified the use of an audit trail, as described above. To assist in ensuring confirmability, the researcher kept in mind the following questions while analysing the data: Are the findings grounded in data? Are the data-derived inferences logical? Do the categories have explanatory power? And do they fit the data?

1.14 SIGNIFICANCE OF THE STUDY

It is anticipated that the information generated from this study will enable the Department of Basic Education (DoBE) and other stakeholders to think about providing support structures, workshops and training that will equip Mathematics teachers with the skills they require to overcome their challenges. Furthermore, the study will provide important information on the challenges that educators and learners encountered regarding teaching and learning Mathematics in Grade 12. The findings of the study will therefore be of great use to parents, teachers, learners and school administrators. Improved performance will give learners the chance to study Mathematics-related courses in institutions of higher education.

1.15 DELIMITATIONS OF THE STUDY

The study was conducted in two secondary schools that were selected in the Nzhelele West Circuit. Even though this problem is experienced nationwide, the research will be confined to the Nzhelele West Circuit in Limpopo Province, South Africa. Since the study was qualitative in nature, the results obtained from the data collected could not be generalized.

1.16 ETHICAL CONSIDERATIONS

The study considered the following ethical considerations:

1.16.1 Informed Consent

Before collecting data, the researcher negotiated with identified participants and find out if they are willing to participate in the study. When a researcher negotiates with the

identified participants, he or she is said to be seeking informed consent. When a researcher has identified children under the age of eighteen as participants in a research study, the researcher got permission from the children's parents or guardians. Participants were allowed to exercise their free will and power of choice, without any undue pressure.

1.16.2 Beneficence (Maximising Benefits)

The researcher protected the identity of the participants, protected them from harm or exposure, honoured their integrity, and preserved the confidentiality of records and data generated by the research.

The researcher acted in ways that benefit people, or at least in ways that minimize harm to others. He or she brought acts of empathy, mercy, kindness, care, and charity and is suggestive of altruism, love, humanity and promoting the good of others (Halai, 2006). The researcher also protected and defended the rights of others, prevented harm from occurring to others, rescued people in danger and helped people with disabilities.

1.16.3 Non-maleficence (Minimising Harm)

In addressing this principle, the researcher will have a high level of sensitivity about what constitutes 'harm'. Harm in the context of research could be physical, psychological or emotional, social or economic in nature. For example, a researcher will have to understand that if she enquires about intimate details of the participants' lives, she will have to be prepared to deal with opening old wounds or ongoing issues. The researcher would not pressure the guardians or caregivers to grant permission to work with the children under the pretence that the researcher or the project might help with their welfare. The researcher guarded against promoting relationships of dependency with participants.

1.16.4 Respect for Anonymity and Confidentiality

Anonymity refers to the researcher's undertaking to ensure that the participants' identities throughout the research are protected (Okeke & Van Wyk, 2017:307). Participants' identities might not include their names, the names of the institution in which they work, their addresses, their relatives' names, their nicknames, etc. Participants' identities were protected throughout the research process and after. This means that from the day the research idea is conceived, through to the publication of results, participant anonymity is thought about and maintained. Anonymity assures research participants that they are protected by remaining unidentifiable. Anonymity will be achieved, for example, by assigning pseudonyms to participants. The researcher checked with the respondents if they were happy with the pseudonyms, as sometimes the pseudonyms assigned may coincidentally be the respondents' nicknames or a brother/sister's name. This may be the reason why some researchers simply assign numbers or letters of the alphabet to respondents e.g., Respondents 1, 2; or Educator A, B. Anonymity also includes the protection of the research site where research is conducted. The researcher considered that both the name of the school and the participants will remain unidentifiable. Data collected during research and after was, therefore, kept confidential. The research was kept confidential, and they were secured in a locked place and will not be shared with anyone without written permission from participants.

1.16.5 Respect for Privacy

The principle of respect for privacy has been identified as the point at which research goals and the right to privacy may come into conflict. This meant that even if people had agreed to participate in a research project, consent will also be negotiated on the amount of privacy to be maintained. If this is done, it could result in an individual's rights being violated. Private information, such as beliefs, attitudes, opinions and records, will not be shared without the participant's knowledge or consent (Beauchamp & Childres, 2001).

1.16.6 Sensitivity of Data

The researcher understood that if he or she enquired about intimate details of the participants' lives he or she will be prepared to deal with opening old wounds or perhaps pain. The researcher also exercised sensitivity about information or data he or she collected during research. For example, data concerning sexual preferences represents information that many people would want to keep private. Such information was viewed as highly sensitive. Therefore, the researcher protected the participants' privacy. The researcher respected situational sensitive data such as age, weight, personal income, marital status, state of health, medical history, and other details that participants may regard as private. The researcher continuously negotiated with participants to protect their privacy.

1.16.7 Setting in where the Research Takes Place

Settings, like participants' homes were construed as being private, so the researcher negotiated with the participants' where the research was conducted. The researcher also negotiated consent from participants, if they were going to conduct research in private spaces. Research, therefore, considered the setting in which data were to be collected if undue invasion of privacy was to be avoided.

1.17 OUTLINE OF THE STUDY

The research is outlined in the following sequence:

CHAPTER ONE: BACKGROUND OF STUDY

This chapter provides the background information to the study. This will include the purpose statement, research objectives and research methodology. The methodology will be comprised of the population of the study. Sampling techniques, the sample, criteria for inclusion and exclusion and the data collection instruments. The chapter also discussed the delimitation of the study, ethical considerations, and definitions of operational concepts.

CHAPTER TWO: LITERATURE REVIEW

This chapter provided a literature review based on the available literature from other scholars pertaining to the topic under investigation. The chapter also provides a detailed discussion regarding the theoretical framework to be employed in this research.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

This chapter discussed the design and methodology to be used in the study. This will comprise of the research design, population, sampling techniques and sample size and description of data. The chapter will also discuss data collection instruments and procedures, limitations of the study and delimitations, ethical considerations and procedures for data analysis. It also included ethical considerations which governed the research process.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATIONS

This chapter presented the results of the data analysis and interpretations.

CHAPTER FIVE: FINDINGS AND RECOMMENDATIONS

This chapter will have the findings of the study synthesized. It will provide conclusions of the study. Based on the review of the literature, the research findings and recommendations will be made to various implicated stakeholders.

1.18 CONCLUSION

This chapter provided the study background, problem statement, study objectives, research questions, research design and methodology, literature review, theoretical framework, study's trustworthiness and delimitations of the study, ethical consideration, definitions of operational concepts and terms, organization of the study and a conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter One discussed the background to the problem, the problem statement, and the objectives of the study. The research questions, limitations and delimitations of the study were also presented. Chapter Two presents a review of the factors contributing to learners' poor performance in Mathematics. This chapter is divided into two sections. Section 1 discusses the theoretical framework that underpins the study. The second section discusses the factors influencing learners' performance in Mathematics. Literature review is described as a research process of examining and synthesising information by focussing on documented research outcomes (Boote and Beile, 2005). Denney and Tewksbury (2013) define literature review as a compressive review of previous research that has investigated a particular phenomenon. There are four types of literature review. Firstly, narrative or traditional which is critique and summarise the body of s literature. Secondly, systematic literature which is a comprehensive and details the timeframe within which the literature was selected. Thirdly, conceptual literature review which groups' articles according to concepts, categories or themes. Lastly, theoretical literature review which focuses on a pool of theory that has accumulated in regard to an issue, concept, phenomena and theory. The literature review used in this study was derived from the following themes: learners' attitude, teachers' attitude, methods of teaching Mathematics, socio-economic factors, teachers' content knowledge, teaching and learning resources, learners' attendance rate and overcrowded classrooms. To get relevant information related to the research topic, the researcher used the following search indices or data basis: Google Scholar, Ehsco Horst, Sage, Google, etc. Furthermore, the researcher also relied on journals, magazines, books, dissertations and theses. Next, the researcher discusses the theoretical framework underpinning the study.

2.2 THEORETICAL FRAMEWORK UNDERPINNING THE STUDY

This study is premised within a constructivist learning theory. Maphalala (2016) defines constructivism as a theory founded on the understanding that learners construct their knowledge and meaning through active learning and the mental process of development. In constructivism, learners are more active in creating and building knowledge. This knowledge is based on their experiences, interpretations, and cultural factors. A learner is not a blank slate to be filled with information as is alleged in behaviourism but a co-creator of knowledge as he or she takes initiative for his or her own learning. Therefore, learning is more effective in a constructivist classroom because a learner is actively engaged in the learner-centred learning process. In such a classroom learners' experiences are accommodated within the learning process and divergent thinking is encouraged. In this context, the educator encourages critical thinking and creates an enabling atmosphere for learners to exchange ideas among themselves.

Constructivism is recognized by this study because it emphasizes the interaction of human beings and situations in the acquisition and refinement of skills and knowledge. The interaction can identify learning gaps and has the potential to provide relevant interaction strategies. The theory is relevant to this study because it offers room for cooperative and collaborative learning. It prepares learners for problem-solving in complex environments. The contributions of constructivism theory to teaching and learning help educators understand how learners interpret knowledge. It assists in guiding them to refine their understanding and interpretation and to improve their learned knowledge quality (Mafenya, 2016). Therefore, the researcher sees this constructivist framework as an efficient instructional approach for motivating learners to knowledge construction. The researcher will discuss two types of constructivism that are closely related to learning and teaching. These two are cognitive and social constructivism.

2.2.1 Cognitive Constructivism

The cognitive learning theory by Piaget's (1968) offers a solid framework to understand the way in which children do things and think at different levels in their development. This theory exposes to educators what children are generally interested in and capable doing of at different age groups. Piaget (1968) acknowledged that children progress through four sequenced stages of development:

- The initial one is the sensorimotor stage where children learn through their senses and movements by interacting with the physical environment.
- Secondly, the pre-operational stage is where children begin to think with symbols and learn to utilize them to represent the concrete world.
- Thirdly, concrete operations are when children start to think through relationships, perceive consequences of acts, group entities in a logical fashion, systematic and organize their thoughts.
- Lastly, the stage of formal operations in which children now can work from abstractions, theories, and logical relationships. A child passes through a series of developmental stages and therefore, the child's ability to think and learn changes with age.

Piaget (1968) suggested four concepts responsible for learning namely, assimilation, accommodation, scheme, and equilibration. According to Ganga (2013) and Maphalala (2016) accommodation occurs when new information or experiences have to be fitted into the existing mental structure whereas assimilation occurs when new objects or events are perceived by a child in terms of existing schemes. Schemes are knowledge construction blocks or the building blocks of thinking. Bhattacharya and Han (2009) confirm that when learners are satisfied with their modes of thought in the form of accommodation and assimilation, equilibration takes place. According to Piaget (1968) learning is constructed by either accommodation or assimilation and concludes that learning takes place through discovery.

The educator is expected to help the learner to construct new schemes which might help in the formulation of cognitive maps (Maphalala, 2016). Therefore, children will progressively develop in ways that will help them to organize and adapt to their environment. Cognitive learning theory is relevant to this study because it displays important principles that include: the sensitivity of the readiness of learners to learn, acceptance of individual differences, the construction of knowledge, and the discovery of new ideas (Piaget, 1970). Cognitive learning theory is useful to this study as it guides educators with an understanding of cognitive development and how learning occurs. Discovery learning helps learners in memory retention and boosts their confidence in the learning process. Furthermore, it encourages learners to be actively engaged, and flexible in reasoning and allows for self-regulation and creativity. It exposes learners to conducive learning environments in which they discover knowledge and insights. Again, this learning theory allows educators to match teaching strategies to the development level and to promote strategies to accommodate individual learning styles. In addition, the theory helps educators to view learners as unique individuals. Therefore, their learning experiences should be personalized and facilitate the development of their learning skills. Lastly, educators are provided with a systematic frame of reference for teaching learners at different levels of cognitive development.

2.2.2 Social Constructivism

Lev Vygotsky (1978) is known as one of the fathers of social constructivism. He believes that children construct new ideas through social learning where culture and symbols assist to develop concepts. Vygotsky (1978) rejected Piaget's (1970) assumption which indicates that it is feasible to isolate learning from its social setting. According to Vygotsky's (1978) view, socialization with other individuals in the environment and children's interactions help in cognitive development. In social constructivism learning theory, learning is contextualized and situated within the children's experiences and culture. Vygotsky (1978) believed that new connections are made through interaction, mediation, and scaffolding. He amplified the essence of language and culture in

cognitive development and proposed that these offer a framework to comprehend how learners communicate, experience, and understand reality. Ideally, children construct or acquire much of the content in their knowledge through culture. Again, Vygotsky focus was put on cultural signs and symbols in cognitive development. Donald, Lazarus, and Lolwana (2010) emphasized the role of human speech, written language, and algebraic and mathematics symbols in the construction of meaning and sociocultural patterns. Vygotsky's (1978) views showed that learning occurs within the Zone of Proximal Development (ZPD). The ZPD is described as the level at which learning takes place and it shows the distance between what learners know on their own and what they can achieve with some scaffolding from more competent others. Learners are provided with a better understanding of the task, process, or concept, through scaffolding by more competent others. More competent others could be a parent, guardian, peer, sibling, or computer equipment in the learning environment.

The social constructivism theory is helpful in this study because it emphasised the role of social interaction, more competent Others (MCO) or More Knowledgeable Others (MKO) as well as the Zone of Proximal Distance in the teaching and learning process. Social constructivists believe that knowledge is socially and culturally constructed (Vygotsky, 1978). Meaning is created by individuals during their interactions within their environment and with each other. According to Leask and Younie (2001), social constructivists perceive learning as a social process. He emphasizes the collaborative nature of learning where the emphasis is on cultural and social context. Vygotsky (1978) believed that meaningful learning occurs in the case where individuals are engaged in social activities. The constructivist model seems to be more popular than the transmission of data (knowledge) to learners. It is useful in the learning process because it prepares the learner more to be able to adapt to various learning situations. Grade 12 learners' performance in mathematics will be improved if educators employ both the positivist methods and constructivist models in the teaching and learning process.

2.3 FACTORS CONTRIBUTING TO LEARNERS' PERFORMANCE IN MATHEMATICS

Poor performance in Mathematics continues to be a challenge faced locally as well as internationally and it will continue to be a problem unless the causes are discovered. This section discusses factors that contribute to the poor performance of learners in Mathematics. The following factors are discussed in detail: learners' attitudes, teachers' attitudes, methods of teaching Mathematics, socio-economic factors, teacher's content knowledge, overcrowded classrooms, teaching and learning resources, school leadership, and former school background.

2.3.1 Learners' Attitude Towards Mathematics

Attitude is an important aspect of learning, and it can either hinder or enhance learning (Farooq & Sha, 2008). Schankel (2009) contends that attitudes toward Mathematics signify a like or dislike of the subject. Wilkins (1987) and Mokono (2004) conducted a study on attitudes toward Mathematics using a qualitative research approach. In their study, they revealed that a learner who is highly motivated to learn and sees its usefulness can make better progress than one who has a lower degree of aspiration, interest, and motivation. They concluded their study by indicating that the negative the attitude, the lower the performance of the learner. Soak (2005) carried out a study on the attitudes of secondary school learners toward Mathematics in the Democratic Republic of Congo using a quantitative research approach. The study found that the socio-economic background of the learner affected their attitudes toward learning Mathematics. The study further revealed that learners whose parents have a low socio-economic status display negative attitudes towards Mathematics and perform poorly unlike learners whose parents have high socioeconomic status.

Farooq and Shah (2008) observe that positive attitudes toward Mathematics achieve success, while negative attitudes normally result in depressed academic performance. Schenkel (2009) had a similar view as Farooq and Shah (2008) when he indicates that

there is a relationship between a positive attitude and better performance in Mathematics. However, the above study did not investigate the causes of the negative attitude in learners. Another study was conducted by Chaung (1998) and Hannukar (2002) in which they looked at the relationship between a learner's attitude and a learner's academic performance. In their conclusion, they found that there is a positive correlation between attitude and Mathematics achievements. The correlation showed that the more positive the attitude, the higher the level of achievement was in the learner. Hammauri (2004) conducted a qualitative study of learners' attitudes and academic performance. He used interviews to collect data. He was able to draw conclusions like Chaung (1998) and Hannukar (2002) confirming that the better a student's attitude towards Mathematics may be, the more successful and the higher performance level will be for that learner. Despite convincing evidence regarding a positive relationship between the two, Hean, Cradock, and O'Halloran (2009) suppose that attitudes seem not to have an effect on achievement in Mathematics. Their study didn't motivate why they don't see a relationship between learners' attitudes and Mathematics achievement. Stipek and Granlinski (1991) and Gill (1994) conducted a study on students' attitudes toward Mathematics achievement using a qualitative research approach. In their study, they revealed that girls have lower expectations in Maths than boys and that they do not have the mathematical ability.

When girls perform poorly in Maths, they attribute their poor performance to their inability to do Maths. Again, Gill (1994) indicates that high school girls have positive attitudes toward school but negative attitudes toward Mathematics. According to Swetman (1995) females' attitudes about Mathematics deteriorates as they get older. Firstly, they have a more positive attitude towards Mathematics than males, but they change their attitude when they reach higher grades. The study's findings indicated that across the entire secondary school, achievement showed casual predominance over attitude. Furthermore, Ma and Xu (2004) conducted a study to determine the causal ordering between attitudes toward Mathematics achievement.

2.3.2 Teacher's Attitudes towards Mathematics

Successfully teaching learners Mathematics depends strongly on the teachers' support and attitude (Skenkel, 2009). Among the factors that influence successful performance in Mathematics are teachers' attitudes and beliefs. If teachers' attitudes are positive toward Mathematics this can easily influence learners to love Mathematics as a school subject. Tabuk (2018) carried out a quantitative study using a descriptive approach to determine teachers' attitudes toward teaching Mathematics. The results revealed that teachers have an attitude that is positive toward teaching Mathematics. The study also found that gender and grade levels are not significant factors in attitude scores. The study did not show a relationship between the positive attitude of teachers and the performance of learners.

Authors such as Quinn (1997), Mataat and Zachar (2010), and Durandt and Jacobs (2013) confirm that the quality of teaching Mathematics and the nature of the attitudes of teachers have a pertinent influence on the achievement of learners and their disposition towards mathematics. The study revealed that the teacher's negative attitude leads to the poor performance of learners in Mathematics and vice versa.

Furthermore, the study shows the manipulative factors of positive attitude of teachers such as Mathematical skills, joy of solving Mathematical challenges, higher expectations about achieving in Mathematics, desire to learn more about Mathematics and to satisfy their functions as Mathematics teachers. The study confirms that there is a correlation between teachers' attitudes and learners' performance in Mathematics. Richardson (1996) and Thompson (1994) conducted a study on teachers' conception of (their beliefs, views, and preferences) mathematics teaching to instructional practice using a qualitative approach. The study's findings showed that teachers' beliefs, views, and preferences about Mathematics and teaching played a significant role in shaping their instructional behaviour. There is a strong reason to believe that Mathematics, teachers' conceptions (their beliefs, views, and preferences) about the subject matter and kits teaching play an

important role in affecting their effectiveness as the primary mediators between the subject and learners. The above study failed to indicate the negativity and positivity of teachers' attitudes toward the learners' performance in Mathematics.

2.3.3 Methods of Teaching Mathematics

The poor academic performance of the majority of learners in various subject areas is linked to the application of ineffective teaching methods by teachers to impart knowledge to learners (Hussain & Sultan, 2010). Akanmu, Abinde, and Fajemidagba's (2014) quasi-experimental study investigated teachers teaching strategies and learners' performance at secondary schools using simulation. The study found that the experimental group exposed to the simulation method of teaching performed significantly better than their counterparts in the control group. Though the male learners performed better than the female counterparts, results from this study have also shown that the simulation teaching strategy was beneficial to all ability levels irrespective of the academic standard of the members of such grouping, but, more relevant at improving weak learner academic performance.

Costello's (1991) qualitative research approach to methods of teaching and learner performance suggested that learners whose teachers use the lecture method perform poorly in Mathematics. Costello (1991) indicated that the lecture method technique is unproductive because learners become passive participants in the learning process. He added that discussion, project, and problem-solving methods create an environment that is enabling for learners and ensures that individual differences are cared of, thus learners perform better in their tasks.

Mwenda, Gitaari, Nyanga, Muthaa, and Reche (2013) conducted a qualitative study on factors that contribute to the poor performance of students in Mathematics in public secondary schools in Tharaka South District, Kenya. The results of their study revealed that from demonstration, discussion approach, lecture method, and presentation, the

lecture method is the most frequently used technique adopted by Mathematics teachers. The lecture method displays teacher-centred lessons, passive learners, and poor results (Grabinger & Dunlap, 1995). The researcher, therefore, suggests that Mathematics is a subject that requires an active learning strategy such as group discussion, problem-solving, and inquiry. The views and ideas of learners that are different may be developed through the use of this approach. The divergent and convergent skills of learners are shared with one another to realize effective learning and teaching.

Tababal and Kishssay (2011) engaged in a study using a quasi-experimental design on Ethiopian Grade 9 high school Natural Science students in Ambara National Regional State. The study was to compare the effect of student-centered against teacher-centered methods on improving students' Graphical Interpretation Skills and Conceptual understanding of kinematical motion. The study results showed that the student-centred method was more positively effective than the latter. Learners who were taught by the learner-centred method performed better than those taught by a teacher-centred method. The teacher-centred method is characterized by teachers' requiring little or no active learner involvement. Teachers are more dominant sources of information (Hake, 1998).

Ganyaupfi (2013) investigated the differential effectiveness of teaching methods on students' academic performance. The research design for the investigation was an experimental study. The population was undergraduate students from three fields of specialization. The data for the study was generated from students' academic test scores. Using the general linear model based on Anova methodology, the differential effectiveness of the three teaching strategies (teacher-student interactive, student-centred, teacher-centred, and teacher-centred) on students' academic achievement was investigated. The study results demonstrate that the interactive method for teachers and learners was the most effective of the teaching methods, followed by the student-centred method while the teacher-centred was the least effective teaching method. Research evidence indicates that teacher-student interactive and student-centred teaching methods

seem to produce higher learning outcomes more efficiently than a traditional teacher-centred environment.

Banda, Mudenda, Tindi, and Nakai (2014) conducted action research in the Central Province of Zambia and a biology lesson about a learner-centred approach. They discovered that teachers' teaching skills were improved and learners' pass rates in national examinations increased in biology. The teaching method (learner-centred) used in lesson presentations is inspired by the sense of discovery learning and active learning. This approach encourages learners to enhance their research and thinking skills as learners assume responsibilities that increase interest in learning and subsequently promote reasoning. Similarly, Sagoni (2017) did quasi-experimental research to investigate how a student-centred approach in teaching and student achievement in kinematics in secondary schools in Sabatio County, Kenya. This study revealed that student-centred learning was more effective than the traditional method in learner performance.

Muema, David, Mulwa, Stephen, and Mailu (2018) conducted a qualitative and quantitative study aimed to examine the influence of teaching methods on students' achievement in Mathematics in Dadaab Sub County, Garissa County. Experimental research design and mixed approaches of data collection and analysis were adopted in the study. The participants especially principals and mathematics educators were purposively selected but stratified and simple random sampling was used for learners. Data from participants was collected by achievement tests structured questionnaires and interview guides. Qualitative data were thematically coded and presented using statistical tables, charts, and graphs. The study established a positive correlation between teaching methods and students' achievement than traditional methods of teaching. This indicated that teaching using Information Technology (IT) improves learners' performance.

2.3.4 Socio-economic Factors

The combination of parents' educational level, occupational status, and income level determines the most socio-economic characteristics (Jeynes, 2002). Socioeconomic status is seen as one of the major factors that predict the academic performance of a learner. Researchers like Graetz (1995), Considine and Zappal, (2002), Hansen and Mastekaas, (2003) conducted a study on the impacts of socioeconomic status using a qualitative approach. The result of their study revealed that low socioeconomic status has a negative effect on the academic achievement of a learner. Hansen and Mastekaasa (2003) revealed that low socioeconomic status prevents access to vital resources and creates additional stress at home. They concluded that learners with low socio-economic status perform poorly while learners with high socio-economic status perform better. Considine and Zappala (2002) agree with Graetz (1995) who found that families where the parents are disadvantaged socially, educationally and economically foster a lower level of achievement in their children.

Pedrosa, Norberto, Rafel and Benilton (2006) in their study on the socio-economic background of a learner and academic performance, found that learners coming from disadvantaged socio-economic and educational homes perform relatively better than those from higher socio-economic and educational status. They called this phenomenal educational resilience. McMillan and Westor (2002) argued that a learner from a family of high socioeconomic status performs well than a learner from a family of low socioeconomic status. Dills (2006) had a similar view to McMillan and Westor (2002) when she found that learners from the top quantile consistently perform below learners from the bottom quartile of socio-economic status. Owens (1999) in her study about academic achievement and parents' educational attainment of their children, argued that the higher the parent's educational achievement, the higher the academic achievement of a learner. According to different views, socio-economic status is related to academic performance. There is considerable support that parents' socio-economic status affects

the academic performance of learners (Graetz, 1995; Owens, 1999; Considine & Zappala, 2002; Hansen & Mastekaas, 2005).

Socio-economic Status (SES) is the single best predictor of academic achievement (Caldwell & Ginther 1996; Sirin, 2005). Low SES is highly correlated with low achievement (Malecki & Demargy, 2006; Milne & Plourde, 2006). In Tiffany's (2008) study, learners' socio-economic status was investigated between low and high achievers. The results showed that there is a positive correlation between academic achievement and SES. The gap between low and high SES students is most likely to remain the same, if not widen (Sirin, 2005). Socio-economic status does affect students' abilities (Milne & Plourde, 2006). There is a correlation between family income and children's ability and achievement (Milne & Plourde, 2006). Higher family income is associated with higher educational attainment. Students from low SES backgrounds are the largest population of individuals to be at risk of not graduating high school (Sirin, 2005).

Carlisle and Murray (2015) article are to review the relationship between socio-economic status and academic achievement and discusses the implications of this relationship on educational attainment. The study's results have revealed that high SES is associated with greater academic achievement. Furthermore, the educational literature has provided evidence that SES is one of the strongest predictors of academic achievement and educational attainment (Reardo, 2011). Heigneman and Loxley (1983) conducted a comparative study of high-income and low-income countries in order to further examine the nature of the relationship between SES and academic achievement. In high-income countries, they found evidence of a stronger association between individual students' SES and academic achievement and a relatively weaker association between school-level factors e.g., school and teacher quality and academic achievement. However, their analysis also indicated that within low-income countries, school-level factors shared a relatively stronger association with academic achievement than did individual student SES. These contrasting results are often referred to as the *Heyneman-Loxley Effect* (HL Effect) (Barber, Goesling & Tendre, 2002). The nature of the HL effect challenged the perception that weaker associations exist between school-level factors and achievement

and stronger associations exist between individual student SES and achievement (Barker et al., 2002). Heyneman and Loxley (1983) concluded that the quality of schools and their teachers significantly influences the academic outcomes of students within poorer countries. Shifeng, Qjongying, and Rubcue (2020) investigated the relationship between socioeconomic status (SES) and the academic achievement of students at junior high schools in China. Over the past decades, the relationship between family SES and academic achievement in school-age children has been well documented. However, the underlying mechanism of family SES works on academic achievement remains unclear. In this study, Shifeng et al., examine the possible role of self-concept in the relationship between SES and school academics. Two mediation analyses were conducted. The first analysis tested the hypothesis that self-concept mediated the relationship between performance and SES in China. The second tested the hypothesis that self-concept mediated the relationship between SES and performance in Mathematics. The results showed that both family SES and self-concept were significantly associated with the children's Chinese and Mathematics performance, and family SES was also significantly correlated with self-concept. The mediation analysis showed that self-concept partially mediated the relationship between SES and school academic achievement. These findings suggest that intervention targeting self-concept may be an effective way in which to improve children's school academic achievement. Also, disadvantageous family backgrounds may have a negative impact on how children defined themselves in a school situation and ultimately influence their academic school achievement.

2.3.5 Teachers' Content Knowledge

Hill, Rowan, and Ball (2005) explored whether and how teachers' mathematical knowledge for teaching contributes to gains in students' mathematics achievement. The authors used a linear mixed-model methodology in which first and third graders' mathematical achievement gains over a year were nested within teachers, who in turn were nested within schools. They found that teachers' mathematical knowledge was significantly related to student achievement gains in both first and third grades after

controlling for key student- and teacher-level covariates. This result, while consonant with findings from the educational production function literature, was obtained via a measure focusing on the specialized mathematical knowledge and skills used in teaching mathematics. This finding provides support for policy initiatives designed to improve students' mathematics achievement by improving teachers' mathematical knowledge. Kutub, Wijayani and Manuharawati (2007) engaged on a qualitative and quantitative study about the relationship of teachers' content knowledge and student performance. Data was analyzed using the Chi-Square test in investigating the relationship between teachers' content knowledge and student achievement. The results of the study showed that there is a positive relationship between teachers' content knowledge and student achievement. Yeo (2008) supported the study by pinpointing that the teacher cannot be expected to be able to explain mathematical concepts if he or she does not have a complete understanding of mathematical concepts. Successful learning and the learner's performance depend on the teacher's content knowledge. Furthermore, added that knowledge has fewer opportunities to influence student performance than those who conceptually understand.

Lenhart's (2010) quantitative study investigated the relationship between middle school math teacher pedagogical content knowledge as gathered from a teacher assessment and student Standards of Learning scores using Pearson's Product Moment Coefficient statistical test. The results reflected a relationship between teacher pedagogical content knowledge and student Standards of Learning scores in geometry and measurement.

The results showed a positive association between teachers' high endorsement of the selected classroom practices and learner performance. Guimardes, Sitaran, Jardon, Taquchi, and Robinson (2010) investigated the effect of teacher content knowledge, as measured by test performance on the Maths achievement of fourth-grade students in Brazil. They conducted the analysis using a value-added model that controls for student and teacher characteristics, class composition and school-fixed effects. The evidence suggests that teachers with higher content knowledge have a greater impact on the Maths test scores of their students.

Sheperd's (2012) study assesses the impact of teacher subject knowledge on student performance using a nationally representative dataset of Grade 6 students in South Africa. Test scores in two subjects and correlated random error models are used to identify pupil across subject variation in performance. Teacher knowledge is estimated to have a positive impact on performance across both the poorer and wealthier subsets of schools once controlling for teachers unobservable. For example, parents with a preference for achievement will select schools for their children with high-quality, better motivated, and knowledgeable teachers. The results suggest that consideration needs to be given to contextual factors such as the quality of teacher training and working environment within schools and their relationship to the manner in which teacher knowledge is transferred to students. Two recently compiled case studies in the Gauteng (Carnoy and Chisholm, 2008) and Northwest Provinces (Carnoy and Arends, 2012) of South Africa have provided evidence of a positive relationship between teacher knowledge and student performance.

2.3.6 Overcrowded Classrooms on Learner Performance

Ojonubah (2015) conducted a study on the impact of overcrowding in a Mathematics class in schools in Kogi State, Nigeria using a quantitative research approach. Test questions and questionnaires were the instruments used to obtain information from the students and their teachers. The results of the analyses showed that overcrowded Mathematics classes negatively affect students in Mathematics learning. Furthermore, the findings of this research revealed that learners who learned Mathematics in Normal Class-Size (NCS) performed significantly better than the learners in Overcrowded ClassSize (OCS). The significant difference in performance obtained in the NCS group was in agreement with Barbar (2002) who reported that a Large Class-Size (LCS) is capable of reducing learners' level of achievement and that small class size or NCS favors better achievement of learners. These are possibilities since it was revealed by the learners at all levels in this research that there is a lack of concentration on a task by the learners, lack of motivation and individual attention for learners, ineffective teaching by the teachers, the

existence of bully on the learners, stress, noise, and frustration in learning Mathematics, decline interest by learners in Mathematics learning and insufficient learning materials for the learners in overcrowded classrooms. Muthusamy (2015) conducted a study about teachers' experiences with overcrowded Mathematics classrooms in the Durban South area using a qualitative research design. The overall findings of the research show that teachers' experiences with overcrowded classrooms are 'stressful'. Teachers themselves identified certain conditions that are stressful in an overcrowded classroom. These conditions were inadequate classroom space, issues related to safety and health, minimal learner and teacher interaction, disruptive behaviours, teachers experienced emotional and psychological problems, increased workload, and inadequate teaching time. The study revealed that normal class size performs better than overcrowded classes.

This argument is supported by Marais (2016) who conducted a qualitative study in which teachers' and learners' challenges regarding classroom overcrowding were explored. The results of the study revealed that the effects of overcrowded classrooms are far-reaching for both teachers and learners. The study further found that learners perform much better in classes that do not have a large number of learners. When comparing the large numbers of learners in classes with the achievements of small numbers of learners, class size affects student performance, due to misbehaviour and other disciplinary problems in large classes. According to Marais (2016), learners in smaller classes learned more as they did not experience disruption during lessons. Participation in learning activities and group work in the smaller classes contributed towards the higher scores, and resulted in sound discipline, whereas in the larger classes, learners scored lower marks, and disruptive behaviour made it difficult for teachers to manage these classrooms. In overcrowded classes, teachers make use of teacher-centred approaches that do not actively engage the learners (Dobo, 2015). These approaches are contrary to a constructive view that encourages learning that is learner-centred to encourage learners to participate actively in class.

2.3.7 Teaching and Learning Resources and Academic Performance in Mathematics

Olatunde (2010) conducted a qualitative study about the connection between teaching and learning resources and learner academic performance in Mathematics at secondary schools in Kenya's s Bondo District. The results showed that the more the provision of resources, the better the academic performance of the learner. The study also recommends that review of curriculum, in-servicing of trained teachers, recruiting more competent teachers, the motivation of learners, improved government support to education, good teaching methods, improved students-book ratio and better remuneration of teachers are factors that the government and all stakeholders should pay more attention to improve performance in Mathematics. The creation of an environment conducive to learning is vitally important in the academic achievement of learners (Makgato, 2007). Such an environment extends beyond the school and classroom to include the home. It is from these environments that learners draw resources. These resources can be both tangible and intangible, they have an impact on their educational experiences. Both school and home environments play significant roles in learners' mathematics performance.

Mntunjani (2014) conducted a study about the use of Mathematical resources on learners' performance in the foundation phase. Data were gathered using lesson plan analysis, lesson observations, and semi-structured interviews. The findings of the study revealed that teaching for understanding was often compromised by teaching to enable learners to pass assessments. Resources were often used when learners struggled to understand concepts and calculation tools. It revealed that learners with sufficient resources perform better than learners with insufficient resources. Visser and Jian (2015) conducted a qualitative study in which they looked at school and home resources as predictors of the performance of students in Mathematics in South Africa. It is from these environments that learners draw resources, both tangible and intangible which impact their educational experiences. The findings reveal that both school and home environments play significant

roles in learners' Mathematics performance. This study, therefore, suggests that it is not only the socio-economic factors of schools that impact learners' performance in Mathematics but also that higher levels of parental education have a significant positive influence. This implies that the provision of home and school resources have a positive effect on the academic performance of learners. Yusta, Karugu, Muthee, and Tekle (2016) used both quantitative and qualitative studies to determine the impact of resources used in instruction to mediate the performance of primary school learners in Mathematics in Arusha Tanzania. The study used a descriptive design. The target populations were head teachers and subject teachers from different schools. A questionnaire was used as a major data collection instrument. Data analysis was done manually and computed using the Statistical Package for Social Sciences (SPSS). A descriptive statistic was applied to present the findings. The findings revealed that the lack of teaching resources impacted negatively learners' performance in Mathematics. The study concluded by recommending that the government should provide computers and computer software, Mathematics kit, radio cassettes, and tape recorders which are vital instructional materials in primary schools to enhance effective teaching and learning of Mathematics. The study shows that a lack of resources contributes to the poor performance of learners. By comparing the view of Olatunde (2010), Mntunjani (2014), and Visser and Jian (2015), it can be concluded that the lack of resources negatively affects learners' performance in Mathematics.

2.3.8 School Leadership and Learner Achievement

Hallinger, Bickman, and Davis (1996) claimed that principals contributed to learner achievement through the creation of a positive instructional climate (learner opportunity to learn, high teacher expectations, clear mission, and grouping for instruction). Ross and Gray (2006) propose that principals influence learner achievement by creating capacity in the organization in terms of teacher beliefs in their collective agency and their commitment to the goals of the organization. Principals who adopt transformational leadership behaviours contribute to teachers' professional commitment directly and

indirectly through collective teachers' efficiency (Ross & Gray, 2006). Teachers that are committed to organizational values and members thereof are highly likely to adopt instructional practices that are recommended by the organization, help colleagues, and work very hard to achieve the goals of the organization. Principals can persuade teachers that they can become effective in an organization, for example through personnel supervision and staff development processes (Park, 2004). Park (2004) indicated that principals who engage in such strategies are likely to obtain higher learner achievement as well as staff that is confident, more ambitious, and more persistent.

Leithwood, Louis, Wahlstrom, and Anderson (2004:9) argue that the learners' achievement depends on the leadership displayed by the principal. Segiovanni (2009:131) supported Leithwood et al.'s view when he asserts that it is the principal's leadership that sets the tone of the school, the climate for learning of teachers, and the degree of concern for what the learners may or may not become. Kise and Russel (2010:24-25) revealed that for the school to produce quality results it must have quality leadership that is interactive making systematic, frequent visits to classrooms, being highly visible to teachers, learners and parents, and interacting frequently with each group.

Leithwood et al.'s (2008) framework of leadership actions is influential in instructional leadership and student success. School leadership is considered to be the second on student achievement, following direct instruction (Leithwood et al., Greatest Effector, 2008). In consideration of this knowledge, school leaders have been advised to direct their focus to those leadership practices that are known to improve instruction and student achievement (Leithwood et al., 2010). Leaders have been found to improve teaching and learning indirectly, and most powerfully, by influencing "staff motivations, commitments and working conditions" (Leithwood et al., 2008). It is important therefore that school leaders adapt their leadership and management practices to affect the performance of their staff in these identified areas. Leithwood et al., (2008) proposed a framework of leadership actions that positively affect performance and student

achievement. This framework can be summarised as performing the following actions: “building a vision and setting direction, developing people, redesigning the organization, and managing the teaching and learning program” (Leithwood et al., 2008:29-30). This combination of leadership actions improves staff engagement, student engagement, and student achievement. School leadership has a significant and positive effect on student achievement because principals influence the management of the school organization and direct the teaching practices of staff members. Despite many competing challenges, principals have the ability and the resources to effect a positive change in student outcomes, through the practices of teaching staff by focusing school efforts on those actions known to improve student achievement results.

The centre for Comprehensive School Reform and Improvement argues that the most influential educational leaders are the principals, and their leadership is inextricable to student performance. Leithwood, Seashore, Anderson, and Wahlstrom (2004) claim that leadership is second only to classroom instruction among all school-related factors that contribute to what students learn at school. Leithwood et al., (2004) outlined the three sets of practices that make up the basic core of successful leadership, namely setting direction, developing people, and redesigning the organization. Leaders who set a clear sense of direction have the greatest impact on improving student achievement. When leaders develop a shared understanding of the organization and its goals and activities among staff members, thus understanding becomes the basis for a sense of purpose or vision. They emphasize that having such goals help people make sense of their work and enable them to find a sense of identity for themselves within their work context.

Leithwood, Seashore, Louis, Anderson, and Wahlstrom (2004) distinguished specific leadership practices that help develop people such as stimulating them intellectually, providing them with individual support, and providing them with an appropriate model, for example, developing people through individualized support, Maths coaches can model lesson, observe class, and provide constructive feedback from teachers. Teachers also benefit from peer observation, debriefing sessions with colleagues, and feedback from the principal. New teachers in particular gain support from mentor teachers who have

carefully assigned them in the first few years of teaching. Such practices lead to improvement in student achievement.

Successful educational leaders are purposeful in turning their schools into effective organizations. They do this by developing and counting on contributions from many others in their organization by strengthening the schools' culture, modifying organization structures, and building collaborative processes. Carl Glickman (2003) proposed that in successful schools, principals aren't threatened by the wisdom of others, instead, they cherish it by distributing leadership. Such teacher leadership can contribute to student achievement.

2.3.9 Former School Background and Academic Performance

Students' educational outcomes and academic success are greatly influenced by the type of school they attend. The school one attends is the institutional environment that sets the parameters of a student's learning experience. Depending on the environment, a school can either open or close the doors that lead to academic achievement. According to Consodine and Zappala (2002), the type of school a child attends influences educational outcomes. Considine and Zappala (2002) cite Sparkles (1999) whose study in Britain shows that schools have an independent effect on student attainment and that the school effect is likely to operate through variation in quality and attitudes, so teachers in disadvantaged schools often hold low expectations of their student which compound the low expectations the students have, hence leading to poor performance by students. Kwesiga (2002) agrees that school affects the academic performance of the students but argued that school facilities determine the quality of the school, which in turn influences the achievements, and attainment of its pupils. Sentamu (2003) argues that schools influence learning in the way content is organized and, in the teaching, learning, and assessment procedures. All these scholars agree in principle that schools do affect the academic performance of students.

Felder, Mohr, Dietz, and Ward (1994) carried out a study on the differences between students from 55 rural students and 65 urban students, in their study, differences in academic performance were observed with the urban students doing better on almost every measure investigated. The urban students outperformance rural students and they continued to perform better in chemical engineering courses in subsequent semesters. They concluded that urban students enjoy greater success than rural students. They also found in every measure of scholastic aptitude examined, urban students surpassed rural students. The conclusion of Felder, Mohr, Diez, and Ward (1994), is confirmed by Tremblay, Ross, and Berthelot (2001) in their study on factors affecting grade three student performances in Ontario. They found that students' performance was higher in urban schools than in rural schools. A similar view is held by Kolcic (2006) in his study on academic performance and scientific involvement of final-year medical students coming from urban and rural backgrounds. Kolcic (2006) concludes that students from urban backgrounds had significantly better academic indicators than this from rural and remote backgrounds. He added that more than half the students from rural backgrounds fail at least one year of study. Cheers, (1990) as cited in Considine and Zappala (2002) argued that students from non-metropolitan areas are more likely to have lower educational outcomes in terms of academic performance and retention rates than students from metropolitan areas are more likely to have lower educational outcomes in terms of academic performance and retention rates than students from metropolitan areas and add that inequity exists concerning the quality of the education rural students receive often as a result of costs, restricted and limited subject choice, low levels of family income support and educational facilities within their school. The results of Lee and McIntire (2001) are contrary to Kolcic (2006) and Considine and Zappala (2002). The former argues that there is no significant difference between the performance of students from rural schools and from urban schools. In their study on interstate variations in rural students' achievement and schooling conditions, they observed that given that many rural students are poor and attend schools where instructional resources and course offerings are limited, the level of their academic performance relative to their non-rural counterparts is encouraging. They found that in some states rural students scored higher than their non-rural counterparts.

Some researchers have held the view that school ownership and funding do indeed affect the performance of the student. Crosne, Johnson, and Elder (2004) found that school ownership (that is schools owned by private individuals and those owned by the government) is the important structural component of the school. Private schools, they argue, tend to have both better funding and small sizes than public schools. They found out that additional funding of private schools leads to better academic performance and more access to resources such as components, which have been shown to enhance academic achievement. Sampson (2004) also noted that private schools have alternate sources of funding, higher levels of discipline, and are very selective and this is why they tend to have higher academic performance than students from public schools. Considine and Zappala (2002) concluded in their study on school background that students from independent private schools were more likely to achieve higher end-of-school scores. Crosne, Johnson and Elder (2004), Sampson (2004) and Considine and Zappala (2002) share a similar view and that is; private schools are more likely to have a greater number of students from high SES families, select students with stronger abilities and have greater financial resources. In their conclusion, they maintained that the type of school affects the academic performance of students. Their view is summarized by Miller and Birch (2007), in their study on the influence of high school attended on university performance who argued that outcome at university differs according to the type of high school attended. The studies cited led the researcher to hypothesize that the students' school background is positively related to the academic performance of undergraduate students.

2.4 SUMMARY

This chapter presented a literature review that was guided by the research topic. The review includes a theoretical framework and factors contributing to learners' poor performance in Mathematics. The next chapter will discuss the research design and methodology used in this study.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

Chapter One introduced the research study and provided a summary of the research methodology that was to be used in this research. Chapter Two provided a comprehensive literature review related to the research topic. This chapter presents the design and methodology which was adopted to conduct the study. It focuses on the discussion of the research methodology inclusive of the design, the population of study, and the procedures of sampling. The chapter also discusses data collection and analysis methods. The issues of ethical consideration related to this study were further presented.

3.2 RESEARCH DESIGN

Research design is about the entire issues that are involved in the planning and execution of a research project (Punch, 2011:62). This stretches from identifying the problem to reporting and publishing the research outcomes. According to Maree (2014:70), a research design involves a plan which specifies the choice of participants, the collection of data, and the analysis of data regarding the research. It is clear from these observations that a research design pertains to a comprehensive plan for the way in which the researcher is going to conduct his or her research. In research design, there are different types of inquiries within quantitative, qualitative, and mixed methods approach that offer specifically on the purpose and procedures of research (Okeke & Van Wyk, 2017:165). The researcher uses a qualitative design to answer the research questions which are:

- What factors are responsible for Grade 12 learners' performance in Mathematics in selected schools in Limpopo Province?
- What measures could be put in place to improve Grade 12 learners' performance in Mathematics in these schools?

These research questions are meant to achieve the study's research objectives, which are:

- To identify factors that contributed to Grade 12 learners' poor performance in Mathematics in selected schools in Limpopo.
- To suggest strategies that can be used to improve Grade 12 learners' performance in Mathematics in these schools.

Qualitative research is described as a method of research which demands the understanding of issues in their natural contexts or settings (Creswell & Creswell, 2018:181). Regarding the naturalistic settings that are characteristic of qualitative research, it has come to be referred to as naturalistic inquiry. In addition, it is also known as field research. Platton(2001:39) claims that qualitative research is a "naturalistic approach that seeks to understand the phenomenon" in settings that are context-specific, such as "real world setting where the researcher does not attempt to manipulate the phenomenon of interest".

In this stance, Platton (2001) is supported by Babie and Mouton (2001) who defined qualitative research as the type of research that yields findings from actual life settings in which the phenomenon of interest naturally unfolds. Creswell (2009) describes qualitative research as "an inquiry process of understanding based on methodological traditions of inquiry that explores social or human problems".

According to Denzin and Lincoln (2011:3), qualitative research denotes a situated activity that is able to locate investigators in the world. It studies things in their natural settings, with an attempt to make sense of or interpret situations in terms of meanings that people

generate from them. Recent studies by Okeke and Van Wyk (2017), Creswell and Creswell (2018) are of the opinion that qualitative research is concerned with the understanding of how a particular individual or group of individuals think, and the meaning they attach to their actions, in a natural setting through a gathering of multiple sources of data. The researcher selected the qualitative method to provide an in-depth description and understanding of the human experience. The research method used best suits this study because the researcher is interested in looking at the behaviours, thoughts, or feelings of individuals with certain traits or characteristics. Again, the qualitative method enables the researcher to deal with real people in real settings and to study some general ideas about the people and how they interact with each other in these settings. In contrast to quantitative research design, qualitative research design demonstrates a different approach to research inquiry, this design relies on text and image (Singleton & Straits, 2010; Silverman, 2011). Creswell and Crewell (2018:183) identified five research designs which are: phenomenology, ethnography, case study, grounded theory, and narrative inquiry based. The researcher selected a narrative research design to increase understanding of central issues related to teaching and learning about factors determining the learner performance in Mathematics through the telling and retelling of participants' stories. The design involves the description of the lives of individuals, the collection of individual's stories of their experiences, and discussion of the meaning of those experiences and the discussion of the meaning of those experiences (Okeke & Van Wyk, 2017:273). The researcher used narrative research design because it focuses on the experiences of individuals is concerned with the chronology of an individual's experiences and focuses on the construction of life stories based on data collected through active interviews. The researcher gathers stories and analyses them for key elements of the story through oral history. Data is gathered from participants by asking them to share their experiences (Okeke & Van Wyk, 2017:173).

3.3 RESEARCH METHODOLOGY

3.3.1 Study Population

The population for this study consists of all Grade 12 Mathematics learners, Mathematics teachers, Mathematics departmental heads, and school principals of the two participating schools. The researcher employed inclusion and exclusion criteria. Learners were included in the study because they were better placed to identify the factors that influence their academic performance in Mathematics. Teachers were used because they are the ones who have direct contact with Grade 12 Mathematics learners on each school day. Departmental heads were important in the study because they have the responsibility of supervising, coordinating, and planning curriculum implementation and management at school. Principals were included because there were better placed to clarify the challenges the schools are facing in teaching and learning Mathematics. Those educators who did not teach Mathematics were excluded from participating in the study because they did not have direct knowledge regarding the teaching and learning of Mathematics.

3.3.2 Sample Size

Okeke and Van Wyk (2017:21) viewed sampling as a technique for selecting the characteristics of a relatively small number of participants from a relatively large population of such participants. The researcher draws the participants from two secondary schools which were picked on the basis that they were among the few schools still offering Mathematics, easy to access, and were readily available to participate in the research. The researcher used purposive sampling to select study participants. In purposive sampling, individuals are selected for a particular purpose. The purpose may be of interest in a particular study. However, this does not apply to any case that may happen to be chosen. Purposive sampling implies that participants are chosen according

to some defining features which identify them as holders of data that is required for the study (Maree, 2014:79). The researcher has already indicated in the preceding sections of this study that inclusion and exclusion criteria were used when selecting the study participants. For example, only Grade 12 educators who are currently teaching Mathematics take part in the study. Lastly, Grade 12 educators and learners who are not doing or offering Mathematics were excluded from the study.

3.3.3 Data Collection Procedure

The researcher made two visits to the schools where the data was to be collected. On the first visit, the researcher had to explain the intention of the investigation to the head teacher in the school. The researcher also discussed with Mathematics teachers the intention, criteria and ethical issues to be followed when selecting participants of the study, as the educators will also help in selecting the study participants. The whole group of participants was allocated pseudonyms to protect their identity during the initial and follow-up interviews. To make sure that the study is undertaken in accordance with all the requirements of social research, the researcher applied for ethical clearance from the University of Venda's Ethical Clearance Committee, for permission to interview the selected research participants (See Annexure 2 attached). Participants were asked to sign consent forms to agree to participate in the study (See Annexure 3) voluntarily. The purpose, procedures, and confidentiality of the study were explained in the consent form.

Meriam (2009), Creswell (2010), Maree (2014) as well as Creswell and Creswell (2018) maintain that qualitative researchers obtain information from many sources such as interviews, observations, documents, and audio-visual digital materials. In this study, the researcher collected data by interviewing participants. Interviewing is a term used to describe a group of methods that permit the researcher to engage in a dialogue or conversation with the participants (Lichtman, 2006:116). Maree (2014:87) defined the term interview as a two-way conversation where an interviewer raises questions to participants to collect information and to learn about the beliefs, views, ideas, behaviors,

and opinions of people. In this study, the researcher used interviews to obtain in-depth descriptive data which helped to understand the manner in which participants constructed knowledge and social reality regarding the issue being investigated.

Creswell and Creswell (2018:188) outlined four interview types, namely face-to-face (one on one), telephone, focus-group, and e-mail internet interview. The researcher conducted individual face-to-face and focus-group interviews to set up a situation in which participants will reveal to the researcher their feelings, intentions, meanings, sub-contexts, or thoughts on learners' performance in Mathematics (Lichtman, 2006:117). The researcher used an unstructured interview, guided by a general set of questions to get responses from the participants. Individual interviews were held with educators, HoD's and principals whereas learners were interviewed through the use of focus-group interviews. In a focus-group, the group interaction triggers thoughts and ideas among participants that do not emerge during an individual interview. Furthermore, participants disclosed their own views while at the same time being influenced by their interactions with others. Focus-group also yields a large volume of data within a short time. The group interaction in this research was productive with regard to widening the scope of responses, recalling long-forgotten details in experiences, and unleashing inhibitions that might otherwise impede participants from disclosing some information.

Two interview sessions were conducted in each research site using different days after school hours, one for an individual interview and the second session for focus-group discussion with eight learners. The interviews were guided by the use of an interview guide (See Annexures 4 and 5). The individual interview was scheduled for 40 minutes per participant and an hour and a half for a focus-group. Two focus-group discussions were conducted with Grade 12 learners from the two schools. The researcher employed a similar measuring instrument, regarding the same interview guide, for all the focus-group discussions to solicit different views from the groups. The voice recorder was used to record interviews. The researcher also kept a diary wherein all critical ideas which were

emerging were written down. The researcher immediately transcribed all the digital recording verbatim after conducting the interviews.

3.3.4 Data Analysis

According to Bogdan and Biklen (2003:145), qualitative data analysis entails manipulating data, wherein working data is organized, broken down into manageable units, and synthesized to search for emerging patterns, and discover important issues and those that need to be learned. Maree (2014:103) notes that qualitative data analysis exhibit traits of an interpretive approach which are geared to understand the way in which participants are made to make meanings from the phenomena under study. The researcher engaged in data analysis to understand the meaning that people create, to understand what makes sense to the participants, and even to understand the reasons for people do things or behave the way they do. Data that were collected were recorded digitally, transcribed, and then analysed. Types of data to be analysed are interview data (individual and focus-group), photographs of learners interacting in a focus-group and researchers' notes regarding thoughts about the practice. The researcher used thematic data analysis framework in the analysis process. The data analysis framework was selected as it can offer step-by-step procedures for analysing qualitative data. Okeke and Van Wyk (2017) define thematic analysis as the analysis that focuses on identifying important information in the data and categorizing it.

In Glesne's (2015) term, the thematic analysis uses coding as the first step in analysis that will be followed by the separating of data using those codes to form data clusters for further analysis. The researcher used thematic analysis in this study to uncover themes that were prominent in the data. Again, thematic analysis assisted the researcher in shaping and interpreting emerging themes about the factors that influence the performance of Grade 12 learners in Mathematics in Nzhelele West Circuit (AttridgeStirling, 2001:387).

The researcher's first analysis was on data collected from Mathematics teachers, HoD's and school principals. The second analysis came from Grade 12 learners doing Mathematics who were interviewed using focus-group discussions. The gathered data was analysed guided Collaizi's (1978) thematic data analysis framework. This framework was selected because it has step-by-step data analysis stages and provides an opportunity for returning the findings to the participant for validation. The researcher engaged in data analysis using the following stages:

- **Reading the interview transcription to obtain a sense of the whole**

The interviews conducted by the researcher in this study made her gain a holistic experience of each participant and associated views. The researcher listened three times to information that was audio-recorded to get a clear picture of the experiences of participants. The researcher read each transcription several times to get a detailed understanding of the transcriptions and to familiarise herself with the language used and the meanings that emerged from the spoken words. The personal interpretations of the researcher were avoided by deeply engaging with information that was obtained from participants.

- **Identifying and extracting significant statements from field texts**

The researcher identified aspects of the interview that reflected the experiences and perceptions of participants that resonated with the topic under study. The researcher segmented the whole transcription into several parts to determine the meaning that was expressed by each of the words as regards the experiences. This was done after reviewing the interview transcripts repeatedly. The researcher formulated meanings based on the experiences of the participants from every significant statement extracted. The researcher indicated the themes which dominate each unit. The researcher analysed and extracted significant statements manually.

- **Formulation of meaning from significant statements**

The researcher organized codes and quotes into common categories of themes. This followed the reading and re-reading of the transcripts. A holistic context was provided by a summary that considered the entire themes which were elicited from the data. The transcribing process involved digitally recorded interviews. Therefore, both the natural units and the central units were taken into consideration during this stage of data analysis. Similar points were arising time and again when the researcher repeatedly asks the research questions. Important themes from the transcript emerged when meanings are formulated from the significant statements.

- **Meanings are categorized into clusters and themes**

At this stage, the researcher sorted the formulated meaning into clusters of themes and again, engaged in the grouping of the formulated meanings into categories. The codes that are relevant were clustered together guided by the meanings of participants to consolidate their expression of the experiences into themes. The researcher derived a distinctive construct of themes by putting together groups of clusters of themes that reflected a specific aspect. In Chapter Four, an example of the interpretive process is emphasized for the emergence of the categories.

- **Description of individual and general experiences**

At this stage, the researcher engaged in an activity of integrating all ideas into an exhaustive picture of the same phenomenon. This picture was presented as a descriptive account containing all the dimensions of the lived experiences of participants. The reduction of findings was conducted in a way that the overestimated and redundant descriptions were eliminated from the entire structure. The researcher implemented amendments in the process to eliminate ambiguous structures which weakened the entire description to produce clear relationships between theme clusters and those extracted. The researcher proceeded from the individual structure to the general description to clearly understand the experiences and perceptions of educators regarding the

achievements of learners in Mathematics. The integration of meanings and significances of the phenomenon was developed from the textual and structural descriptions. It is at this stage that several themes from each participant were identified by the researcher. Therefore, these several themes were clustered or infused into several general themes that were familiar to the descriptions of all participants.

- **Describing the structure of the phenomenon and returning to the participants**

The researcher employed individual and focus-group interviews because they were suitable methods for answering the research questions. Guided by Creswell and Creswell (2018) researchers need to convey the steps they will take in their studies to check for the accuracy and credibility of their findings by allowing research participants to assess or comment on research outcomes, interpretations, and conclusions. Participants were offered an opportunity to comment on the relationships between the interpretations of participants and the personal experiences that they attempt to express during their interviews. Participants were given a copy of the transcript with a comments sheet to access the transcripts. The feedback received demonstrated that what participants said during the interviews was true to their experiences. The main themes which emerged from the data were: the impact of Covid-19 pandemic, socio-economic status, educators' and learners' attitudes towards Mathematics, curriculum change, and learner support. These themes are given detailed elaboration in chapter 4 of this study.

3.4. STUDY TRUSTWORTHINESS OR RIGOUR

Study trustworthiness is all about evaluating the quality and credibility of this research study (Morse, Barrets, Mayan, Olson & Spie (2002). Maree (2014:80) revealed that when qualitative researchers speak of “validity and reliability” they usually refer to research that is credible and trustworthy. Morse, Barrets, Mayan, Olson, and Spies (2002) claimed that the concept of trustworthiness contains four aspects, namely: credibility, transferability, dependability, and confirmability.

3.4.1 Credibility

According to Maree (2014), credibility denotes the extent to which the findings of a study represent the meanings obtained from research participants. The researcher used different data sources such as individual and focus-group interviews to understand participants' views regarding the topic that is being investigated. Triangulation assisted the researcher to achieve a point of comparison between methods in order to discover the similarities and differences in the responses of the participants. Triangulation also included the need to achieve internal validity and enabled the researcher to overcome any problems linked with the use of a single approach to data collection. The use of multiple methods helped the researcher to strengthen the research process outcomes in terms of the findings. The researcher's confidence in the results is increased when the data derived from varied sources point to similar conclusions.

Furthermore, the researcher allowed the research participants to comment on the research findings, interpretations, and conclusions (member checking). The researcher submitted the research data to the participants to confirm the correctness of the interpretations made (Maree, 2014:113). The entire group of participants was asked to read the transcriptions to check or verify that the researcher had portrayed their experiences and perceptions correctly. The researcher also availed them of the voice recordings of interviews that were conducted with them during the data collection stage. The researcher requested participants if they felt that the transcriptions made treated fairly and respectfully (Maree, 2014:113). Finally, participants were also asked if they had anything else they would like to add. Participants confirmed that the transcriptions were a true reflection of the views and opinions that were expressed in regard to the research questions.

3.4.2 Transferability

Transferability suggests that the findings of a study may be transferred to other similar contexts or situations quite beyond the contexts or scope of the actual study. The study

may be found to relate to satiations that are reflected in the actual study. Transferability is analogous to external validity in quantitative research. This is in keeping with the concept of generalizability. Generalisability describes the degree to which the researcher can extend the account of a particular population or situation, settings, people, or times outside those that were directly investigated (Creswell, 2011). Transferability as a trustworthy criterion has emerged as a challenge in qualitative research. This is because of the subjectivity of the researcher as the key research instrument. The concern relates to the threat to valid inferences in the traditional sense of the word and in reference to research data. Qualitative researchers need to focus on two main issues to increase transferability in qualitative research. These pertain to the way in which participants are closely linked to the context being studied, and the contextual boundaries of the research results.

Again, qualitative researchers can increase their study's transferability by providing thick descriptions of the phenomenon being investigated (Collaizi, 1978). Thick descriptions suggest that the researcher offers the reader a complete and purposeful account of the research design, participants, and context of the study to enable readers to make their own determinations about transferability. The researcher can also achieve transferability by using purposeful sampling. In this case, participants are selected because they closely relate to the research design, delimitations of the study, and limitations of an investigation (Lincoln & Guba, 1985). For the purpose of achieving a high level of transferability in this study, the researcher gave a detailed description of the context of the study to provide the reader with sufficient information. This was to allow readers to make informed decisions regarding the applicability of the results in other settings.

3.4.3 Dependability

Creswell (2013) claimed that dependability addresses the central concern of a research study, which states that the study has to be consistent across time, analysis techniques, and researchers. Lincoln and Guba (1985) present dependability as the consistency of the entire research procedure that resonates through various stages of the research

process. In this research, the various stages leading to the research report come under scrutiny. These processes include the design of the study, methods of data collection and analysis, as well as methods of interpreting or reporting the findings. Dependability was achieved by explaining, detailing, and documenting the processes, in a manner that enables the auditors and other readers to believe in it. In this study, dependability was achieved by keeping an audit trail of the whole process followed when collecting data. This qualitative research study includes a detailed chronology of the research study includes and processes, influences on data collection and data analysis, emerging themes categories, and analytic memos. The researcher examined the audit trail in order to determine whether the process and conclusions of the study were trustworthy. For example, the researcher asked for help from peer researchers to examine this study's field notes, research procedures, and final product.

3.4.4 Confirmability

Maree (2014:80) maintains that confirmability relates to the information that is sufficiently reported from the protocol for data collection from raw data and based on the research questions. This also is associated with the various stages in the data analysis and the interpretation of the study's findings. The researcher made this study to be sound by making use of clear research processes. This would enable other researchers to master and understand the methods employed in the research. Confirmability was ensured in the study through the auditing of the research process. The totality of the collected data was archived in an organized and retrievable format to allow it to be availed in case the results of the study are contested. The researcher conducted an audit trail to trace the way in which research data was gathered from participants (Denzin & Lincoln, 2008). The researcher kept a research notebook throughout the data analysis stages. Interviews were captured on a voice recorder that can be replayed to ensure that the recorded data can be verified (Mafenya, 2016:129).

3.5 STUDY LIMITATION

While this study obtained the findings that the researcher anticipated achieving in regard to the design, objectives, and conceptual framework, some unavoidable setbacks occurred that the researcher encountered. For example, the study was limited to Grade 12 Mathematics learners and educators. The major limitation of this research study pertained to the utilization of a single case study: Grade 12 learners' performance in Mathematics. Again, the research study was heavily hinged on the use of qualitative research design only, because the researcher wanted to get or produce quality findings or results.

3.6 DELIMITATION OF THE STUDY

This study was restricted to two secondary schools of Nzhelele West Circuit. This implies that the findings of this study are not generalizable to a broader population or other situations. Again, the research was also delimited by a lack of finance since the work was too demanding and seemingly beyond the scope of the available resources.

3.7 ETHICAL CONSIDERATIONS

This research was carried out in consideration of all the standards of ethical consideration. During the data collection process, a few ethical issues were taken into consideration. For example, issues such as informed consent, beneficence (maximizing benefits), non-maleficence (minimizing harm), respect for anonymity and confidentiality, and respect for participants' safety and privacy. Participants were not subjected to physical harm, unusual stress, embarrassment, or loss of self-esteem. The researcher addressed participants' anonymity by assigning them pseudonyms e.g., learners were identified as L1, L2, L3, L4, I5, etc. educators as E1, E2, departmental heads as HoD1, HoD2 and Principals as P1 and P2. The research records were kept confidential, secured in a locked

place, and not shared with anyone without written permission from the participants. Participants that consented to take part in this study were provided with consent forms to append their signatures as a show of agreement with the terms and conditions set out in the study. The researcher also obtained permission from parents and guardians for learners under the age of 18 to participate in the research project.

3.7 CHAPTER SUMMARY

This chapter has explained the research design and methodology that were undertaken in the study. A qualitative research inquiry was used to reflect the experiences of learners, educators, DoDs, and principles pertaining to the influence of 12 learners' performance in Mathematics. Individual and focus-group discussions were conducted to gather information from the participants of the study. Participants in the study were selected using purposive sampling. The inclusion and exclusion criteria which were applied in the study facilitated the researcher to get information-rich participants. Limitations and delimiters of the study were identified. Ethical considerations that are relevant to the study were addressed. Next, Chapter Four presents a presentation of the study findings and discussion.

CHAPTER FOUR

PRESENTATION OF THE STUDY FINDINGS AND DISCUSSIONS

4.1 INTRODUCTION

Chapter One presented the study's introduction, problem statement, the purpose of the study, research objectives, research questions, preliminary literature review, theoretical framework, definitions of key concepts, research design and methodologies, the significance of the study limitations and delimitation of the study, ethical consideration and outline of the study. Chapter Two presented a comprehensive literature review related to the research topic. For example, in this chapter the following important topics were discussed, the theoretical framework underpinning the study and factors contributing to learners' poor performance in Mathematics. Chapter Three provided the research design and methodology used to collect data for this study. In this chapter, the study population, sample size, data collection procedure, and data analysis were outlined. This was followed by a discussion of the ethical considerations which were aligned with the research study. This chapter, Chapter Four presents the findings solicited from individual and focus-group interviews. Focus-group discussions were conducted with learners and individual interviews with educators, departmental heads, and principals of participating schools. Therefore, this study presents findings that emerged from the collected data.

The following themes emerged from the data that was collected and analysed: the impact of Covid-19 on teaching and learning Mathematics, socio-economic background, educator and learner attitude towards Mathematics, curriculum change on teaching and learning Mathematics, and learner support. The researcher mentioned in Chapter Three that all participants were allocated pseudonyms to protect their identities. In this study participants were identified using different codes, for example, learners were identified as L1, L2, L3, L4, L5, etc., educators as E1, E2, departmental heads as HoD1, HoD2 and

Principals as P1 and P2. Next is a discussion of the themes followed by verbal quotations from raw data collected from participants.

4.2 PRESENTATION OF THE STUDY FINDINGS FROM INDIVIDUAL AND FOCUS INTERVIEWS

This section presents the findings that emerged as a result of the data collected in Chapter Three. From the individual and focus-group interviews conducted, five important themes emerged namely, the impact of the Covid-19 pandemic, socio-economic background, educator and learner attitude towards Mathematics, curriculum change on teaching and learning mathematics, and learner support.

4.2.1 Theme 1: The Impact of the Covid-19 Pandemic

The first theme which emerged was that of the impact brought by the Covid-19 pandemic. In December 2019, Covid-19 was first identified in Wuhan city, Hubei province, China. Covid-19 spreads rapidly not only in China, but also worldwide. On 12th March 2020, the World Health Organisation (WHO) announced it was a pandemic. School closures due to Covid-19 have brought significant disruption to education across the world. The government has taken measures to counteract the risk of disease spreading. These measures include travel restrictions, mandatory quarantine for travelers, social distancing, bans on public gatherings, schools, universities, and businesses, self-isolation, asking people to work at home, curfews, and lockdowns. Due to the suspension of classroom teaching in schools, a switch to online teaching for tertiary learners becomes the answer. However, many rural learners have no access to online teaching due to economical and digital divides. It was found that learners were not comfortable with individual learning as they need the support of their educators and peers to succeed, as evidenced in this comment by HoD2:

“Some learners are able to grasp concepts on their own while others are heavily dependent on educators’ explanations in class. So, the closure of schools due to the Covid-19 pandemic enables learners to face challenges in individual learning. This result in misunderstanding of some of concepts or topics.”

Participants showed that the closure of schools due to the Covid-19 pandemic impacted learners’ performance. It was difficult for learners to get explanations from educators when they face difficulties during their individual learning. This study revealed that learners’ disengagement with educators and their peers promotes misunderstanding of some of the concepts and have no access to coaching. Learners lose interest in studying things they don’t understand and have a sense of loneliness because of a lack of effective communication and interaction with others (peers and educators). This study found that poor performance of learners in Mathematics is brought about by individual learning as a result of a lack of clarity or elaboration of concepts, support, or guidance by educators and their peers.

When schools reopened, they closed again as a result of Covid-19 cases for a week or more. The participants showed that the closure of schools reduces the contact time of teaching and learning, as most of the rural public schools have no access to online teaching and learning. One of the educators E2 complained about contact time as shown in this comment:

“Rotational attendance due to the Covid-19 pandemic enables us to engage on less written work, little time for revision and disruption in internal assessments.”

It has emerged during the interviews that learners had few contact hours with their educators in the academic year 2020 and 2021 due to the Covid-19 pandemic. The result of this study confirms that reduced contact hours lead educators to embark on programs matching the limited available time for the work left behind and for the coverage of the

syllabus. This is shown by giving learners less written work (class/home activities and informal tests), unaddressed concepts, and no individual attention for underachievers, and assessment to determine support needs is not done sufficiently. Therefore, learners performed poorly in Mathematics because of reduced motivation and commitment as well as low self-image and self-efficacy. The study's findings further confirm that the Covid-19 pandemic has negatively affected learners' performance in Mathematics. Sintema (2020) supported the study's view when indicating that a drop in the performance levels of Grade 12 learners is caused by reduced contact hours as learners are no longer able to consult educators when they encounter difficulties during their individual studying time. When schools reopen, learners are afraid to learn, and educators are afraid to teach. Both of them are afraid of being contacted by the virus. They avoid coming to school thinking that maybe the school will close for the final or the final examination will be postponed for the next year. Learners also viewed the Covid-19 pandemic as one that swallow the spirit of learning and disconnected engagement, one of the learners L8 made the following comment:

“My spirit of learning is destroyed and my commitment to learning is reduced because of the loss of life of our relatives and our educators. Even when school is on, sometimes I failed to go to school thinking that “who is the next to die.”

The participants have shown that too long breaks due to Covid-19 created learners to become passive and lose interest in learning. Learners together with their educators are psychologically disturbed because of the loss of their loved ones. Focus and attention to teaching and learning were swept by the pain and fear they have. They cannot concentrate on schoolwork. When a learner fails to go to school, he or she misses more lessons of the day. This means that they missed the elaboration of concepts, guidance or support, and connection of new knowledge to prior knowledge by the educator. Learners failed to succeed in Mathematics tests and examinations because they suffer from psychological and emotional distress and had difficulty concentrating because of depression. The study showed that Covid-19 pandemic lockdown negatively affected the learners' academic performance in Mathematics. Interviews conducted with principals

indicated that due to Covid-19 there are challenges that disrupt and impact learning as shown in this comment by participant P1 below:

“During the closure of schools and rotational attendance, early marriages increased, more children are recruited into small business or company, pregnancy of girls rises.”

The participants from individual interviews reported that there were effects of Covid-19 on learners' performance. Closure of schools and rotational attendance make learners feel bored at home as they disconnect with schoolwork, they engage in sex, are employed temporarily by unregistered businesses, and stay at their boyfriend's home for a number of days or permanently as well as alcohol and substance abuse. Some of the family members lost their jobs due to Covid-19 effects, so their learners face a greater shortage of food. Some of the learners especially boys were temporarily hired by a small construction company (building houses) whereas girls were collecting firewood from the bush or baking scones to sell. Such unacceptable behaviours place pressure on school children as they reduce motivation, commitment, and level of engagement in schoolwork. Therefore, learners perform poorly in tests and examinations as they are no longer dedicated to school affairs.

The findings of the study showed that Covid-19 has negatively affected the performance of learners in mathematics. Contrary to the above, Novikovs' (2020) study showed that there were no considerable effects of Covid-19 on learners. Furthermore, Sintemas' (2020) findings supported the result of the present study showing that Covid-19 impacted learners' achievement. Similarly, Mahdy (2020a) and Oyinloye's (2020) studies confirmed that Covid-19 has negatively influenced the performance of learners in Nigeria. In addition, the findings are like that of the study that was conducted by Ehaday, Elhaty and Mohamed (2020) indicate that Covid-19 has negatively affected the learners' performance. When considering the overall findings related to the effects of Covid-19 on the academic performance of learners, it was clear that Covid-19 has negatively affected the academic performance of learners in mathematics.

4.2.2 Theme 2: Socio-economic Status

Another theme that arose during individual and focuses-group interviews was socioeconomic status. Bhat, Joshi, and Wani (2016) describe socioeconomic status as the blend of economic and social measures of a family in connection to a learner's academic performance on the premise of income, educational levels, and occupational status. Educational inequality is built by different opportunities and capacities that families have in participation in education. Learners showed how parent's income and level of education affect learning as indicated by participant L14 in this comment:

".....My father always helps me in mathematics homework and assignments. If he finds that the task is difficult, he hires a private educator to help me and sometimes I use a laptop to search for ways to come to solutions. Such assistance helps me to perform better in Mathematics."

Participants showed that the level of education and economic status of parents are the key factors to determine the academic performance of learners. Results from the focus-group discussions revealed that learners of parents with high socioeconomic status are in a better position to improve their academic activities as their parents completely support them in their learning. This means that educated parents are often interested in and influential on the academic performance of their children. They allow their children to attend extra classes, help them with home activities and employ home educators. Furthermore, parents of high socioeconomic status create an atmosphere in which learners are encouraged to discover knowledge and construct their own meaning of it by connecting them to various learning resources or materials. The interview revealed that generally, children from families with high income and high quality of education perform better than children from families of low income and low quality of education. The above statement was supported by participant L14 by confirming that the income of parents has an impact on the academic performance of the learners:

"..... My mother is a domestic worker, and my father is unemployed. They cannot afford to buy extra textbooks, and study guides, pay for my extra

classes and I cannot access the internet. I'm performing poorly in mathematics because of a lack of learning resources and support."

The participants showed that socio-economic status is a significant predictor of a learner's achievement. This suggests that families from low socio-economic status are less likely to provide resources or support to their children as they are not having enough money and they are uneducated. Parents from low socio-economic status are powerless to meet the expenses of resources and fail to assist their children in their schoolwork. The study results revealed that insufficient resources and low levels of education of parents negatively affect the learner's achievement. This finding is similar to Eamon's (2005) study which found that learners whose parental socio-economic status is low performed poorly in schools. Departmental heads agree that there is a relationship between the socioeconomic and academic performance of learners. One of the departmental heads (HoD) made the following comment:

"..... Learners who live in poverty are more subjected to social problems. These unaddressed social problems enable learners not to concentrate during the teaching and learning process and sometimes they fail to attend classes. This kind of behaviour causes learners to miss some lessons or tests."

From the individual interviews held with educators, it was revealed that socio-economic factors have a large influence on school achievement. The stress of living in poverty (shortage of food, clothes, and shelter) enables learners to engage in unhealthy behaviour such as smoking, drinking, being gangsters, or eating unhealthy food. Again, learners tend to be demotivated and lack confidence in the learning process. The mental development of the child is greatly retarded, and the learner's performance is negatively affected. Learners are always struggling with Mathematics as their focus is shifted from learning. The study's findings revealed that socioeconomic status has a direct impact on learners' academic achievement in Mathematics. The study's findings are in the same view as studies conducted by Graetz (1995), Consodine and Zappal (2002), Hansen and

Matekaas (2003) indicating that learners with high socio-economic status perform better than learners with low socio-economic status. Similarly, other studies conducted by Bharti, Joshi and Wani (2016), Ovansa (2017), Li and Oru (2018), and Sonarward (2020) are of the same view as the current study's findings when they suggest that parent's income and parent's level of education have a positive impact on the academic performance. In addition, the present study's finding is supported by a study conducted by Dills (2006) which confirms that parents' socioeconomic status is the determinant of learners' academic achievement. Contrary to the above, Pedrasa, Norberto, Rafel, and Benilton (2006) do not agree with the present study's findings by confirming that learners of low socio-economic backgrounds perform better than those from higher socio-economic status.

4.2.3 Theme 3: Educators' and Learners' Attitude towards Mathematics

The third theme which emerged was educators' and learners' attitudes toward Mathematics. Maqsud (1998) defined the attitude toward Mathematics as a person's tendency to like or dislike Mathematics to deal with or avoid Mathematics activities, his or her belief of being successful or not, or belief that Mathematics was useful or not. Attitude is an important concept in learning and teaching. It affects and influences a person's behaviour which in turn affects performance. An educator's attitude to teaching certainly affects his or her performance positively or negatively in the classroom. What educators like or dislike, appreciate or disapprove, and how they feel about their teaching could have a significant effect on their learners. This means that how educators teach, how they behave, and how they interact with learners can be more important to learners' performance (Kwale, 2004). Most of the learners that participated in the focus-group interviews indicated that Mathematics is a very difficult subject. Some of them have even gone to the extent of revealing that if it was not for the fact that Mathematics is a compulsory subject, they were not going to do it. One of the learners who was identified as L3 has revealed that the results in most of the schools around the circuit are dropping down because of the poor results they get in Mathematics. The learner went on to say:

“Mathematics is a difficult subject; I will never be good at it. So, what is the point of trying.”

From the above quotation, it could be indicated that most of the learners who participated in the study have negative attitudes towards Mathematics because some of them think that Mathematics is a difficult subject. The participants show that low self-esteem contributed to the negative attitudes of learners. This indicated that learners view themselves as they cannot succeed in Mathematics. This negative attitude towards Mathematics may lead learners to lose their interest as well as self-confidence in Mathematics and they end up performing poorly in Mathematics. The negative attitude discourages, limits performance, reduces motivation and inhibits learning. Again, a negative attitude will be caused by pressure to perform well, over-demanding tasks, uninteresting lessons, and repetition of failures or problems when dealing with Mathematics tasks. A learner fails before he or she attempts to solve a problem because of his or her negative attitude toward Mathematics. The study revealed that negative attitudes of learners contributed to reduced learner performance in Mathematics. Although the majority of learners have shown that Mathematics is not an easy subject, there are learners who showed that they enjoy doing Mathematics as shown by L9 who made the following comment:

“Mathematics is not too bad after all. It is a fun game. Now I understand it.”

Even if the previous participant indicated that there are learners who have a negative attitude towards Mathematics, the participants' comments from above show that there are Mathematics learners who have a positive attitude towards the subject. The study showed that learners with better academic performance have more positive attitudes regarding Mathematics than those with poorer academic performance. A positive attitude creates the opportunity for learners to learn and motivation that leads to success in Mathematics. A learner with a positive attitude shows enthusiasm, curiosity, or engagement when a learning opportunity occurs. Even when they might not be interested in the subject, a learner with a positive attitude participates in the learning activity and

shows a willingness to try and learn. Good achievers face Mathematics tasks as real challenges that increase intrinsic motivation, raising the sense of competence when the tasks are solved and leading to the development of positive attitudes towards Mathematics. This shows that learners learn more effectively when they are interested, when they enjoy what they are learning, and perform better in their tasks. Educators who lack some experiences and skills develop negative attitudes toward Mathematics as shown in the comment by participant L9:

“.....My educator always says that Mathematics is a killer subject and also indicated that there are concepts that are difficult for her as an educator, and they will be doubly difficult to us.”

Such kinds of comments are very bad, especially when they are coming from someone who is expected to help you. The participants revealed that educators are unable to create a supportive learning environment because of their negative attitude towards Mathematics. Educators' negative attitudes are influenced by a lack of professional training, lack of resources, academic qualification, content knowledge, overcrowded classes, and lack of institutional support (Watkins, 2003; Zarece, 2011). The morale of learners is destroyed when Mathematics educators cited that Mathematics is a killer subject. This means that educators are not competent enough or interested to teach Mathematics. Learners won't actively participate in Mathematics classes because of their negative attitude towards Mathematics that is influenced by their Mathematics educators. Again, they cannot perform better as other concepts are not taught or are incorrectly taught. Furthermore, learners find it difficult to ask questions to educators with negative attitudes because they (educators) are not approachable. So, learners begin to lose interest in Mathematics and fail to engage in learning which will in turn negatively affect their school performance. Findings from this study established that negative attitudes of educators towards Mathematics contributed to the poor performance of learners in the subject.

This study's findings are similar to Mwangi's (1983) findings which emphasized that the negative attitude of educators was correlated with low achievement in Mathematics. These findings agree strongly with the conclusion made by Afolabi (2009) and Akinfe, Olofimeyi, and Fashiky (2012) whose studies established a positive and significant relationship between educators' attitudes and learners' achievement. Hooley and Jones (2006), Kurgat and Garden's (2014) study findings have shown that educators' attitudes do not affect learners' academic achievement. However, the present study's findings together with studies conducted by Mwangi (1983), Afolabi (2009), and Akinfe, Olofimeyi, and Fashiky (2012) seem to differ from the study conducted by Hooley and Jones (2006) whose studies indicate that poor performance of learners is not influenced by the educators' attitude. A learner identified as L7 made the following comment regarding his attitude toward mathematics:

"...Mathematics is for gifted learners, so I can't make it. I will never be good at it. That's why I am not good as my friend in Mathematics?"

The participants' responses revealed that the majority of participants have a negative attitude toward Mathematics. Many learners' self-esteem and confidence are shattered due to their reoccurring failure in Mathematics. The feeling of being a failure every day makes learners have negative attitude towards Mathematics. It shows that learners don't have interest and have poor attitudes in the subject. Interest and attitude are predictors for the learners' participation and success in Mathematics. Learners with positive attitudes towards Mathematics are more inclined to work harder in order to improve their performance. Learners' attitude is affected by factors such as socioeconomic background, motivation, interest, aspiration, age, number of years per grade, and emotional and learning support. The study revealed that a negative attitude towards Mathematics has contributed to lower participation and poor performance. The study's findings are supported by Mokono (2004), Soak (2005), Farog and Shah (2008) who confirm that the negative attitude of a learner contributed to his or her poor performance. The study's findings are also in line with the findings of Yasar (2011), Ela (2017), and Kennedy (2019) who concluded that the learner negative attitude contributed to poor performance in Mathematics. Hean, Cradock and O, Halloran's (2009) findings differ from the above studies' findings by indicating that there is no relationship between learners' attitudes and

performance in Mathematics. Furthermore, the present study's findings are also supported by Nicolaidou and Phillippou (2003) when citing that learners who are having positive attitudes perform better than ones with negative attitudes. Similarly, these results were also confirmed by Lipnerich, MacCann, Krumm, Burrus, and Roberts (2011) when indicating that positive attitudes of learners promote better academic achievement.

4.2.4 Theme 4: Curriculum Change

The fourth theme which emerged was that of curriculum change. According to Liston, Borko, and Whotomb (2008) curriculum change refers to any alteration in the curriculum's aspects that include values, philosophy, organizational structure, objectives, materials, teaching strategies, learner experiences, assessment, and learning outcomes. The purpose of curriculum change is to improve the instructional methods, materials, and assessment so that greater learner learning will result. South African curriculum change came to address the education system which was characterized by racism, discrimination, and inequalities. Changes in curriculum policy may lead to greater changes from the educators in the way they teach, and the way learners learn in the classroom (Booyse & Du Plessis, 2018). In this light, curriculum 2005, Outcome Based Education (OBE), National Curriculum Statement (NCS) and the Curriculum Statement Policy Statement (CAPS) are implemented to address these objectives. Educators complained about the work added to them by the new curriculum (CAPS) shifting their role of being a facilitator to an administrator in the teaching and learning process as stated by educator E3:

"... Most of the time I spend preparing CASS portfolio files because I'm not used to these new practices. The workload and administrative work also reduce the teaching and learning time."

The participants showed that educators are still lacking some knowledge and skills that they will use for meaningful teaching and learning. Lack of knowledge and skills enable educators to design activities that cannot stimulate learners' understanding to solve the

learning problems faced by learners. When most of the teaching and learning time is lost, resulting in educators being unable to complete the syllabi. Learners will therefore be unsuccessful in the examination because some of the topics are not covered. The study revealed that poor academic performance in Mathematics is contributed by educators' misunderstanding of how teaching and learning take place due to changing in curriculum. One of the principals worried about the underperformance of learners in Mathematics since the introduction of the Revised National Curriculum Statement (RNCS) till Curriculum Assessment Policy Statement (CAPS), as shown in the following comment by participant P1:

"I'm thinking to quit this career of being a principal. When learners fail Mathematics, all stakeholders point fingers at me instead of new curriculum (CAPS) that is not producing."

The participants showed that Curriculum change is influenced by a high failure rate in Mathematics. This means that the government is changing the curriculum from one to another in order to solve the challenges they encounter. One of the problems they face is underperformance and that is the reason for shifting from NCS to CAPS. The study revealed that misinterpretation of the curriculum may lead to poor performance of learners in Mathematics. Learners feel happy and willing to learn new ways of teaching and learning. The fear from the educator and threatened learning environment are reduced, comment from L3:

"... When working together with my peers in a small group, I can master the material presented by my peer better than working alone. Now, I can connect between what I learn at school and my daily life."

The focus-group discussions revealed that the new curriculum provides new teaching strategies such as cooperation, discovery, problem-solving, and scaffolding. These new strategies give learners an opportunity to learn and create new understanding. Learners are exposed to a deeper understanding of Mathematics and learners' critical thinking and

reasoning skills are strengthened. As these new strategies help learners to understand the materials taught, they passed tests and examinations. This study showed a positive relationship between learners' performance and curriculum change. Educators show how useful the new curriculum (CAPS) is to learners' performance, commented by E2:

“Before we present a lesson, we start by asking learners questions that are in line with the new topic. We use class and home activities, tests, projects or assignments and examinations to assess learners. Nowadays we are no longer assessing by tests only, but a variety of assessment tasks.”

Participants indicated that different assessment techniques brought by curriculum change are used to assess learners to determine what learners already know, find out about the cause of learning difficulties, monitor learners' progress towards the achievement of learning objectives, and provide a wholesale picture concerning the success of learners at a given time. This indicates that assessment is a continuous process, not once-off activity. Learners are given time to assess their own work or assessed by their peers and educators.

When learners are encouraged to assess their own learning (classwork), they become more aware of what they know, how they learn, and what resources they are using when they do Mathematics. This helps learners to participate actively in the instructional process and become responsible for her or their work. Learners are involved in a dynamic process of creating and exploring methods of solution, solving problems, and communicating their understanding. Learners understand fully the material taught and perform better in tests and examinations. This study's findings confirm that curriculum change affected positively the performance of learners in Mathematics.

4.2.5 Theme 5: Learner Support

Learner support was the last theme that emerged during the interviews. Learner support refers to various forms of learning support received by learners in meeting learners' academic, social and emotional needs by addressing barriers to learning (Department of Education, 2001). Learners' achievement is rooted in the support that learners receive from educators and families. Parental support displays a strong association with learners' self-efficacy for example, when parents encourage their children to be confident and when they support their children's educational efforts and achievements. Educators can convey enthusiasm in support to develop a positive learning attitude in learners through learning goals, motivation to master tasks, self-efficacy, and enjoyment of studying. Providing support services to learners by school and home is of great value because it enhances learners' self-esteem and improves learners' academic performance. Learners are not happy about the way they learn mathematics, a learner identified as L9 made the following comments:

“.....We cannot succeed in Mathematics because we are memorizing, and we don't understand. The educator provides knowledge, and we receive it.”

Participants revealed that there is a lack of support when an inappropriate teaching strategy is used. As learners are different in varying aspects such as their intellectual capacity, their background, and knowledge as well as skills, so the one size fits all strategy (lecture method) will not be effective. This indicates that learners who are not good at listening, observing, and taking notes are disadvantaged through narrative learning. The narrative method does not cater to different learners' interests, abilities, levels of understanding, and learning styles. Therefore, it minimizes learner participation. Learners cannot succeed in Mathematics as they rely heavily on the educator as the source of information, and they do not take much responsibility for their own learning activities. Learners are performing poorly in Mathematics because they are not supported as inappropriate teaching strategies are used in their learning. The study's findings

demonstrated the existence of a strong relationship between support given to learners and their academic achievement. From the focus-group discussions, learners indicated that parents are not supporting them to succeed in their learning. Learner L12 explains how learners' performance has been affected by a lack of support from parents:

“... My mother works far always from home. After school I started by sweeping, cooking for the whole family, and washing during the weekend for my siblings.”

Participants' responses established that parents are unable to create a supportive learning environment. This shows that family-related factors can play a role in a learner's academic performance. When older children are taking the responsibility to raise their siblings, this will cause learners to lose their academic focus. So, there is a huge negative impact on the academic performance of a learner because of such heavy responsibility on a child. Working parents are too busy to care about their children's performance and a learner's attention is easily consumed and causes his or her academic performance to decline. The lack of support can cause stress and frustration for learners.

Learners are unable to learn to their fullest potential because they are not given the proper support. Children who receive support from their parents develop an appropriate mindset, motivation, and self-discipline at school and they perform better in their performance. Disengaged parents who are not interested in the academic life of their kids often promote school failures. The support services learners received in various ways can improve their understanding, motivate them, improve self-esteem, make them work harder, and help them to perform better in Mathematics. The study's results concluded that learners' poor performance is also influenced by a lack of support from their parents. Learners argue that content knowledge determines the performance of learners, commented by L14 in this manner:

“.... Educators sometimes talk about things done last year instead of teaching it now. When we ask questions, he said Mathematics needs wise learners.”

The participants discovered that a learning supportive environment plays a significant role in the academic performance of learners. The study shows that failing to create a conducive learning environment for learning is related to a lack of support. This suggests that educators are there in the classroom to extend the understanding of concepts to learners. If an educator is confident with respect to the possession of requisite knowledge of the taught subject, learners are bound to develop a better understanding and successful completion of tasks (Berk, 2007; Brook, 2008). When educators fail to help the learners solve problems beyond their cognitive level or achieve the lesson objectives, poor academic performance will result. This study confirms that support given to learners by educators affects the learners' academic performance in Mathematics. The findings of the study are in line with study carried out by Mashau, Steyn, Van der Walt, and Wolhunter (2008) when indicating that educators' actions and practices that support learners enhance learners' self-esteem and promote acceptable social behaviour and academic success.

4.3 CHAPTER SUMMARY

The chapter discussed the data analysis, interpretation, and discussion of the results from the data collected using a qualitative approach. The presentation of the findings was guided by the following major themes: impact of Covid-19, socioeconomic status background, educator and learner attitude towards Mathematics, Curriculum change, and learner support. Each theme was discussed with their raw data excerpts. The findings of the study revealed that there are various factors that contribute to Grade 12 learners' poor performance in Mathematics. Next, Chapter Five presents conclusions and recommendations.

CHAPTER FIVE

SUMMARY OF THE STUDY FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND LIMITATIONS

5.1 INTRODUCTION

This chapter outlines the findings of the study, conclusions, recommendations, and limitations. Various sections are outlined in this chapter. The first section offers a summary of the major findings of the study which emerged as a result of the data collected using qualitative data collection strategies, namely, individual and focus-group interviews. Conclusions are drawn from the findings in the second section. The third section presents the recommendations for the improvement of Grade 12 learners' performance in Mathematics while the fourth section discusses the limitations of the study. The study was evaluated to determine if the research methodologies used have managed to achieve the study's objectives. The detailed study findings which are reported in Chapter Four give descriptive answers to the following research questions:

- Which factors are responsible for Grade 12 learners' poor performance in Mathematics?
- What measures could be put in place to improve Grade 12 learners' performance in Mathematics?

These research questions help to achieve the study's research objectives, which are:

- To identify factors that contributed to Grade 12 learners' performance in Mathematics
- To suggest strategies that can be used to improve Grade 12 learners' performance in Mathematics.

From the research objectives and research questions, the study managed to yield several findings which were discussed in Chapter Four of the study. The main objective of the research study was to find out the reasons why most of the learners, especially those in Grade 12 are performing badly in Mathematics. It was, therefore, this researcher's intention to explore this study area so that strategies are devised to address this challenge. What comes next is a summary of the study's main findings.

5.2 SUMMARY OF THE MAJOR FINDINGS OF THE STUDY

It has been shown in this study that there are factors that affect Grade 12 learners' poor performance in Mathematics. This is evidenced by the findings that emerged from the interviews that were held with learners, educators, departmental heads, and school principals. The research methodologies used, yielded several important themes namely: the impact of the Covid-19 pandemic, socio-economic status, educators' and learners' attitudes towards Mathematics, curriculum change, and learner support. Results of this study revealed that there was a drop in the pass percentage of Grade 12 Mathematics learners.

The first theme, the impact of the Covid-19 pandemic on Grade 12 learners' performance revealed that learners were heavily affected by the Covid-19 pandemic. Learners' commitment to Mathematics was reduced as they were learning on their own without any guidance from the educators. The disconnection of learners to everyday practice led learners to unacceptable behaviour such as love affairs, teenage pregnancies, drug, and alcohol abuse as well as child labour. When learners and educators or one of the family members tested positive, they did not avail themselves of school due to self-isolation. These situations made educators to be behind the content coverage and forced them to teach some concepts using lecture methods to cover the syllabus. Learners were passive during the teaching and learning process. The teaching method used did not cater to different learners' interests, abilities, levels of understanding, and learning styles. The results of Grade 12 in Mathematics dropped because of inappropriate teaching methods

used during the catch-up programs, a high rate of absenteeism, individual learning, and a lack of commitment and motivation. The performance of learners in Mathematics is also negatively affected by the stress of the pandemic. Both learners and educators were psychologically affected because of the loss of life of their parents, siblings, friends, relatives, and colleagues. Stress and depression among them disrupted the spirit of teaching and learning and this resulted in poor performance in Mathematics.

Again, the Covid-19 pandemic brought learners unequal opportunities for learning depending on access to technology and parental support during the school closures. Learners who had access to technology and support from parents (hired private educators) tend to perform better than those who were not having those opportunities. Participants in this study indicated that more learners were negatively affected as they are rural dwellers and most of their parents were unemployed. Therefore learners 'performance in Mathematics is negatively affected. The interviews held with educators, departmental heads, and principals revealed that the closure of schools due to the Covid-19 pandemic reduces the contact time with learners. Learners failed to consult their educators on areas of need during the lockdowns. It was difficult for learners to get explanations when they encounter barriers during their individual learning at home. Such kinds of environments made learners lose interest and focus on schoolwork and perform poorly in their mathematics examinations. The study findings revealed that all these Covid-19 related factors contributed to Grade 12 poor performance in mathematics.

The findings from the second source that is, socio-economic status, showed that parents of low socio-economic status learners are unable to cater to expensive learners' resources such as study guides, laptops, and private educators and they also failed to assist their children with schoolwork. When learners feel that they are not socially and economically supported by their parents, they become demotivated, lack confidence in their learning, and fail their examinations. The demotivated learners from families of low socio-economic status engaged themselves in unhealthy behaviours like alcohol and substance abuse, gangsters, bullying, etc. Children from low-income families often do

not receive the stimulation that they need, and it is difficult for them to get enough resources that will extend their understanding. Therefore, they perform poorly in their examinations. The result of this study confirms that the socio-economic status of parents is critical in determining the academic performance of learners.

The third theme, educators' and learners' attitudes towards mathematics revealed that attitude plays a significant role in leveraging the performance of learners in mathematics. Through this theme participants disclosed that a negative attitude is related to poor performance and vice versa. Furthermore, the result showed that a positive attitude toward mathematics increases motivation, active engagement in learning, and higher achievement. Negative attitudes diminish learners' sense of comfort and self-esteem and result in poor performance. Again, the study revealed that educators' attitude toward mathematics is a predictor of learners' achievement in mathematics. The result of this study confirmed that educators' and learners' attitudes affect the performance of learners in mathematics. This is supported by Nicolaidou and Phillippou (2003) when indicating that learners having positive attitudes achieve better.

This research also showed that curriculum change has an important part in contributing to the performance of learners in mathematics. The findings revealed the existence of challenges facing curriculum changes that contribute to learners' performance in mathematics. Among these challenges were educators not adequately trained for implementing CAPS, workload and administrative work, inadequate resources, and misinterpretation of the curriculum. The participants interviewed stated that these challenges make it difficult to implement CAPS effectively which in turn negatively impacts the performance of learners in mathematics. The study confirmed that CAPS challenges limit learners and educators to perform well in mathematics. It was also found that the new curriculum (CAPS) encourages learners to focus on the learning outcomes because they engage in their own learning. This is part of constructive learning. The study revealed that new strategies brought by the new curriculum (e.g., group work, self and peer assessment, project instead of the test) assist learners to understand the materials and perform better in Mathematics.

Participants indicated that the lack of support given to learners hinders effective learning and teaching processes. Learners' achievements depend on various forms of support given by parents, educators, the government, and other stakeholders. The results of the interviews revealed that support given to learners plays a significant role in the learners' performance.

Some of the participants interviewed indicated that parents are not involved fully in the school activities of their children. Family-related factors such as child-headed families, lack resources, and failure to create a supportive learning environment affect learners' academic performance. Learners also experience a lot of barriers within the school and classroom environments, especially when they are not getting full support from their parents, educators, and the government.

5.3. CONCLUSIONS

To realize the objectives of this study, a qualitative research approach was employed. Data was gathered through the use of individual and focus-group discussions. Below are themes that emerged from the two discussions:

- The impact of the Covid-19 pandemic.
- Socio-economic status.
- The educators' and learners' attitudes towards Mathematics.
- Curriculum change.
- Learner support.

The study findings revealed that there were numerous factors at home and school which contribute to the low performance of Grade 12 learners in mathematics. This study showed that poor performance in Grade 12 mathematics is influenced by the Covid-19 pandemic. This study also pointed out that socio-economic is a problem that prevents learners from succeeding in mathematics. Educators' and learners' negative attitudes

towards mathematics are recognized by this study as some of the factors that are responsible for poor performance by Grade 12 learners in mathematics. It is further disclosed that most educators fail to implement the content received due to the changes in the curriculum. The inadequate knowledge and skills of educators limit learners' achievement in mathematics. This study further revealed that lack of support from educators and parents prevents learners from performing well in mathematics, Learners at home have the responsibility of taking care of their siblings as their parents are farm laborers and are not able to assist them in household chores. Learners disconnect from learning due to unacceptable behaviours such as alcohol and substance abuse. Some parents are unemployed and as a result, the needs of learners cannot be adequately met. This study is important in that it provides information to the Ministry of Education about the factors which influence poor academic performance in mathematics by Grade 12 learners. The study is also significant to educational research as it contributes important literature that researchers could use to support future studies related to the research topic.

5.4 RECOMMENDATIONS

Arising from the conclusions that have been made above, the following recommendations are made:

- Educators should provide opportunities for learners to engage with tasks or materials.
- Learners should be exposed to various methods of learning and choose which best suits them.
- Educators should also provide opportunities for learners to explore and find out information for themselves.
- Learners should be given opportunities for individual, paired, and group work.
- Educators should be allowed to outsource and use videos with experts imparting mathematics knowledge.
- Educators should be well-trained to introduce the new curriculum in mathematics.

- New teaching and learning strategies should be introduced to arouse learners' participation in understanding the content.
- Curriculum support forums should be established at the school and district levels.
- Learners should therefore be provided with sufficient support from home and school.
- Learners should always be provided with consistent feedback by their educators.
- Learners should be encouraged to do project-based assignments in small groups.
- The government should support both educators and learners with online tools and techniques for mathematics in secondary schools.
- The government should make available Wi-Fi facilities, cheap internet packages as well as visual resources.
- Schools should implement learning recovery programs for learners to cover up for the lost time.
- Parents should allow their children to attend spring enrichment classes during spring holidays.
- Social and economic policies should be implemented so that all learners including those from poverty-stricken families are afforded equal learning opportunities.
- The government should provide the necessary resources to all learners.

5.5 LIMITATIONS

Although the study's objectives have been achieved, the researcher experienced some limitations and challenges. The study was carried out in two secondary schools where only 22 participants were sampled for interviews. The number of participants and the number of schools involved in this study are not enough. To gain a wider understanding in regard to the topic under study, the researcher would have loved to involve as many participants as possible. The Covid-19 pandemic and the limited resources made it impossible for this researcher to have many participants. As data extracted from the participants provided valuable insight about Grade 12 learners' performance in

mathematics from two secondary schools in Nzhelele West Circuit, the study's findings cannot be generalised.

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ANNEXURES

ANNEXURE 1: PERMISSION TO INTERVIEW GRADE 12 MATHEMATICS LEARNERS, TEACHERS, DEPARTMENTAL HEADS AND PRINCIPALS

I, **Naledzani Margret Ramabulana**, a registered M. Ed: Curriculum Studies student with the University of Venda, hereby request for the permission to interview Grade 12 Mathematics learners, educators, heads of department and principals so that they could assist me in collecting data for the study entitled “***Grade 12 Learners’ Performance in Mathematics: A Case Study of Two Secondary Schools in Nzhelele West Circuit, Vhembe West District, Limpopo Province***”. The purpose and objectives of the study will be explained to the participants before participation. Participants’ right to privacy and confidentiality will be respected at all times and they will be protected against any harm whatsoever. No names of participants will be revealed at any stage of the study or in any publication and they will be free to withdraw from the study at any time if they so wish. The research participants will be allowed to review the research data (member checking).

Your co-operation in this matter will be highly appreciated.

Yours faithfully

Ramabulana N.M

E-mail Address: maggieramabulana@gmail.com

ANNEXURE 2: PARTICIPANT CONSENT FORM FOR INTERVIEW

RESEARCH TITLE: GRADE 12 LEARNERS' PERFORMANCE IN MATHEMATICS: A CASE STUDY OF TWO SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT, LIMPOPO PROVINCE.

Principal investigator and contact information: Ramabulana N. Margret. Student number: 10083668, University of Venda. Contact number: 0712208100 or email at: maggieramabulana@gmail.com

Supervisor and contact information: Dr Mafenya N.P University of Venda. Contact number: 079 330 8661/073 335 8441 or email at: nkhangweleni.mafenyam@univen.ac.za

Purpose of study: This study seeks to understand Grade 12 learners' performance in Mathematics. The study will gather information from learners, educators, Departmental heads and principals.

Procedures: Participants will be asked to participate in interviews. The interviews will be held at a time convenient to them and will be recorded only if they and their parents/guardian consent to that. Research findings will be used for academic purposes only.

Confidentiality: Your name, child's name and the name of the school will not be revealed at any stage of the research process.

Voluntary nature of participation: You and your child have the right to exercise your free will of choice. When you indicate that there are deviations from what was agreed on

here, or have any other reasons, you and your child have right to withdraw from the project.

ANNEXURE 3: PARTICIPATION INFORMATION SHEET

I have read and understood the nature of the research and agreed to participate voluntarily as requested. I agree to the following statements:

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reasons.
3. I agree to take part in the above study.
4. I agree to the interview/focus-group being audio-recorded
5. I agree to the use of anonymized quotes in publications
6. I agree that data gathered in this study may be stored in a specialist data center and may be used for future research.

Name of participant----- **Date**----- **Signature**-----

Name of researcher: Ramabulana N.M Date-----**Signature**

N.M Ramabulana

ANNEXURE 4: REQUEST FOR PERMISSION FOR CHILD UNDER 18 YEARS TO PARTICIPATE IN A RESEARCH PROJECT

My name is **Ramabulana N.M** (Student Number: 18003668), and I am a student at the University of Venda. I am currently registered for a Master's degree in Education. In order to meet the requirements for the degree, I have to conduct a research project.

I humbly request your permission to allow your child to participate in my research project.

The research seeks to understand Grade 12 learners' performance in Mathematics.

During the course of the research, the learners will participate in focus-group discussions. The research activities will take place during school break time. I would like to record the interviews and therefore seek your permission to do so. Participation is voluntary, the study will not pose any harm to your child, and I will ensure that their anonymity and confidentiality is kept at all times during and after the research process.

Should you require further, you can contact my supervisor, Dr Mafenya N.P, University of Venda, at this number 0793308661 or email him at: nkhangweleni.mafenya@univen.ac.za

N.M Ramabulana (Signature and date)

Researcher Ramabulana Maggie

.....

Please complete the section below and return it to the school.

I..... (parent/guardian) give permission for my child,
....., a learner in Grade 12 to participate in a research project
conducted by Ramabulana N.M

.....

Signature (parent/guardian)

.....

Date

ANNEXURE 5: LEARNERS FOCUS-GROUP DISCUSSION GUIDE

DATA COLLECTION TOOL

RESEARCH TITLE: GRADE 12 LEARNERS' PERFORMANCE IN MATHEMATICS: A CASE STUDY OF TWO SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT, LIMPOPO PROVINCE

Student: Naledzani Margret Ramabulana

Degree: M. Ed: Curriculum Studies

1. How did you perform in Mathematics during June examinations?
2. Which personal behaviours do you think are the direct results of your performance in Mathematics?
3. Which challenges are you facing when learning Mathematics?
4. How the support you get from your educators and the government does assist you in learning Mathematics?
5. How do your parents contribute to your achievement in Mathematics?
6. How Covid-19 pandemic do affect your Mathematics performance?
7. How do teaching methods used by your educators influence your academic achievement in Mathematics?

ANNEXURE 6: EDUCATORS AND DEPARTMENTAL HEADS INTERVIEW GUIDE

RESEARCH TITLE: GRADE 12 LEARNERS' PERFORMANCE IN MATHEMATICS: A CASE STUDY OF TWO SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT, LIMPOPO PROVINCE

Student: Naledzani Margret Ramabulana

Degree: M Ed: Curriculum Studies

1. Do you enjoy teaching Mathematics in your school? If yes or no, motivate.
2. Why are your learners performing/not performing in Mathematics?
3. What challenges do you face when teaching Mathematics in your school?
4. What is the impact of lack of support to learners' performance in Mathematics?
5. How do parents' involvements determine learners' academic achievement?
6. How does Covid-19 pandemic contribute towards the performance of learners in Mathematics?
7. How do your teaching methods contribute to learners' achievement in Mathematics?

ANNEXURE 7: PRINCIPALS INTERVIEW GUIDE

1. In which subject are learners not performing well in Grade 12 in your school, and why are they not performing?
2. Which learners and educators-based factors responsible for that kind of performance?
3. Do you think involving parents in teaching and learning process can motivate learners? To what extent does this matter contribute to the learners' performance?
4. How do schools' closures due to Covid-19 pandemic affect learners' performance in Mathematics?
5. How do teaching methods and learning styles impact learners' performance in Mathematics?
6. Which strategies can you use to improve the performance of learners?

ANNEXURE 8: UNIVERSITY ETHICS LETTER

ETHICS APPROVAL CERTIFICATE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:

Mrs NM Ramabulana

STUDENT NO:

18003668

PROJECT TITLE: **Grade 12 learners' performance in Mathematics: A case of two secondary schools in Nzhelele West Circuit, Vhembe West District, Limpopo Province.**

ETHICAL CLEARANCE NO: SEDU/20/CSEM/19/0502

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Dr NP Mafenya	University of Venda	Supervisor
Dr MP Tshiskharwe	University of Venda	Co - Supervisor
Mrs NM Ramabulana	University of Venda	Investigator - Student

Type: Masters Research

Risk: Minimal risk to humans, animals or environment

Approval Period: February 2021 – February 2023

The Research Ethics Social Sciences Committee (RESSC) hereby approves your project as indicated above.

General Conditions

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and aligned in the application form, please note the following:

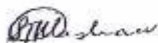
- The project leader (principal investigator) must report in the prescribed format to the REC:
 - Annually (or as otherwise requested) on the progress of the project, and upon completion of the project
 - Within 48hrs in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project
 - Annually a number of projects may be randomly selected for an external audit.
- The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of those changes at the REC. Would there be deviations from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.
- The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date; a new application must be made to the REC and new approvals received before or on the expiry date.
- In the interest of ethical responsibility, the REC retains the right to:
 - Request access to any information or data at any time during the course or after completion of the project,
 - To ask further questions; Seek additional information; Require further modification or monitor the conduct of your research or the informed consent process
 - Withdraw or postpone approval if:
 - Any unethical principles or practices of the project are revealed or suspected.
 - It becomes apparent that any relevant information was withheld from the REC or that information has been false or misrepresented.
 - The required annual report and reporting of adverse events was not done timely and accurately,
 - New institutional rules, national legislation or international conventions deem it necessary.

ISSUED BY:

UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: November 2020

Name of the RESSC Chairperson of the Committee: Prof Takalani Mashau



Signature:



CONFIDENTIAL



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

OFFICE OF THE PREMIER

Office of the Premier

Research and Development Directorate

Private Bag X9483, Polokwane, 0700, South Africa

Tel: (015) 230 9910, Email: mokobij@premier.limpopo.gov.za

LIMPOPO PROVINCIAL RESEARCH ETHICS

COMMITTEE CLEARANCE CERTIFICATE

Online Review Date: 10th – 17th February 2022

Project Number: LPREC/136/2021: PG

Subject: Grade 12 Learners' Performance in Mathematics: A Case of Two Secondary Schools in Nzhelele West Circuit, Vhembe West District, Limpopo.

Researcher: Ramabulana NM

Dr Thembinkosi Mabila



Chairperson: Limpopo Provincial Research Ethics Committee

The Limpopo Provincial Research Ethics Committee (LPREC) is registered with National Health Research Council (NHREC) Registration Number **REC-111513-038**.

Note:

- i. **This study is categorized as a Low Risk Level in accordance with risk level descriptors as enshrined in LPREC Standard Operating Procedures (SOPs)**
- ii. **Should there be any amendment to the approved research proposal; the researcher(s) must re-submit the proposal to the ethics committee for review prior data collection.**
- iii. **The researcher(s) must provide annual reporting to the committee as well as the relevant department and also provide the department with the final report/thesis.**
- iv. **The ethical clearance certificate is valid for 12 months. Should the need to extend the period for data collection arise then the researcher should renew the certificate through LPREC secretariat. PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRIES.**

ENQ: NDOU T.J.
CELL: 079 811 3188
OFFICE: 079 496 2603

gmsecondary,2017@gmail.com



EMIS NO. : 092 833 0879
P.O BOX 334
DZANANI
0955
22 FEBRUARY 2022

Dear Sirs,

TO WHOM TO WHOM IT MAY CONCERN,
CONSENT TO CONDUCT A RESEARCH AT GEORGE MBULAHENI SECONDARY SCHOOL.

NAME: RAMABULANA N.M.

ID : 7010220678082

STUDENT NO: 18003668

TOPIC: GRADE 12 LEARNERS PERFORMANCE IN MATHEMATICS: A CASE OF TWO SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT LIMPOPO PROVINCE.

1. George Mbulaheni Secondary School hereby unreservedly grant consent to RAMABULANA N.M to conduct research within our school communal.
2. The school furthermore hopes that this undertaking will not only benefit the student in her dissertation, but also the school in improving the results in this scared skill subjects.
3. In lieu of the above, the school therefore does not hesitate to permit her the undertaking of this venture as it would be beneficial to her, the school and the community at large.
4. Hoping that you will find this communique useful and in order.

Yours Faithfully,
Ndou T.J.
(PRINCIPAL)





DIMBANYIKA SECONDARY SCHOOL
RALIPHASWA, NZHELELE, MAKHADO, 0993
P O BOX 500, NZHELELE, MAKHADO, 0993
082 599 6520
dimbanyikasecondaryschool@gmail.com



EMIS: 928330893

Enq: RAMBUDA N.C

Cell NO: 082 599 6520

Dear madam

TO WHOM IT MAY CONCERN

Permission to conduct research at Dimbanyika sec school

NAME: Ramabulana N.M

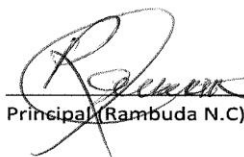
ID : 7010220678082

STUDENT NO: 18003668

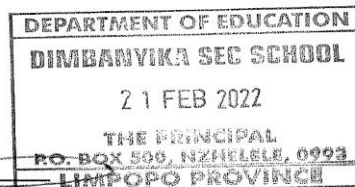
TOPIC: GRADE 12 LEARNERS PERFORMANCE IN MATHEMATICS: A CASE OF TWO SECONDARY SCHOOLS IN NZHELELE WEST CIRCUIT, VHEMBE WEST DISTRICT LIMPOPO PROVINCE.

1. In response to your letter dated 21/02/2022 permission is hereby granted to RAMABULANA N.M to conduct research within our school community.
2. It is widely understood that postgraduate students have an obligation to conduct research for their dissertation.
3. While this outpouring of knowledge has generally been welcomed by the school, we are granting her permission to maximize the chances of her success.
4. Hoping that you will find the above to be in order.

Yours faithfully



Principal (Rambuda N.C)



21/02/2022

Date(21/02/2022)

GRADE 12 LEARNERS' PERFORMANCE IN MATHEMATICS

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28 April, 2022

EDITING AND PROOFREADING REPORT

This is to certify that I, **Dr B Dube**, have proofread the document entitled:

Grade 12 learners' performance in Mathematics: A case of two secondary schools in

Nzhelele west Circuit, Vhembe West District, Limpopo province

RAMABULANA NALEDZANI MARGRET

I carefully read through the document, focusing on proofreading and minor editorial issues. The recommended suggestions are clearly highlighted and can either be accepted or rejected using the Microsoft Track Changes Function.

Thank you