

**FACTORS AFFECTING GRADE 12 LEARNERS' PERFORMANCE IN  
MATHEMATICS AT NZHELELE EAST CIRCUIT:  
VHEMBE DISTRICT IN LIMPOPO**

by

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## DECLARATION

I declare that **“Factors affecting grade 12 learners performance in mathematics at Nzhelele East Circuit: Vhembe district in Limpopo”** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

.....

.....

Signature

Date

(Mrs)

## **DEDICATION**

This study is dedicated to my loving husband Pastor Joseph Sinyosi and my children Mulanga, Murangi and Mufunwa, not forgetting my adopted daughter Abigail Muleya for their patience, support and understanding when I was busy with my studies and they needed me most.

To my mother, Shavhani Gladys Takalani, thanks for implanting the value of education in me, this work belongs to you.

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## **ABSTRACT**

The quality of education in South Africa has come increasingly under scrutiny for various reasons and learners' performance in mathematics is one of the main areas of concern. Learners in secondary schools in Nzhelele East Circuit in Limpopo Province, South Africa, are not performing well in mathematics. Learners who want to pursue careers such as civil engineering, medicine and other qualifications where mathematics is a prerequisite find it difficult to follow these careers. The study used focus group discussions with 20 Grade 12 learners, face-to-face semi-structured interviews with six teachers and four SMT to investigate factors affecting grade 12 learners performance in mathematics in two secondary schools. The study highlighted socio-cultural and psychological factors that are seen to be barriers in mathematics performance. The purpose of this study was to explore factors that affect Grade 12 learners' performance in mathematics. As there are many factors, this study's main emphasis was on the influence of the home environment, teachers' competence and attitudes in teaching mathematics, learners' attitudes towards mathematics and strategies that can be used to improve learners' performance in mathematics. The afore-said were named themes each of which related to questions contained in the semi-structured interview schedule. The study included literature review from Kenya, Ghana and South Africa. Qualitative research method was used. Interviews were conducted with SMT, teachers and learners.

### **The researcher set out to answer the following question**

- What are the dominant and most profound socio-cultural and psychological factors of the Grade 12 mathematics learners affecting performance in the Nzhelele East Circuit, Vhembe District of Limpopo Province?

The following points will also be taken into consideration during this research.

- How do learner performance trends in mathematics education look like among Grade 12 mathematics learners in the Nzhelele East Circuit, Vhembe District of Limpopo Province, and South Africa
- What are the teacher-based factors established to have been contributory to the state of learner performance in mathematics in the selected participant schools?

- What are the School Management Team (SMTs) factors established to have been contributory to the state of learner performance in mathematics in the selected participant schools?

## **THE AIMS AND OBJECTIVES**

### **Aim**

This study investigates the dominant and most profound socio-cultural and psychological factors affecting learner performance in mathematics among Grade 12 learners in the Nzhelele East Circuit, Vhembe District of Limpopo Province, and South Africa.

### **Objectives**

The objective of this study was to explore the socio-cultural and psychological factors in the home and school environment that affect Grade 12 learners performance in mathematics at Nzhelele East Circuit, Vhembe District of Limpopo Province.

Based on the above question the following were findings of the research.

- Mathematics is believed to be a critical school subject in most regions of the world in general, and Sub-Saharan Africa in particular.
- A plethora of governments – especially those in developing economies where governments are targeting industrialization and technological development believe mathematics is crucial for facilitating development and advancement of the general populace of their regions.
- Mathematics is a compulsory subject in most education systems around the world.
- There are a variety of complexities and constraints affecting the teaching and learning of mathematics in most regions of the world.
- There is poor learner performance in mathematics. This is indicated by high failure rate in mathematics during end-of-year learner assessments.
- The reasons for the poor performance of learners in mathematics in the selected schools were vast and intertwined.
- Efforts have been made at international level to intervene with regard finding solutions to complexities and constraints affecting teaching-learning environment in mathematics.

- The complexities and constraints affecting the teaching-learning environment of mathematics in South Africa stem from South Africa's past era of apartheid education.
- Mathematics has been a major target of improvement and transformation by the post-apartheid government in South Africa.
- Regardless of the efforts made by the post-apartheid government in South Africa to improve and transform teaching-learning environment in mathematics, there are perpetual complexities and constraints still hindering progress, and this affects learner output in mathematics.
- Mathematics is one of the poorly performing subjects in the post-apartheid education system in South African schools – especially those schools which are based in formerly disadvantaged areas such as homelands and townships.
- There is a growing body of literature investigating the complexities and constraints affecting the teaching-learning of mathematics in South Africa.

Apart from the conclusions based on general observations, the study furthermore concluded that critical learner-based factors, teacher-based factors and SMT-base factors contributed to the state of affairs in the selected participant schools.

This study therefore concluded thus:

- **Learner-based factors**

Mathematics learners were poorly prepared in the lower grades for senior grades. In other words, learners lacked proper foundation and background in mathematics. Learners were not well taught the basics of mathematics in previous grades. Furthermore, mathematics learners lacked assistance with homework for example because the majority of parents were illiterate and therefore not involved in supervision of learners beyond school environment. Learners showed negative attitude towards their teachers and the subject. Learners were not self-motivated in mathematics.

- **Teacher-based factors**

Teachers did not have enough workshops on how to teach mathematics, and also on content knowledge improvement. Less creative teachers were teaching mathematics. Teachers lacked support from their principals. The majority of teachers lacked passion in mathematics.

- **School Management Teams (SMTs) factors**

This study concludes that mathematics teachers were not receiving adequate support from the School management Teams (SMTs). Lack of teacher support by SMTs stems from poor organisation of supervisory roles expected from SMTs. Teachers' work is not being properly monitored and supervised.

## **RECOMMENDATIONS**

Based on the conclusions drawn from the study, the following recommendations are crucial, and they have to be implemented:

- **Recommendations to the Department of Education**

This study recommends that the Department of Education should monitor or revisit the methods of teaching and learning of mathematics. Assessment should also be revisited to ensure that the mathematics paper is not too long for the learners during examinations. Enlisted service providers who facilitate teacher workshops for mathematics must be conversant with content requirements of mathematics. Considerations should be made to simplify the mathematics question paper. The Department of Education should also provide necessary resources such as textbooks timeously. Knowledgeable mathematics specialists and advisers could be enlisted to visit regular visits to schools to assist teachers and learners throughout the year.

- **Recommendations to the School Management Teams (SMTs)**

The SMT should ensure that their educators are adequately qualified to teach mathematics, as a subject as well as being able to teach their learners in a way that they understand the subject. In addition, teachers who are knowledgeable in teaching mathematics should be appointed to teach mathematics. The SMTs should also ensure that compulsory workshops are provided for mathematics teachers at school level. Furthermore, the SMTs should ensure that educators are able to identify learners that are under-performing, monitor the utilisation of study time and assist in resolving problems regarding the poor performance of such individual learners. School Management Teams shall facilitate additional after-hours lessons and sessions to assist learners identified as lacking in home environment assistance for example. Moreover, SMTs should also encourage all Grade 12 mathematics learners to participate in supervised extra mathematics lessons and extra-mural activities in order to develop and build their self-confidence and positive self-esteem. In addition, the SMT members should be more supportive to their mathematics teachers. Continuous moderation of teachers' work should be encouraged. School Management Teams (SMTs) should also develop motivational programmes and instruments to encourage and motivate learners in their respective schools. For example, performing learners could be awarded with prizes in public – especially during school organised functions which might include learners, teachers and parents.

- **Recommendations to the teachers**

The teachers should make it a point that they attended mathematics workshops as organised by various stakeholders. Teachers' interest in mathematics could be improved by improving their knowledge of subject content in mathematics, and personal recognition by authorities. Performing teachers could also be recognised and awarded with prizes publicly at school gatherings and meetings. Teachers should also be encouraged to obtain further qualifications and skills in mathematics.

- **Recommendations to the learners**

Efforts should be made to improve learners' attitudes towards mathematics, and in addition to their mathematics teachers. Learners should be made aware of national target for mathematics education and the implications thereof. This could be achieved by utilising

educators – especially those who teach Guidance as a subject to learners to provide more convincing evidence of the spin-offs of obtaining good passes in mathematics in South Africa.

### **SUGGESTION FOR AREAS NEEDING FURTHER STUDY**

There is a need to conduct follow-up research on:

- applied strategies and instrument to improve learner attitude towards mathematics.
- Establishing whether the complexities and constraints affecting learner performance in mathematics affect both girl and boy learners the same considering that their circumstances and conditions might materially differ.

### **Key terms**

Mathematics; socio-cultural factors; psychological factors; achievements; Parents involvement; Peer pressure, Anxiety; grade 12 Learners performance ; mathematics teachers; mathematics education ; factors ; attitudes .

## **LIST OF ACRONYMS AND ABBREVIATIONS**

DoE: Department of Education

DSM: District Senior Manager

KILLs :Key Information Interviews

SGB: School Governing Body

SMT: School Management Team

## **LIST OF TABLES**

<b>TABLE</b>	<b>HEADING</b>	<b>PAGE NUMBER</b>
TABLE 1	Performance of learners from 2008-2013	8
TABLE 2	Participants from two schools	34
TABLE 3	Educators profile	35
TABLE 4	SMT profile	35
TABLE 5	Learners profile	35

## **LIST OF APPENDICES**

<b>APPENDIX</b>	<b>PAGE NUMBER</b>
Appendix 1 Letter requesting permission to research	78
Appendix 2 Letter of approval to carry out research	79
Appendix 3 Letter requesting permission in school A	80
Appendix 4 Letter requesting to do research in school B	81
Appendix 5 Letter of approval from school A	82
Appendix 6 Letter of approval from school B	83
Appendix 7 Consent from participants of school A	84
Appendix 8 Consent from participants of School B	85
Appendix 9 Editing and proof reading certificate	86

## **TABLE OF CONTENTS**

### **CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY**

1.1 Introduction and background	1
1.2 Motivation of the study	7
1.3 Statement of the problem	9
1.4 Research questions	9
1.5 Aims of the study	10
1.5.1 Aim	10
1.5.2 Objectives	10
1.6 Definition of concepts	10
1.7 The researcher's assumptions	11
1.8 Delimitations of the study	12
1.9 Limitations of the study	12
1.10 Chapter division	13
1.11 Conclusion	14

### **CHAPTER TWO : THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

2.1 Introduction	15
2.2 Theoretical framework of the study	15
2.3 literature review	20
2.3.1 Factors affecting learner performance in mathematics in Kenya and Ghana	20
2.3.1.1 Kenya	20
2.3.1.2 Ghana	23
2.3.1.3 South Africa	24

2.3.2 Historical overview of mathematics subject in South Africa	25
2.3.3 Parents educational level	27
2.3.4 Language effects in mathematics	27
2.3.5 The impact of attitude of learners towards performance	28
2.3.6 Gender differences in relation to attitudes	30
2.3.7 Teacher attitude towards mathematics	30
2.4 Conclusion	32
<b>CHAPTER THREE : RESEARCH DESIGN</b>	
3.1 Introduction	33
3.2 Research methodology	33
3.2.1 Research design	33
3.2.2 Sample frame and sampling procedures	34
3.2.3 Data collection instruments, procedures and data analysis	36
3.3 Ethical considerations	39
3.4 Conclusion	40
<b>CHAPTER FOUR :RESEARCH FINDINGS AND DISCUSSIONS</b>	
4.1 Introduction	41
4.2 Interview with teachers	41
4.2.1 Teaching experience in mathematics	41
4.2.2 Qualification of teachers in mathematics	43
4.2.3 Teacher's professional development and in-service training in mathematics	44
4.2.4 Class size	44
4.2.5 Teachers' perception of mathematics	45

4.2.6 Learner motivation in mathematics	46
4.2.7 Support by principals	47
4.2.8 Perception of teachers on learner poor performance in mathematics	48
4.2.9 Other support received towards learner motivation	49
4.3 Interviews with school management teams (smts)	49
4.3.1 Performance of mathematics learners	50
4.3.2 Teacher qualifications in mathematics as opined by smts	50
4.3.3 Moderation of teachers' work	50
4.3.4 Teacher assistance and support through workshops	51
4.4 Group interviews with learners	51
4.4.1 Parents/guardian's qualifications	52
4.4.2 Parental involvement	52
4.4.3 Learner supplementary studies in mathematics	53
4.4.3.1 Attendance of saturday and winter classes	53
4.4.3.2 Learner perception of mathematics	54
4.4.3.3 Attitudes of learners	54
4.4.3.4 Future ambition of the learner	55
4.4.3.5 Learner relationship with mathematics teachers	55
4.4.3.6 Day-to-day practice of mathematics	56
4.4.3.7 Causes of learners; poor performance in mathematics	58
4.4.3.8 Strategies	58
4.4.3.9 Summary	61
4.5 The findings	62

4.5.1 Theme 1: influence of the home environment	62
4.5.2 Theme 2: teacher attitudes and competence	63
4.5.3 Theme 3: learners' attitudes towards mathematics	64
4.4.4 Theme 4: strategies to improve learner performance in mathematics	65
4.6 Conclusion	66
<b>CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS</b>	
5.1 Introduction	66
5.2 The conclusions emanating from the study	66
5.2.1 General observations	66
5.2.2 Learner-based factors	68
5.2.3 Teacher-based factors	68
5.2.4 School management teams (smts) factors	69
5.3 Recommendations	69
5.3.1 Recommendation to the department of education	69
5.3.2 Recommendation to the school management teams	69
5.3.3 Recommendation to the teachers	70
5.3.4 Recommendation to learners	70
5.4 Suggestions for areas needing further study	70
5.5 Conclusion	71
6. LIST OF SOURCES	72

## **CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY**

### **1.1 INTRODUCTION AND BACKGROUND**

The postulation made by Maliki, Ngban and Ibu (2009:131) suggests that the development of man's social, economic, political, geographical, scientific and technological are centered on proper education humans acquire – especially in numerical disciplines such as mathematics. Maybe Maliki et al. (2009:131), when making this assertion had fashioned it on the postulation made by the former president of the World Bank, Robert McNamara. When visiting South Africa in 1982 McNamara had this to say "I have seen very few countries in the world that have such inadequate educational conditions. I was shocked at what I saw in some of the rural areas and homelands. Education is of fundamental importance. There is no social, political, or economic problem you can solve without adequate education." (Lyman, Strachan and Lazaridou, 2012). In addition, Tella (2007:149) also argued that economic development of every modern economy would largely depend on the strides made by such economy with regard unearthing and developing appropriate industrial and technological skills among its general populace or human resource capital. This might be achieved by advancing a successful mathematics school curriculum beyond the current status where mathematics education is continuously performing poorly. According to Tella (2007:149), the current state of mathematics in schools – referring to post-independence Nigeria for example might be impeding to attaining progress towards attaining expected industrial and technological development and advancement of the economy. It is evident that based on both Maliki et al. (2009:131) and the Robert McNamara's postulations, a further postulation might be made suggesting that the subject mathematics as taught and learned in the majority of formal school systems the world over is therefore crucial and fundamental for improvement and development of human life. This assertion refers to the broader mathematics family including sub-disciplines such as statistics, accounting, arithmetics and engineering among others.

The fundamental importance of mathematics to humans could be explained in terms of the interrelationship between mathematics and development of humans to advance the cause

of humans. According to Maliki, et al. (2009:132), mathematics is more related to the scientific and technological facets of man's world than to any other aspect as it occurs and re-occurs in the physical and natural sciences.

Mathematics, as part of the broader family of sciences such as physical science for example, has as a result of its fundamental importance and significance to humans and their advancement and development therefore received increased attention both at policy level and teaching and learning practice around the world. In other words, this explains the reasons behind the emerging and growing interest and debate among policy-makers and other related stakeholders with regard how mathematics as a formal school subject has to be designed and also dispatched for learning in various school systems around the world. For example, in apartheid South Africa – that is, during the period 1948 when the National Party (NP) government came into power in South Africa up to 27 April 1994 when South Africa attained its liberation, the teaching and learning of mathematics as part of the broader science family has always been exclusive in terms of quality and content to favour the formerly White education system. Apart from this exclusion of the Blacks from receiving quality mathematics education being an education matter, this resulted in complex socio-economic implications for South Africa. For example, it became difficult for South Africa to develop the Blacks into the world of science and technology. This is because the odds favoured the Whites with state intervention and assistance being directed to developing White scientists, and not Blacks. In other words, mathematics education was actually uncharacteristically skewed towards promoting and maintaining racialism and perpetual entrenchment of white supremacy tendencies over the indigenous Blacks in South Africa.

Evidently, from as far back as the rise of the National Party (NP) in South Africa, successive apartheid regimes thereafter sought to consolidate apartheid's exclusionist approach of development. The apartheid regime sought to employ this tactic to achieve its policy target of the promotion of self-determination and separate development for the Blacks – away from the Whites (Giliomee, 2012:67-86). This was to be achieved by offering the Blacks “relevant” education which would be convenient for use in their own environment (Giliomee, 2012:67-86). From Prime Minister Hendrick Verwoerd to the last apartheid President Frederick Willem (FW) De Klerk, this approach was employed to remove Blacks

from competitive socio-economic life in South Africa. In fact, it was Hendrick Verwoerd who vehemently argued for a separate education system in terms of race to propagate his belief in separate development and self-determination.

On a larger scale, it was Verwoerd who argued for the creation of Black homelands where the Blacks would be encouraged to develop themselves there, away from the world of Europeans. Verwoerd argued that the Blacks had no part in the world of the Europeans. Verwoerd vehemently argued "...the Bantu must be guided to serve his own community in all respects. There is no place for him in the European community above the level of certain forms of labour within his own community, however, all doors are open" (Giliomee, 2012:72). Verwoerd's philosophy expanded into education, and he is on record as having had said "...education should have its roots entirely in the Native areas and in the Native environment and the Native community..." (Giliomee, 2012:72). The product to finally emerge from the Verwoerdian education system in South Africa was a racially-promoted class-based inequalities between the Blacks and the Whites. Fundamentally, Verwoerd's racial system created a South Africa characterised by double-barreled economy of the rich Whites and the poor Blacks on the one hand (Mafukata, 2012:1-479). Some 21 years after apartheid and the Verwoerdian ideology, the effects of these "ghosts" still persist.

South Africa's history of education evidently points to an apartheid system in education which lasted for decades. The education system evolved through various stages until it got firmly embedded in society. The bedrock of apartheid education was built on the sentiments of J.N. Le Roux, a politician of the National Party (NP) in South African apartheid systems who in 1945 said "We should not give the Natives any academic education. If we do, who is going to do the manual labour in the community?" (Msila and Netshitangani, 2014:279).

It is therefore evident that Verwoerd was not alone in this heinous deed of denying Black people decent education. In strengthening the argument of the National Party (NP) government on the above stated assertion, the apartheid architect Prime Minister Hendrick Verwoerd in fact later expressed his opinion on the education of the Black child – particularly with regard mathematics education when he said "There is no place for [the Bantu] in the European community above the level of certain forms of labour...What is the use of teaching the Bantu child mathematics when it cannot use it in practice? That is quite absurd. Education must train people in accordance with their opportunities in life, according to the sphere in which they live" (Morris and Linneger, 2004:165). Prior to this statement by

Prime Minister Verwoerd, the draconian Bantu Education Act of 1953 being Act No. 47 of 1953; later renamed the Black Education Act, 153 was enacted by the National Party (NP) regime to propagate apartheid education in South Africa. Following the articulations of the National Party (NP) government, and in particular Hendrick Verwoerd, perpetual racist commentators on Black education in South Africa such as Gwendolen Carter, affirmed Hendrick Verwoerd when writing thus, "There was much that made sense in the Nationalist arguments. It is obvious that the lack of opportunities in the South African context for Africans with advanced training makes them frustrated and bitter. Moreover, it is hard to deny the importance of basing education on the culture of the particular group" (Giliomee, 2012:67-86). Even though some might want to convince certain sections of society that Gwendolen Carter was not a racist, but a Canadian well-respected scholar who chose to express matters of observation to society, it is evident from Carter's assertion that she also bought into apartheid myth that South African Blacks deserved to serve the Whites to make them relevant. There is no racism worse than this.

South Africa's exposure to politics of racialism and exclusionism as advocated by various instruments of apartheid, and vehemently defended by a plethora of racials throughout apartheid systems assisted in strengthening this inhumane practice against Black people in South Africa. As demonstrated by the sentiments of the former apartheid South African Deputy Minister of Bantu Education, Punt Janson in 1974 when addressing the apartheid parliament in his famous diabolical assertion "I have not consulted the African people on the language issue and I'm not going to. An African might find that 'the big boss' only spoke Afrikaans or only spoke English. It would be to his advantage to know both languages." (Butler, 2011:76), it is evident that the main idea of Black education under the National Party regimes was to promote White supremacy over Blacks. The fight against Bantu education became the major issue of political debate and struggle throughout the South African political space discourse. In 1976, during the so-called Soweto student uprisings, the Soweto Students Representative Council made this proclamation "We shall reject the whole system of Bantu Education whose aim is to reduce us, mentally and physically, into 'hewers of wood and drawers of water' (Msila and Netshitangani, 2014:279). This proclamation was carried over throughout the political discourse in South Africa until 27 April 1994.

Post-liberation in South Africa, general popular postulation and consensus among policy makers and social commentators immensely shifted towards building of a non-racial

education system – especially in the sciences such as mathematics and physical science for example (Tshiredo, 2013: 1-174). This policy shift was based on the new socio-economic growth path and discourse the post-liberation South Africa needed to build and also sustain. The target was to build a middle-class economy endowed with better and advanced skilled human capital endowed with appropriate and relevant modern technological competence to fulfill the needs of the newly created democratic non-racial and non-sexist society. This new policy approach facilitated for an emergence of quality science education approach – especially in mathematics transcending the scope initiated by the Verwoerdian racially-based education policy which had excluded Black children in particular from accessing and receiving science education in general – mathematics in particular.

To start with, the new South African Constitution, Act 196 of 1996 prioritised education and in addition entrenched it as a Basic Human Right in the Constitution's Chapter 2 which deals with the Bill of Rights. An OBE (Outcome Based Education) was then developed, and implemented in Grade One in 1996 to begin South Africa's inclusive education system (Manqele, 2012: 1-157). Furthermore, the post-apartheid government developed an instrument called the National Strategy for Mathematics, Science and Technology Education of 2001 which sought to develop and promote the vision of a highly educationally developed human capital base in terms of required skills and expertise for the new South African democratic state (Kriek and Grayson, 2009). From this instrument, what came to be known as DINALEDI Focus Schools aiming at increasing number of learners in mathematics and physical science for example, from Grade 10 to 12 was developed. In addition, DINALEDI also sought to improve “teacher pedagogical and content knowledge capacity in the sciences while simultaneously increasing learner pass rate” in these subjects (Mafukata, 2016: 68-79; Mji and Makgato, 2006: 253-266). Successively thereafter, various other policy instruments were also developed towards this imperative. The Outcomes Based Education (OBE), Curriculum 2005 introduced in 1998 and the National Curriculum Statement (NCS) of 2002 formed the platform in transforming education from its apartheid past to the new democratic dispensation. Furthermore, government strengthened this transformation agenda by prioritising issues of education in its National Development Plan (NDP). According to Mafukata (2016:68-79), it is the fundamental objective of the National Development Plan (NDP) through its Vision 2030 to improve the quality of education received by all in South Africa to pave way for South Africa's anticipated economic growth and societal development as key outcomes of democracy. However, despite efforts of the

post-apartheid government to transform education in South Africa there still were a plethora of fundamental complexities and constraints impeding the envisaged final outcome of the process. Some of these complexities and constraints were to be institutional, technical, pedagogical and anthropological among others, for example. These complexities were obviously evident in mathematics teaching and learning in South African schools post-apartheid manifesting themselves through poor performance of learners in mathematics for example. This study wishes to establish some of the factors involved in poor performance of learners in mathematics in South African schools post-apartheid.

Various literatures emerged post-apartheid investigating complexities and constraints affecting learner performance in various disciplines. For example, Mafukata (2016: 68-79) and Mavhungu (2004) investigated such complexities in physical science and agricultural science teaching and learning respectively. On the other hand, Tshiredo (2013; 1-174) investigated and studied complexities and constraints experienced in schools in science education as a result of curriculum change in teaching and learning of science subjects. The choice of mathematics for this study is motivated by a plethora of factors. Firstly, mathematics has become a subject of global interest of modern economies. This is demonstrated by the global efforts to improve its teaching and learning in schools. Secondly, there has been a growing interest and debate worldwide of how to improve teaching and learning in mathematics. In most economies, the subject has been elevated to a status of a compulsory subject of learning among learners (Adebola and Ademola 2011:1). It can be reasonably inferred from the assertion above that mathematics has, in most modern economies been widely recognised as the for acquisition and attainment of scientific and technological knowledge expertise that is vital in achieving meaningful socio-economic development blueprint (Mbugua, Kibert, Muthaa & Nkonke 2012:87) of a transforming economy such as South Africa for example (Tshiredo, 2013: 1-174). As postulated by Awokaya and Fafunwa in Maliki, et al. (2009:131) who argued that modern humans live in a world where science and technology is fast becoming an integral part of the world culture and development agenda, it is evident that mathematics teaching and learning has developed into an inescapable option. Therefore, for any nation to be relevant, it must not overlook the importance of mathematics in its educational system. Nevertheless, of critical importance is that the performance of learners in mathematics in schools has not been satisfactory. In other words, learners have, over some decades – especially post-apartheid in South Africa performed very poorly. The poor performance of

learners in mathematics education has become a great concern to this practicing educationist researcher and to society at large. This concern affects also other stakeholders of education elsewhere globally (Siyepu, 2013:1). This has prompted researchers to look into the causes of poor performance of learners in mathematics.

Corroborating the view that learners performed poorly in mathematics, the study by Van der Walt, Maree and Ellis in Siyepu (2013:1) for example argued that “researchers agree that the subject matter knowledge of the majority of learners in South Africa is parlous”. These researchers furthermore explain that South African learners experience problems relating to their limited technical vocabulary of mathematics for example. Reddy in Siyepu (2013:1) concurs with other researchers that there is no particular single factor which is solely responsible in affecting learners’ performance in mathematics in South African schools. In other words, such factors were to be multi-pronged and diverse. For example, in collaboration with this assertion, Van der Walt, Maree and Ellis (2008:499) found, reported and argued that the reasons for the poor performance of South African learners in mathematics were diverse and intertwined. These authors argued that, among others, poor socio-economic background of learners, lack of appropriate learner support materials, general poverty of school environment, general poor quality of teachers and teaching, language instruction and an inadequate study orientation in mathematics, and in the sciences such as physical science in general were the major causes (Mafukata, 2016; Siyepu, 2012:1). However, Maliki, et al. (2009:131) revealed that learners’ performance in mathematics would vary from person to person and from school to school. The variance would, in all probability be due to the different challenges and experiences posed by each environment.

## **1.2 MOTIVATION OF THE STUDY**

The researcher’s interest in this study was motivated by personal observations on learner performance in mathematics during the period as an educator, and later principal at one of the Secondary Schools in the Nzhelele East Circuit, Vhembe District of Limpopo Province, South Africa. The researcher’s observations were corroborated by the statistical records as indicated in table 1. The record reveals a fluctuating, but most importantly

declining performance of learners in mathematics between 2008-2013 in the Nzhelele East Circuit, Vhembe District of Limpopo Province, South Africa.

Table 1: Learners performance in mathematics from 2008 to 2013

<b>Year</b>	<b>Percentage achieved</b>
<b>2008</b>	50
<b>2009</b>	49.5
<b>2010</b>	49.2
<b>2011</b>	48.5
<b>2012</b>	47.1
<b>2013</b>	44.0

Source: Nzhelele East Circuit (2008-January 2014).

The fluctuating decline in learner performance in mathematics as indicated in table 1 is however not a unique factor of mathematics in this study site. A prior study conducted in the same area by Mafukata (2016:68-79) revealed that this challenge was not only affecting mathematics but other science subjects such as physical science in schools in the area for example. Mafukata (2016:68-79) found that, instead of the schools affected by the poor state of affairs in the sciences to seek for an effective corrective instrument and strategies to address the challenge, schools were adopting counter-productive measures such as discontinuation of the non-performing subjects in their curriculum. Mafukata (2016:68-79) further argued that this not only disadvantaged the poor learners but also infringed on the overall government socio-economic policy targets for the entire citizenry. In other words, the discontinuation strategy is self-defeating to government's societal transformation agenda in general. This prompted the researcher to explore the reasons behind this poor performance in mathematics in particular to assist policy makers design meaningful corrective instrument to address the challenge.

### **1.3 STATEMENT OF THE PROBLEM**

The South African post-apartheid government has prioritised science education – especially on mathematics and physical science teaching and learning in its new school system. This is contrary to the approach adopted by the apartheid regime of the National Party (NP) government which came into demise on 27 April 1994. Despite numerous policy efforts to improve the state of science education in the country, mathematics remains one of the worst performing subjects – especially when measured against end-of-year learner performances through examinations. Although this trend has been affecting the greater part of South Africa, such trends were more visible in poorer regions such as Limpopo Province. However, as a result of some material limitations, this study only focused on the Vhembe District schools – with particular interest on the Nzhelele East Circuit. In this study area, various intervention strategies to improve the situation have been employed but with little progress. The failure of the employed strategies to emerge with any meaningful improvement strategies and instrument might be suggestive of some further empirical interrogation to establish any under-lying complexities and constrains to the challenge. This study is however aware of the fact that it might be highly ambitious to try establish the factors as a whole through a study of this magnitude. This study therefore chose to employ the theoretical underpinnings adopted by Van der Walt, et al. (2008:55) who argued that socio-cultural and psychological factors of learners might be the major causes of poor performance in mathematics in under-performing schools.

### **1.4 RESEARCH QUESTION**

- What are the dominant and most profound socio-cultural and psychological factors of the Grade 12 mathematics learners affecting performance in the Nzhelele East Circuit, Vhembe District of Limpopo Province, South Africa?

This will also be taken into consideration during this research

- How do learner performance trends in mathematics education look like among Grade 12 mathematics learners in the Nzhelele East Circuit, Vhembe District of Limpopo Province, and South Africa

- What are the teacher-based factors established to have been contributory to the state of learner performance in mathematics in the selected participant schools?
- What are the School Management Team (SMTs) factors established to have been contributory to the state of learner performance in mathematics in the selected participant schools?

## **1.5 THE AIMS AND OBJECTIVES**

### **Aim**

This study investigates the dominant and most profound socio-cultural and psychological factors affecting learner performance in mathematics among Grade 12 learners in the Nzhelele East Circuit, Vhembe District of Limpopo Province, and South Africa.

### **Objectives**

The objective of this study was to explore the socio-cultural and psychological factors in the home and school environment that affect Grade 12 learners performance in mathematics at Nzhelele East Circuit, Vhembe District of Limpopo Province.

## **1.6 DEFINITION OF CONCEPTS**

Below are definitions of terms as used in this study.

**Mathematics:** According to the Department of Education (DoE) (2011:8), mathematics is a language that makes use of symbols and notions for describing numerical, geometric and graphical relationships. It is a human activity that involves observing, representing and investigating patterns and qualitative relationships in physical and social phenomena and between mathematical objects themselves. It helps to develop mental processes that enhance logical and critical thinking, accuracy and problem solving that will contribute in decision-making.

**Socio-cultural factors:** Sociocultural factors are the elements that are related to or pertaining to the combination or interactions of social and cultural habits (Abdullah, Adebayo & Talib, 2015: 87-92).

**Methodology:** According to McMillan and Schumacher (2010:8), methodology entails the ways in which one collects and analyses data. In a broader context, methodology refers to a design whereby the researcher selects data collection and analysis procedures to investigate a specific research problem.

**Factor:** A factor is one of the elements contributing to a particular result or situation. By factor, the researcher refers to the psychological, socio-cultural elements, teacher experience, learner and teacher attitudes as well as teacher-learner ratio as they affect learner performance in mathematics at Nzhelele East Circuit.

**Learner:** Tsanwani (2009:13) defined the word “learner” as follows: Learner can have the following meanings: persons who learn, persons preparing for a particular subject, persons who through lengthy and systematic study attain a high degree of expertise, skill and efficiency, and persons who have the following attitudes or characteristics: curiosity, perseverance, initiative, originality, creativity and integrity. These characteristics are precisely those that are regarded as essential for achievement in mathematics.

## **1.7 THE RESEARCHER'S ASSUMPTIONS**

A plethora of literature (Giliomee, 2012:67-86; Tshiredo, 2013) has emerged postulating that the current status of education in South Africa is being defined largely from a platform laid by the former architect of apartheid education in South Africa, Mr Hendrick Verwoerd. Verwoerd is famously known for his comments promoting denial of the Black child's access to science education in South Africa (Giliomee, 2012:67-86; Tshiredo, 2013). Verwoerd was a racial supremacist advocating for separate development for Blacks and the Whites. Based on a plethora of factors that emanated from apartheid education policy of Verwoerd as dispensed to Black children, education in South Africa was therefore entangled in an assortment of negative factors impeding its delivery henceforth – especially the period post-apartheid. Some of these complexities and constraints affecting post-apartheid education

transformation were sufficiently investigated by, amongst others many emerging researchers (Mafukata, 2016:68-79; Tshiredo, 2013:1-147).

Given the limitations of this study, its specific focus was therefore on matters as they affected the teaching and learning of mathematics in some South African schools. The main question to arise from this scenario is therefore trying to establish solution(s) to the complexities and constraints as affecting mathematics in Grade 12. The focus is on learner performance in mathematics. The assumption is that the factors to emerge would have a bearing from the Verwoerdian education policy of apartheid, the effects of which have been carried over to modern educational set-up and system in post-apartheid South Africa. Bearing the limitations of this study, the main focus is therefore only limited to investigating the socio-cultural and psychological factors of the learner as observed in the schools within the Nzhelele East Circuit of the Vhembe District, Limpopo Province, South Africa.

## **1.8 DELIMITATION OF THE STUDY**

This study was confined to two secondary schools in Nzhelele East Circuit. The study focused on School Management Teams (SMTs), mathematics teachers who teach grade 10, 11 and 12 and Grade 12 mathematics learners in these particular schools. The study was focused on Nzhelele East Circuit because no prior research of this nature had been conducted in this area with regard to factors affecting performance of Grade 12 learners in mathematics. However, a much similar study was conducted (Mafukata, 2016:68-79) in physical science. Nzhelele East Circuit is situated in the western side of Thohoyandou area just some 20 Kilometers on the eastern side of the National Road One (N1) towards the northern border town of Musina into Zimbabwe. The selected schools are in the Makhado Municipality of the Vhembe District Municipality, Limpopo Province.

## **1.9 LIMITATIONS OF THE STUDY**

The main purpose of this study was to determine factors affecting the performance of Grade 12 learners in mathematics in Nzhelele East Circuit. However, the study had certain limitations. To start with, this study was limited to SMTs, teachers and learners of the two selected secondary schools. Crucially, because of logistical limitations of this study, important

stakeholders such as parents of the learners attending the selected schools, circuit managers and School Governing Body members (SGBs) who could have provided some valuable information – to add quality and validity and reliability of the study have been excluded. However, to address the limitation, a follow-up study to this effect has been recommended for the future. The limitations of this study as explained point to some obvious limited resources, time and financial constraints which eventually restricted the researcher to a study involving this scope. Furthermore, methodological limitations were also identified. For example, since the sample size was too small for a quantitative opinion, the choice fell on a qualitative research approach.

The study was designed to be exploratory and descriptive in nature. It is difficult to assess whether all participants interpreted all the items correctly and honestly. Finally, the study area has some increased levels of illiteracy, and for the respondents to cope with an English questionnaire for example was going to pose some fundamental challenges. In this regard, the researcher borrowed a solution from Mafukata (2014:67-75) who recommended that cross-language questionnaire instruments be employed in such circumstances. The research questionnaire instrument was translated from English to Tshivenda which is a language commonly used in the area to collect data. The argument is that employing the English questionnaire instrument might have had some material impact on the validity and reliability of the collected data, and therefore subsequently affecting the final research outcome.

## **1.10 CHAPTER DIVISION**

The study was conducted under a different set of sub-themes, and the sub-themes have been grouped into specific areas of reference to promote readability of the report. The specific areas were categorised as chapters. This section describes what each chapter presents in the report.

### **Chapter one**

This chapter presents the introduction and the background statement of the study. Furthermore, the chapter also presents the statement of the problem, research questions, aim

of the study, definitions of concepts, assumptions, delimitation and limitations of the study, ethical considerations, chapter division and conclusion.

## **Chapter two**

Chapter two presents the theoretical framework and summary of literature reviewed for the purpose of this study. The literature review was sourced from Kenyan, Ghanaian and South African literature sources. The reasons for this have been detailed elsewhere in the research report.

## **Chapter three**

Chapter three presents the research design and methodology employed undertaking the study. This chapter also describes how data were collected, analysed and reported.

## **Chapter four**

This chapter presents the main findings of the study.

## **Chapter five**

This chapter presents the overview, synthesis and recommendations of the study.

## **1.11 CONCLUSION**

This study investigated the factors affecting performance of Grade 12 learners in mathematics. The study was undertaken at two secondary schools in the Nzhelele East Circuit, Vhembe District of Limpopo Province, South Africa. Reviewed literature and the results of this study proved that indeed there were some serious complexities and constraints affecting learner performance in Grade 12 mathematics which needed urgent attention at policy and school levels in South African schools. Recommendations are made at the end of this report.

## **CHAPTER TWO: THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

### **2.1 INTRODUCTION**

This chapter outlines the theoretical framework underpinning the study. Furthermore, this chapter reviews literature used in this study. In order to conceive the research topic in a way that permits a clear formulation of the statement of the problem, some background information is therefore crucially necessary. This is obtained by reading what has been published before by other researchers opined to be relevant to the research topic. The literature reviewed for the purpose of this study was mainly sourced from some specifically selected regions such as Southern Africa (South Africa) East and West Africa (Kenya and Ghana) where research on factors affecting performance of learners in mathematics has been considerable and influential. The choice of these few regions is the obvious limitations attached to this study as a result of its level of study. However, this chapter considers the fact that there could be some fundamental differences with regard the socio-cultural and psychological contexts of learners – in particular with regard learning of mathematics between South Africa and East and West Africa in particular. Despite this limitation, this chapter could still assist the study achieve its intended objective(s) – and also to draw parallels, albeit in a limited way. Through considering parallels and differences between East and West Africa and Southern Africa, the researcher looked at factors affecting performance in mathematics in Kenya and Ghana.

### **2.2 THEORETICAL FRAMEWORK OF THE STUDY**

This study bases its theoretical framework on a set of intertwined theories. First is the critical thinking theory used and adopted by Thompson (2011:1) and the Whole System Analytical Framework adopted and used by Mafukata (2016:68-79). Since no one particular theory could be the final and sole provider of an analytical framework of a study of a complex and cumbersome complexities and constraints such as this, other supplementary theories used to achieve the objective(s) of this study are also discussed. These other theories include behaviourism, observational learning adopted by Craig, Chi and Valehn (2009:786) and

Groenendijk, Janssen, Rijlaarsdam & Van den Bergh (2011:1-16), and socio-cultural theory as adopted and widely affirmed by Ayodele, Ojewole, Olutunde and Oluwatoyin (2014:193-205) for instance. Ayodele et al. (2014:193-205) borrowed the theoretical framework from the work of Professor Albert Bandura, the Canadian Clinical Psychologist and scholar who is widely acclaimed as the “founding father” of observational theory. Observational learning theorists postulate that learners learn by watching the learning process, interpreting and evaluating peers carrying out a particular task (Groenendijk et al., 2011:1-16). This alone explains the inter-connectedness of observational theory and social theory commonly adopted by most social scientists in modern research. Both social and behavioural theorists contend that “behaviour either good or bad, is learnt” (Ayodele et al. (2014:193-205).

It is evident that the focus of observational learning theory is to enhance creativity and independent thinking among learners’ thereby promoting performance and motivation of the observing learner (Groenendijk et al., 2011:1-16). Observational theory allowed this study to analyse the learner's behaviour and responses during learning, although such inferences were made based on the information sourced from the teachers. The question posed to the teachers requested them to describe how their learners behaved and responded to the task at hand during lessons.

Since learner performance could be linked with thinking abilities of the learners, it was critical and crucial that questions be raised which had to do with analysis of the thinking abilities of the respondent learners in this study. This study evoked the elements of critical thinking theory to provide the analytical framework. Critical thinking theory builds its characterisation and properties from progressive movement which became dominant in the social sciences as early as post-World War 1 (Thompson, 2011:1). According to Thompson, 2011:1, critical thinking theorists such as John Dewey believed that learners of mathematics for example, have to be assisted to achieve key fundamentals such as problem solving, conducting scientific inquiry, acquiring active learning skills and achieving self-discipline among others. These are skills needed in critical thinking. In other words, these skills theorise that the learner of mathematics for example would be able to master how to think, rather than what to think (Thompson, 2011:1). Evidently, critical theorists fundamentally shift from the direction adopted say by behaviourists for example. Behaviourists argue that learning could be mechanical, permanent, involving observable change in the behaviour of the learner as a result of emanating personal experience. Behaviourists argue that the change is effected in the learner through a process of reward and reinforcement. In other words, behaviourists deviate

from the dimensions of critical theorists in that behaviourists emphasise mechanical and “conditioning” work such as learning through drill work and practice based on adherence to strict procedures including memorisation of formulas and the use of one-way methods to solve mathematical problems rather than focusing on strengthening mental development and exercise widely adopted by critical thinking theorists such as John Dewey (Thompson, 2011:1).

Although behaviourism has received immense criticisms of late in current literature on mathematics teaching and learning in South Africa, pointers are that the theory is still prevalent in some practice of mathematics education in some areas of South Africa. Teachers adopt the theoretical factors of behaviourism in order to achieve required, demanded and expected results from them by the authorities. However, there is also the factor of a possible transference of, and exportation of behaviourism from the Bantu education dispensation, mainly because of insufficient re-training and pedagogical support provided to practicing teachers through teacher in-service-training and otherwise. This assertion could be corroborated by the findings reported by Mafukata (2016:68-79) who argued that teacher-in-service-training was at its lowest ebb in South African schools – especially in the sciences such as mathematics and physical science.

Furthermore, John Dewey and other critical thinking theorists postulated that critical thinking would define the role of the teacher in problem solving and conducting scientific inquiries among learners. This study hypothesised therefore that the teacher would play a major role in determining the learner's performance in mathematics. In view of this, the study professed therefore that the teacher would dispense a facilitator service during learning; supporting the learner in locating, analysing, interpreting and evaluation of data (Thompson, 2011:1). Evidently, the facilitator has that role of creating a creativity-intense child-centred and activity-centred learning teaching and environment (Thompson, 2011:1). These are characteristics of critical thinking theory of John Dewey and others. Critically, the hypothesis made by this study is that as matters are, and as observed from the statement of the problem, it could be that teaching and learning of mathematics in this case study schools are not effectively promoting critical thinking among learners. This assertion could be corroborated by the views expressed by Thompson (2011:1) who argued that “teaching does not always result in critical thinking”. The adoption of critical thinking theory as analysis framework instrument for this study was in fact necessitated by the need to answer issues on the

psychological factors of the learners in trying to establish how this links, to, and also affected learner performance in mathematics – especially in this case study. This is informed by the desire of the study to achieve the main objective of this study, and in addition, to answer issues of question which guides this study. The design of this study elevates the learner to the primary focus status. This makes issues of the learner fundamentally crucial for a balanced analysis of the statement of the problem. Questions are used in the engagement of the researcher with the learner in order to establish the real learner-focused factors impeding learner performance in mathematics in the respective schools. To achieve the objective(s) of this line of engagement with the learner, this study relied on the properties of the theoretical assumptions designed by Barnett and Gareis (2007:727-748) in which the researcher argues that parental involvement or non-involvement would bear significance on the learner's socio-emotional characterisation. Often the manifestations of non-involvement of parents in the education of the learner reveals among others negative factors of emotional distress, involvement of the child in violence and substance abuse for example (Barnett and Gareis, 2007:734). This study tries to extract this validation by asking the learner if the parent was involved in assisting the learner with studies. Evidently, this approach allows for an integration of multiple theories in the investigation.

The adopted theories express and affirm the view that “schooling is a multifaceted process in which student's achievement is influenced by student characteristics” (Kiwanuka, Van Damme, Van Den Noortgate, Anumendem and Namusisi (2015:1). In other words the assertion of this study is that factors affecting performance of learners in mathematics – especially for the selected case study, are vast and intertwined – even beyond school and classroom inputs (Giliomee, 2012; Mafukata, 2016:68-79). What this assertion implies is that the factors affecting learning, teaching and learner performance in mathematics were at most beyond school and classroom inputs just as these factors are in science education in general as has been postulated by other science education scholars such as Mafukata (2016:68-79).

Having looked into the application of the adopted theoretical frameworks for this study, it could be concluded therefore that scholars of education would adopt a broader set of theories to analyse their problems, and to also draw conclusions. This approach adds value in methodological dimensions of problem investigation considering that other across-field current literature, Mafukata (2016:68-79) for example applied other theoretical frameworks to analyse and draw their conclusions. For example, Mafukata (2016:68-79) argued for the

adoption of the Whole System Analytical Framework for a study investigating complexities and constraints affecting learner performance in physical science in Vhembe District schools. According to Mafukata (2016:68-79), the Whole System Analytical Framework is an extension of the Input-Process-Outcome Framework used and adopted by scholars such as Howe and Muzah for example. I made this parallel citation of the theories to indicate that there are a broad range of theoretical frameworks in studies of this nature, only that the adoption and usage of any of these, or all of these depend on the nature of the problem being investigated. For example, in the Mafukata (2016:68-79) study, this study might as well overlap to adopt some portions – especially with regard investigation of the effect of factors such as socio-economic dynamics of learners involving poverty, availability of resources, teaching-learning cultures, availability of infrastructure and teacher-based factors such as qualifications and teacher experience for example amongst. In fact, researchers such as Kriek and Grayson (2009) and Mafukata (2016:68-79) seem to agree with this approach. Evidently, theories for this kind of study prove to be highly multiple, intertwined and complex (Mafukata, 2016:68-79) – to that point of even borrowing characteristics from each other. Based on this assertion, this study postulated therefore that the poor performance of learners in mathematics is dependent on a multiplicity of factors. This view is corroborated by both Mafukata (2016:68-79) who argued that studies such as this usually establish that there were that wide ranging inter-connectedness of factors which collaborate in affecting performance of a learner; either by lowering the standard or by improving the standards in science subjects such as mathematics.

Portions of Mafukata's Whole System Analytical Framework theory in investigations of problems such as has been expressed in this study have also been used to address the expectations of Research Question in particular read together with the main aim of this study. Mafukata's defence for the adoption of the Whole System Analytical Framework theory seems to bear demand of recognition and adoption for this study because, the theory he applied is relevant to the issues to be raised by this study. For example, this study's investigation is spread over the learner, teachers, School Management Teams – which all together point to the properties of the Whole System Analytical Framework theory.

## **2.3 LITERATURE REVIEW**

This section presents the literature reviewed for the purpose of this study. The reviewed literature has been purposively selected from South Africa, Kenya and Ghana respectively as explained elsewhere in the methodology of the study.

### **2.3.1 Factors affecting learner performance in mathematics in Kenya and Ghana**

This sub-section presents the literature sourced out of Kenya.

#### **2.3.1.1 Kenya**

Like most African countries that were oppressed, Kenya got independence from Britain in 1963. From that year on wards, education in Kenya was viewed as the means to eradicating poverty, ignorance and diseases (Mbugua, et al., 2012:60). Mathematics was then viewed by the greater part of society as the foundation of scientific and technological knowledge vital in attaining social-economic development of the new Kenyan nation. In Kenya, mathematics is a compulsory subject at both primary and secondary school levels (Mbugua, et al., 2012:75). This differs from South Africa where in Grade 10 up to 12, learners are allowed to choose between pure mathematics or mathematics proper and mathematical literacy. Ironically, in South Africa, mathematics is also used as a basic entry requirement into any of the prestigious degree programmes and courses such as medicine, architecture and engineering among others. A large number of children who do not take mathematics as a compulsory subject at high school would be excluded from obtaining qualifications in the above-mentioned fields.

Despite the important role that mathematics plays in society, and the fact that it is a compulsory subject in countries such as Kenya for example, Mbugua, et al. (2012:88) found and reported that learner performance in mathematics has persistently been poor in Kenyan schools. As a result of poor performance in mathematics in Kenya, a study was conducted to investigate factors contributing to such poor performance and to establish the strategies that could be adopted to improve performance and enhance the output of learners in mathematics in Kenyan secondary schools. The study was conducted in the Baringo County. Descriptive survey research design was adopted for the Mbugua, et al. (2012:88) study. In the Mbugua,

et al. (2012:88) study, the target population was 1718 secondary school learners selected from 26 secondary schools in the study site. Mbugua, et al. (2012:88) further selected 132 mathematics teachers and 26 head teachers for the study. The questionnaire instrument which the Mbugua, et al. (2012:88) study employed for the study comprised sections on socio-economic and cultural factors, school-based factors with items such as teachers' attitude towards mathematics, teachers' workload, teacher effectiveness and availability of teaching/learning materials (Mbugua, et al., 2012:102). This approach was also adopted by Mafukata (2016:68-29) in the study of similar circumstances in South Africa in the subject of physical science. Mbugua, et al. (2012:88) found and reported that performance in mathematics in Kenya was influenced by the following factors: (1) school-based factors, (2) socio-economic and cultural factors of the learners, (3) teacher-based factors, and (4) institutional factors among others. Here-under a shortened presentation is made under the Mbugua, et al. (2012) findings as demonstrated from factor one (1) to factor four (4) above.

- School-based factors

Mbugua, et al. (2012) reported a variety of intertwined school-based factors affecting learner performance in mathematics in Kenya.

- Socio-economic and cultural factors of the learner

Mbugua, et al. (2012) found that learners of mathematics in Kenyan schools were affected by the poor formal school education level attained by the parents. Most parents in the Mbugua, et al. (2012) study had attained only primary school level. The implication is that the learners would not receive any assistance from the parents outside the school – especially with regard home work. Poverty also played a major role. The majority of households where the learners came from in the Mbugua, et al. (2012) study were poor. The majority of the Learners' parents or guardians had their household income sources from primary informal agriculture which generated very little disposable income. Apart from the income being little and insufficient, the income was also inconsistent. Therefore, learners Mbugua, et al. (2012) concluded that the majority of learners' whose parents relied mainly on primary informal agriculture for a living were likely to receive inadequate support – especially with regard obtaining learning resources such as stationary. In addition, Mbugua, et al. (2012) found that cultural factors of society impacted on learners. For example, factors such as circumcision, certain beliefs, early marriages and household family income levels provided fundamental complexities and constraints to studying – especially with regard

mathematics. Mbugua, et al. (2012) argued that environments caused by socio-cultural practices such as cattle rustling, early marriages and female genital mutilation for example would manifest emotional problems at school.

- Teacher-based factors

According to Mbugua, et al. (2012), teachers of mathematics in the Kenya study had a major role in determining performance of learners in mathematics. For example, the fact that despite the poor performance of learners in mathematics in the majority of schools, a significant proportion of the teachers remained positive that the situation would improve. In other words, notwithstanding the difficulties experienced in mathematics in Kenya, the teachers still demonstrated increased levels of positive attitude towards mathematics. However, mathematics teachers were mostly overloaded in Kenya. Over-loaded teachers find it difficult to have enough time for individual learners for assistance in mathematics – especially where struggling learners needed that assistance.

- Institutional-based factors

In the Mbugua, et al. (2012) study, information obtained shows that schools in Kenya lacked proper physical facilities suitable to the teaching and learning environment of mathematics. Some schools lacked even basics such as textbooks.

- Learner's personal factors

Personal factors contributing to poor performance in mathematics were found to be gender, economic factors and attitude towards mathematics. In the Mbugua, et al. (2012) study, the findings were that learners displayed positive attitude towards mathematics.

Conclusions drawn by Mbugua, et al. (2012) were that:

Although both teachers and learners displayed positive attitude towards mathematics, their performance could have been mainly negatively affected by other factors such as increased work overload of teachers, lack of physical facilities, uneducated parents and early marriages among others (Mbugua,et al., 2012:89). Based on the afore-going statement in the study conducted in Kenya, this researcher aimed at finding out the causes of poor performance in mathematics in the Nzhelele East Circuit, Limpopo Province, South Africa.

The following sub-section presents the literature sourced out of Ghana.

### **2.3.1.2 Ghana**

In Ghana, mathematics is a core subject at all levels of education. It is regrettable, that in the contemporary times many learners of mathematics still struggled with mathematics and also performed poorly in most jurisdictions in Ghana (Mensa, Okyere and Kuranchie 2013:130). In Ghana, learners' performance in mathematics at high school level has not been encouraging of late (Chief Examiner's Report, 2007). The cause of poor performance in mathematics might be that some candidates are reportedly exhibiting poor understanding of mathematical concepts. In addition, such learners of mathematics are unable to develop the appropriate mathematical models which could be tackled with the requisite skills (Chief Examiner's Report, 2007). In Ghana, it has also been realised that as a direct result of the large number of students that fail mathematics every year, many learners have developed negative attitude towards the study of the subject. Similar attitudes have been observed in South Africa, especially in the circuit under study. This finding is contrary to the findings of Mbugua, et al. (2012) in Kenya where the majority of learners and teachers displayed positive attitude towards mathematics regardless of their poor performances in the subject. According to Mensa et al. (2013:132), the seriousness attached to the teaching of mathematics invariably affects learners' performance in their final examinations. For example, the conceptions, attitudes, and expectations of learners regarding mathematics learning and mathematics teaching have been considered to be very significant factors underlying their school experience and achievement (Mensah, et al., 2013:140).

In general, the misconceptions that learners hold about mathematics would determine how the learners approach the subject. In many cases, learners have been found to approach mathematics as procedural and rule-oriented. This prevents them from experiencing the richness of mathematics and the many approaches that could be used to develop competence in the subject. Educational researchers have expended time and energy trying to unravel the possible causes of learners' poor attitudes and performance in mathematics. A study was conducted in Ghana which focused on the correlation between teacher attitude and student attitude toward learning mathematics (Mensah, et al., 2013:156). The study sought to determine the attitude of mathematics teachers as perceived by the learners. The results demonstrated that all the teachers had positive attitude towards mathematics based on their attitude score. The results again show a positive and significant correlation between teacher attitude and student attitude.

The findings by Mensah, et al., 2013 corroborate the assertion postulated by Yara (2009:145) who opined that teachers with a positive attitude towards mathematics are inclined to stimulate favourable attitudes in their learners. The study disclosed that the attitudes of mathematics teachers were related to the attitude of the learners towards the subject. This connotes that irrespective of the mathematical capacity of learners, if teachers display negative attitude towards mathematics, learners may not develop positive attitude towards the subject and vice versa. The more positive the attitude of mathematics teachers towards the subject, the more positive the learners' attitude towards the study of the subject.

From the above findings, it is evident that the negative attitude of both teachers and learners in mathematics is a contributory factor of poor performance of mathematics in Ghana. It is vital for the current study to consider teachers and learners' attitude and investigate if there is impact on the performance of learners of mathematics. It is also evident from the exposition in the two countries that the three learning theories tie very well with the factors affecting learner performance in mathematics, especially in the area of teacher effectiveness, children's socio-economic background and whether society rewards certain behaviours that encourage performance in the subject.

### **2.3.1.3 South Africa**

It is unfortunate that even under a democratic government South Africa is still performing poorly on international assessments of mathematics. According to Pereira (2010:1), learner performance at both primary and secondary school levels does not appear to have improved significantly over the past 10 years. More than 50% of all learners who wrote mathematics in 2008 had failed the examinations in South African schools (Mukadam, 2009:2). Therefore; many learners are going for the easier option by enrolling for mathematical literacy instead of pure mathematics. Mafukata (2016) found and reported similar patterns in physical science in an earlier study conducted in the Vhembe District. These defeats the intended outcome of producing skilled human resources from among South African learners expected to follow careers in pure sciences such as mathematics, medicine and engineering for example. Mafukata (2016) postulated similarly, but added that the country would instead have to depend on foreign nationals to achieve its growth and development programme post-apartheid.

Observations are that the other reasons affecting learner performance in mathematics are with regard:

- Poor time management practices at school and classroom levels
- Teacher knowledge of mathematics
- Insufficient classroom work – homework and tasks performed (Pereira, 2010:2).
- South Africa's past experiences of colonialism and apartheid
- Lack of learner-teacher support materials, and
- Low educational levels among parents.

### **2.3.2 Historical overview of mathematics subject in South Africa**

Of major importance is to understand first, the five dispensations involving the evolution of education in South Africa. The historical overview of mathematics in South Africa could be best understood in the context of the entire education system throughout history. These dispensations were summarised as postulated by Jansen (n.d:1-12):

- Traditional African education

This dispensation was led by indigenous African community elders with education dispensed through oral tradition and cultural mechanisms and instruments. The education was integrated with real life experiences.

- Slave educational

This dispensation was introduced by the early European settler colonialists who based their education system of simple Christian instruction.

- Mission education

This dispensation was introduced in the 1800s by Christian missionary societies who introduced European form of education in South Africa – especially on Blacks.

- Native education

Native education dispensation first emerged in the 1920s with emphasis on segregated curricula. This dispensation is famous of the rapid structural deterioration of Black schools in South Africa.

- Bantu education

This came into effect as a result of the Verwoerdian apartheid policy education wanting to adapt the teaching of Black South Africans to adapt to working for a White man. This was introduced in 1953.

- Post-apartheid education

The post-apartheid education dispensation came into being during South Africa's attainment of liberation from apartheid in April 1994. This is characterised by transformational objectives wanting to create an inclusive education system for all South Africans irrespective of race, gender, religious affiliation among others. This is in terms of the South African post-apartheid Constitution promoting democracy in South Africa.

During apartheid, the Bantu curriculum, as one white Nationalist official once stated during the height of apartheid, was to teach a curriculum that suited the "nature and requirements of the black people (Maxwell: 2010:1)." In other words, the purpose of Bantu schools was to produce a large unskilled labour force which would have served to ensure white prosperity and their domination of the Blacks. Maxwell (2010:2) indicated that the over-all aim of Bantu education was to prevent Africans from receiving an education that would have lead them to aspire to positions similar to those of the Whites. Black education curriculum delivery focused on dissuading the Black child from developing an interest in the sciences such as mathematics and physics. To maintain this approach, the apartheid regime made sure that resources necessary for the teaching of mathematics and physics for example were not adequately deployed to Black schools. The training of Black mathematics and physics teachers was never a priority. This subjected Black children to being taught by an inadequately trained teacher. Mafukata (2016) also found similarly in physical science. The actions of the apartheid regime also meant that both the learner and the teacher struggled with mathematics content knowledge development and acquisition - thereby compromising the development of interest in mathematics among Black learners and teachers.

In Bantu schools (as blacks schools were called) during apartheid, learners were not allowed to study science, mathematics and other subjects that would have prepared them for jobs in the apartheid-era economy (Maxwell, 2010:2). Lack of background in mathematics led the Black child to lack interest in mathematics and science. According to Tachie and Chireshe (2013:1), the importance of having a solid background in mathematics is well recognised as it serves as gateway to future professions in a variety of fields. Mathematics is crucial for human life as it deals with real life situation. A thorough understanding of mathematics is an asset, if not essential, for applicants interested in obtaining better employment in the world, but this was denied the Black child by the apartheid regime.

According to Mefor (2011:1), the poor performance of learners in mathematics has become a source of worry to many countries worldwide. The solutions to this problem have been raised by many experts in the field, yet the problem tends to persist. Mefor (2011:3) wrote that the solution proffered should not simply be a paper solution but that there is a need to go beyond paper solutions into an implementation stage of such solutions if the nation wishes to become one of the 20 most developed economies by the year 2020.

### **2.3.3 Parents educational level**

Parent's formal educational level has been shown to be a factor in academic achievement (Saritas and Akdemir, 2009:3). Parents serve as role models and guide in encouraging their children to pursue high educational goals and desires. This they achieved by establishing the educational resources on hand in the home and holding particular attitudes and values towards their children's learning. Educational attainment of parents serve as an indicator of attitudes and values which parents use to create a home environment promoting increased learning desire among children while inculcating that desire for achievement on the one hand. According to Saritas, et al. (2009:4), student achievements are correlated highly with the educational attainment of parents. In addition, Saritas, et al. (2009:5) indicated that learners whose parents had less than high school education obtained lower in mathematics than those whose parents had higher levels of education. The learners' perception of family support directly affects performance, while the mother's level of education does so indirectly. Rammala (2009:14) supported this assertion and indicated also that those learners whose parents are not adequately literate are disadvantaged because in modern education parents are required to assist children with their assignments and projects from the home.

### **2.3.4 Effect of language in performance of learners in mathematics**

According to Pereira (2010:4), language proficiency is a sensitive but important issue, which affects learning achievement in mathematics. The Department of Education's Language in Education Policy (LiEP) promotes additive multilingualism. However, schools are not implementing this properly. In many cases, teachers use a largely unplanned code switching strategy. There is a risk of high failure rate in mathematics as core concepts in mathematics may not be understood, or are lost. Learners need to be fluent in the language of learning and teaching to have full access to mathematical terms and concepts and the associated reasoning skills. Rammala (2009:16) also indicated the importance of language in the performance of learners in mathematics. According to Rammala (2009:21), there are arguments that mother tongue for example is the basis of all teaching and that must be the medium of instruction because bilingualism cannot be set as the aim of teaching. Rammala (2009:22) added that most Grade 12 learners in most South African schools are struggling to communicate in English and that could be one of the factors that put them at a disadvantage, since that is the language used to respond to questions in the examination. Mafukata (2016) also found similarly in an earlier study conducted in the area in physical science.

### **2.3.5 The impact of attitude of learners towards performance**

Coming from a background of a circuit which is under-performing, this section will look at the attitude of learners towards learner performance in mathematics. Odhiambo, Standslause, Maito and Ochiel (2013:117) indicated that an attitude is a point of view about a situation; it is a way of thinking. It is an inward feeling expressed by outward behaviour. Therefore, this study focuses on how attitude as a concept is concerned with an individual's way of thinking, acting and behaving (Mensah, et al., 2013:131). It has very serious implications like low performance levels by both the learner and the teacher, the immediate social group with which the individual learner relates, and the entire school system. Attitudes are formed as a result of some kind of learning experiences learners go through. Mensah, et al. (2013:132) indicated that attitude plays a great role on the performance of learners in mathematics. It is further asserted that the formation of attitude is experiential. In addition, Mensah, et al. (2013:134) further indicated that some authorities regard attitude towards mathematics as just a like or dislike for mathematics, while others extend the meaning to embrace beliefs, ability, and usefulness of mathematics.

According to Mata, Monteiro and Peixoto (2012:1), attitudes are regarded as an important factor to be taken into account when attempting to understand and explain variability in student performance in mathematics. They continue and indicate that it is believed that learners with positive attitude perform well but learners with negative attitude perform badly. The attitudes of learners are influenced by many things. Mohamed and Waheed in Mata, et al. (2012:2) identified three groups of factors that play a vital role in influencing student attitudes: (1) factors associated with the learners themselves (for example, mathematical achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school); (2) factors associated with the school, teacher, and teaching (for example, teaching materials, classroom management, teacher knowledge, attitudes towards mathematics, guidance, beliefs) and (3) factors from the home environment and society (for example, educational background, parental expectations).

These factors must be taken into consideration if we want to address factors such as poor performance of learners in mathematics. The other point is of attitude being caused by academic performance. Tsanwani (2009:24) added that factors such as attitude and beliefs play an important role in mathematics achievement. In Zachariah, Komen and George (2012:87) and Mwamwenda (1995) supported this assertion and furthermore argued that the achievement of learners in a subject is determined by their attitudes rather than inability to study or perform. Zachariah, et al. (2012:88) added another type of attitude which is resistance by learners. He indicated that the cause of most failures in schools might not be only due to insufficient or inadequate instruction but by active resistance by learners (Zachariah, et al., 2012:87).

Lipnevich, McCann, Krumm, Burrus and Roberts (2011:110) in a study developed with USA and Bielo Russian middle school learners highlighted the importance of attitudes in predicting academic achievement. According to Rammala (2009:19), the negative attitude towards learning could result in learners performing poorly preventing them from obtaining required results for university entrance. This means that the general relationship between attitude and achievement is based on the concept that the better the attitude a learner has towards a subject or task, the higher the achievement or performance level in. This is also supporting the idea that positive attitude lead to good performance whereas negative attitude lead to poor performance.

It may thus be concluded that, while attitude is shaped by many experiences, it becomes a determining factor in the effort that one is ready to exert on an activity, propelled by a desire to achieve. From the authors referred to above, it is clear that learners need a motivating environment, created by parent, teachers and the general school environment, to achieve academically, including achievement in mathematics. In the context of South Africa, government policy also played a significant role. South Africa, with a long history of subjugation of the black majority by a white minority, which also affected education provisioning, especially the idea that mathematics is not for black people, may have also created negative perceptions for mathematics in black children. This then would have led to negative attitude towards mathematics in the black child. This attitude may have been the leading cause of poor performance in mathematics.

### **2.3.6 Gender differences in relation to attitude**

Mensah, et al. (2013:135) indicated that attitude can also be gender-related. There are many who hold the view that boys do better in mathematics than girls. This belief tends to affect the attitude of girls towards mathematics. Mensah, et al. (2013:136) indicated that Farooq and Shah in a study of secondary school learners in Pakistan found that there was no significant difference in confidence of male and female learners towards mathematics at secondary school level. They rather found that learners' success in mathematics depended on attitude towards the subject. Nonetheless, some studies have found gender difference in learners' confidence in mathematics. Compared to boys, girls lacked confidence, had debilitating causal attribution patterns, perceived mathematics as a male domain and were anxious about mathematics. Mensah, et al. (2013:137) indicated another study of Casey, Nuttal and Pezaris. In the study, girls were found to have lower self-confidence in mathematics than boys.

### **2.3.7 Teacher attitude towards mathematics**

According to Mensah, et al. (2013:137), an understanding of how attitudes are learned should establish a connection between teachers and learners' attitudes, and attitudes and performance. In addition, Mensah, et al. (2013:139) indicated that positive teacher attitude towards mathematics was significantly related to high achievement in pupils. The study conducted disclosed that learners with the devoted teachers had the courage and determination to face difficulties in school life. Teachers were recognised as those who

provided support, encouraged learners and their value for love eradicated unwanted behaviour in learners. Teachers are, invariably, role models whose behaviours are easily copied by learners. What teachers like or dislike, appreciate and how they feel about their learning or studies could have a significant effect on their learners. Unfortunately, however, many teachers seldom realise that how they teach, how they behave and how they interact with learners can be more paramount than what they teach (Yara, 2009:20). Clarke, Thomas and Vidakovic (2009:98) postulate that attitudes and practices of teaching mathematics are deeply affected by beliefs, emotions, social context and content knowledge. Studies confirm that emotional responses toward mathematics that are found in teachers include like and dislike of mathematics, anxiety associated with mathematics and self-confidence in relation to mathematics (Phillipou and Christou, 1998; Brady and Bowd, 2005; Henderson and Rodrigues, 2008). These emotional factors have been found to have an impact on student performance. In their study of teachers' self-esteem connected to mathematics, Henderson and Rodrigues (2008) found that approximately half of the participating pre-service teachers, some of whom were highly qualified, lacked self-esteem in relation to mathematics. Burks, Heidenburg, Leoni and Ratliff (2009) stipulate that teachers' exhibition of self-confidence when teaching mathematics motivates student achievement in mathematics. The learner draws from the teacher's disposition to form his own attitude which may affect his learning outcomes.

Teachers' beliefs about mathematics such as the usefulness of mathematics, the way mathematics should be learned, the difficulty or ease of mathematics, as well as gender ability and beliefs also affect their attitude towards the subject and impact on learners' performance. Teachers' beliefs about the utility of mathematics are often found to correlate with either a more positive or negative attitude towards the subject. It is believed that a teacher who sees no usefulness of mathematics in the real world and believes that mathematics should be learnt as a set of rules and algorithms will require his learners to memorise procedures and rules without meaning. This is a negative outlook that will make his learners develop a negative attitude towards the subject. Also, a teacher who believes that girls are poor in mathematics is likely to impact negatively on girls in his class who will begin to believe that they cannot do mathematics.

Another aspect of the teacher's attitude towards mathematics is the teacher's behaviour in relation to mathematics. Such mathematics-related behaviour as avoidance of mathematics,

pursuit of mathematics and instructional behaviour in the classroom all affect student attitude and performance. Usually, the way that mathematics is represented in the classroom and perceived by learners, even when teachers believe they are presenting it in authentic and context dependent way, stands to alienate many learners from mathematics. From the theories underpinning this study, it is clear that the behaviour, observation and environment do influence and affect performance of learners. The literature review in this study is evident that poor performance in mathematics needs to be addressed

## **2.4 CONCLUSION**

This chapter presented theoretical framework and literature review. From the literature presented, it has emerged that attitudes of learners and teachers, teacher development, parents' educational level and language are making a serious impact on learners. The truth is unless we know the cause of this attitude towards mathematics we will not get a solution to the poor mathematics performance problem. I understand that this research cannot be the only solution to many challenges facing mathematics subject but it can add value to what needs to be done.

## **CHAPTER THREE: RESEARCH DESIGN**

### **3.1 INTRODUCTION**

This chapter discusses the methodology employed in this study. Within the context of the methodology applied, data collection and data analysis processes and procedures are also documented. Furthermore, this chapter presents the research design and sampling procedures followed in the study, and ethical considerations. According to McMillan and Schumacher (2010:8), methodology entails the ways in which one collects and analyses data. In a broader context, methodology refers to a design whereby the researcher selects data collection and analysis procedures to investigate a specific research problem.

### **3.2 RESEARCH METHODOLOGY**

This section presents the research design, Sample frame and sampling procedures, data collection instruments, procedures and data analysis techniques and ethical considerations employed in this study.

#### **3.2.1 Research design**

A research design describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained, analysed and reported for example (McMillan, et al., 2010:20). According to Luck and Ruin (2009:78), “A research design is the determination and statement of the general research approach or strategy adopted for the particular project” Evidently, what Luck and Ruin (2009:78) are postulating is that a research design would be expected to assist and provide in addition, with some planning of the research. Therefore, it could be inferred that if the research design adheres to the research objective(s), it therefore primarily ensure that the client’s needs are served. Research design therefore includes the justification of the study hypotheses or exploration of posed research questions, while presenting also a detailed presentation of the research steps followed in collecting, choosing and analysing the data. In the context of the submission by McMillan, et al. (2010:20) and Luck and Ruin (2009:78), this study employs qualitative research characteristics while detailing all the other factors as postulated by the previous researchers mentioned.

The choice for a qualitative design hinged on several factors. Firstly, qualitative research design was the most relevant design for this study as the researcher personally collected data in the field at the site where participants experienced the problem under investigation in this study. Secondly, the study considered the fact that qualitative research is more concerned with the meaning people have constructed, like how people make sense of their world and the experiences they have in the world (McMillan, et al., 2010:360). This research was interested in understanding participants' perspectives on the performance of mathematics. The investigation was carried in real life situations and no attempt was made to manipulate the phenomenon of interest and accepted the researcher's subjectivity (Kobus, 2010:4). The participants expressed different and vast beliefs and views concerning factors affecting the performance of learners in mathematics.

### 3.2.2 Sample frame and sampling procedures

The study used convenient purposive sampling whereby participants willingly volunteered to participate in the study. Tables 2 -5 indicate the number of participants from the two targeted secondary schools and their profiles.

Table 2: Participants from two schools

Participants	School A	School B
SMT members	2	2
Teachers	3	3
Learners	10	10
Totals per site	15	15
Grand Total	30	

Table 3: Educators' profile

School	A	A	A	B	B	B
Educators	T1	T2	T3	T4	T5	T6
Teaching grade	10	11	12	10	11	12
Age	46	30	45	35	30	46
Gender	Male	Male	Male	Male	Male	Male
Teaching experience	6	4	6	5	4	6
Post level	CS1	CS1	CS1	CS1	CS1	CS1
Professional qualification	STD	STD	STD	STD	STD	STD
School setting	Rural	Rural	Rural	Rural	Rural	Rural
School level	Level 3	Level 3	Level 3	Level 2	Level 2	Level 2

Table 4: SMT profile

SMT members	SMT 1	SMT 2	SMT 3	SMT 4
School	A	A	B	B
Experience	4	6	4	6
Age	46	40	38	48
Gender	Male	Female	Female	Male

Table 5: Learners' profile

LEARNERS	SCHOOL A	SCHOOL B
Learners	1-10	11-20
Age Average	16-18	16-18
Number of learners	10	10
PERFORMANCE	Below 40%	Below 40%
Gender	4 male/6 female	4 male/6 female

### 3.2.3 Data collection instruments, procedures and data analysis

To simplify the process of data collection – especially among learners, this study employed a semi-structured questionnaire instrument. In other words, data were to be sourced based on the research questions. The translation of the English to Tshivenda questionnaire was guided by the suggestions postulated by Mafukata (2014:71). As has been alluded to earlier, a Tshivenda language translated questionnaire was used to collect data through face-to-face interviews. In order to create ownership of the research process by the learners, it was decided to ask participant learners to suggest venues for interviews. All the learners chose their schools as venues for the interviews. Interviews were conducted immediately after school lessons to avoid clashes with classroom obligations and learners having to miss lessons to attend interviews.

Data collected from the learners were guided by the following questions:

- What are your parents’/guardian’s highest academic qualifications?
- What kind of support do you receive from your parents regarding your school work?
- Have you ever participated in any Saturday or winter classes in the past three years?
- What is it like to be in a mathematics class?
- Now that you are in Grade 12, where do you see yourself in five years’ time?
- How would you describe your relationship with your mathematics teacher?
- How do you practice mathematics in your spare time?
- How do you rate your performance in mathematics?

What do you think should be done to improve learner performance in mathematics?

Data were also collected from School Management Team members (SMTs) of selected schools and some teachers. Guideline questions were drawn for the discussions. For the SMTs and the teachers, the researcher employed Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs). Focus Group Discussions involved small groups of selected individuals as encouraged by McMillan, et al. (2010:363). In this regard, the researcher adopted a small-group discussion Focus Group Discussion (FGDs) approach expressed by

McMillan, et al. (2010:363) and Olsen (2012: 77). The researcher facilitated the Focus Group Discussions (FGDs) meetings. In a nutshell, Focus Group Discussions (FGDs) with teachers were guided by the following questions:

- For how long have you been teaching mathematics?
- What is your highest qualification in mathematics?
- How do you improve on your teaching of mathematics?
- What number of students are you responsible for as a mathematics teacher?
- Do you enjoy teaching mathematics?
- How do you motivate your mathematics learners to do better in the subject?
- Do you receive any support from the principal?
- What do you think are causes of poor performance in mathematics?

Questions employed for Key Informant Interviews (KIIs) with School management Team members (SMTs) were structured as follows:

- What is the performance of mathematics learners like in your school?
- Are your teachers qualified to teach mathematics?
- How well do you quality-assure your teachers' work through moderation?
- Are your teachers subjected to any school-initiated programme of development?

In each case, it was imperative to keep the discussions shorter to avoid respondents getting tired of the proceedings. The researcher had planned for interviews lasting at most for 30 minutes in each group particularly with the learner component. In all the three instances, collected data were recorded as field notes and later coded for analysis. The coding was facilitated by dividing the collected research data into smaller parts by using a created classification system by the researcher. During data analysis, coding analytical method were used. Similar ideas were grouped as sub-themes. Individual interviews participants were referred to as, "school A" (school A teacher 1, school A teacher 2 school A teacher 3, and other participants were referred to as "school B", school B teacher 4, school B teacher 5,", school B teacher 6,), while School Management Team was (SMT 1 from school A, SMT 2 from school A, SMT 3 from school B, SMT 4 from school B. The focus group interviews participants were referred to as "learner" Group A (learner 1 from school A, learner 2 from

school A, learner 3 from school A, learner 4 from school A, learner 5 from school A, learner 5 from school A, learner 6 from school A, learner 7 from school A, learner 8 from school A, learner 9 from school A, learner 10 from school A) Group B (learner 1 from school B, learner 2 from school B, learner 3 from school B, learner 4 from school B, learner 5 from school B, learner 6 from school B, learner 7 from school B, learner 8 from school B, learner 9 from school B, learner 10 from school B ). In line with the thematic analysis as described above, the following themes (Theme one to theme four) employed for the analyses finally emerged:

- The learner's home environment

The learner's home environment is theme 1. Theme 1 deals with the home environment and information regarding this emanated from the responses by learners. However, during data analysis, it emerged that some of the responses sourced from both the teachers and the School Management Team members (SMT) for example also pointed to factors of the home environment of the learners. For example, some cultural practices affecting the learning and teaching environment of the learner would emerge pointing to the cross environment of the home of the learners. In other words, learner performance, according to participating teachers was also subject to the home environment of the learner.

- Attitude and competence of the mathematics teacher

Theme 2 represents the attitudes and competence of the mathematics teachers in schools. These were derived from responses from the teachers, learners and SMT members. The responses were related to qualifications of teachers in mathematics, and mathematics teaching, subjection to professional development programmes, support received from principals, methods used in delivering content, and number of learners in a mathematics classroom.

- Learner attitude towards mathematics

Theme 3 is basically talking about the learners and their attitudes towards mathematics as a subject. This entailed responses derived from the learners as well as those of their teachers. In addition, learner attitude towards the mathematics teacher also received attention. Furthermore, the level of learner practice of mathematics during their spare time, participation in enrichment programmes such as Saturday and winter enrichment classes received attention for measurement.

- Intervention strategies to curb the identified problem

Theme 4 is all about the strategies employed by stakeholders to improve the learners' performance in mathematics. The responses are sourced from teachers, learners and School Management Team members (SMTs). Inferences will also be made in this regard based on the responses. This means that responses will have to be interpreted in line with academic arguments. For an example, if a teacher reveals that he or she has not been subjected to any professional development programme, and further states difficulties in teaching the subject, the conclusion to be drawn therefore is that subjecting teachers to professional development programmes could or might assist improvement of learner performance in mathematics. The outcome has been recorded in chapter four of this report.

### **3.3 ETHICAL CONSIDERATIONS**

According to McMillan and Schumacher (2006:142) ethics are considered to deal with beliefs of what is considered to be right or wrong, proper or improper, good or bad. From the beginning of the research process for this study, the researcher made efforts to keep to this fundamental postulation opined by McMillan and Schumacher (2006:142). Firstly, to kick-start the process, the researcher obtained permission from District Senior Manager of Vhembe (See the attached Appendix 1). Permission was also sourced from respective school principals with the involvement of their SMT members, teachers and learners who willingly and voluntarily participated in the study (See the attached Appendix 2, 3 and 4). Ethical measures included informed consent from all participants. The researcher thoroughly explained the main aim of the study and the study processes to the participants. The participants were assured of anonymity and confidentiality of the information they provided. To ensure anonymity schools were named A and B only. Participants were requested and encouraged to voluntarily participate in the study. Further explanations to the participants were that they were allowed to withdraw from the study anytime they felt doing so. The participants were informed that they were not going to receive any monies as payment to source information from them.

### **3.4 CONCLUSION**

This chapter presented the research design and explanations on how the study was executed to its completion.

## **CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION**

### **4.1 INTRODUCTION**

The previous chapter outlined the research design and methodological processes of the study. This chapter presents the findings of this study. The findings are reported in three categories. First, the chapter presents results of the interviews held with the teachers of the selected schools. Secondly, the chapter presents the results of the interviews held with the School Management Teams (SMTs) of the selected schools, and thirdly, the chapter presents the results of the interviews held with the learners of the selected schools.

### **4.2 INTERVIEWS WITH TEACHERS**

The interviews with teachers sought to extract data based on the following variables:

- the experience of the teacher measured in years teaching mathematics
- qualifications held by the teacher in mathematics
- teacher's professional development and in-service training in mathematics
- class size
- teacher's perception of mathematics
- teacher's motivation strategies of mathematics learners
- support by school authorities – principal for example
- perception of teacher on learner poor performance in mathematics, and
- Other support received towards learning mathematics.

A brief description of each sub-theme is presented here-under:

#### **4.2.1 Teaching experience in mathematics**

In this question, the participants were expected to mention the number of years they have spent teaching mathematics. Those teachers who have taught for four years and below were

regarded as beginners and those who have taught for five years and above as experienced teachers. The results of this study revealed that the respondents have many years in teaching mathematics. Three respondents (teachers) had the highest years of experience which is six years. They are followed by one respondent who had five years of experience in teaching mathematics and lastly two respondents who had four years of experience. This indicates that all the teachers who were teaching mathematics in the selected and participant schools were highly experienced. This assertion is corroborated by the results of this study which revealed that the majority of the teachers had been teaching at least for six years. However, the results of this study revealed that a considerable number of teachers were also beginners.

The responses from the teachers' interviews were recorded as follows:

“I have taught mathematics for 6 years” (T1)

“For the past 4 years I have taught mathematics” (T2)

“Me, I have taught mathematics for 6 years” (T3)

“I have knowledge of mathematics; remember I have taught it for 5 years” (T4)

“I have taught mathematics for 4 years” (T5)

“Believe me is long, I have taught mathematics for 6 years” (T6)

The results of this study revealed fundamental differences with those in other sciences – especially physical science. In a study conducted in the same area, Mafukata (2016:74) reported very wide teacher experience levels in teaching physical science. The majority of physical science teachers in the same study area had experience ranging between 17 and 23 years. Mafukata (2016) reported that these teachers had a mean average experience of teaching physical science of 23.7 years. Comparatively, the suggestions of the results of this study opine that teachers were less experienced in teaching mathematics than they were in physical science. What remains challenging in the case of this scenario is that both these subjects are from the same subject stream classification. A further study is needed to investigate the reasons informing this wide gap.

#### 4.2.2 Qualifications of teachers in mathematics

The respondents were required to state their highest qualifications attained in mathematics. All the six teachers' responded to the question reflecting that they had attained the basic Secondary Teacher's Diploma (STD) as their highest qualification. The Secondary Teacher's Diploma (STD) is obtainable through teachers' training colleges.

The results of this study revealed the following:

Teacher 1 from school A stated that he has a secondary teacher's diploma as his highest qualification for mathematics. During the interviews, teacher 2 added "I also have a secondary teacher's diploma because one never had a chance to further the studies." Teacher 3 also pointed out that she only has attained a Secondary Teacher's Diploma (STD) from a teacher's training college. Teacher 4 from school B pointed out that he does not have a degree but holds a Secondary Teachers Diploma (STD) as his highest qualification. Furthermore, teacher 5 and 6 also had similar qualifications. The responses obtained from the teachers during the interviews were as recorded:

"I have secondary teachers' diploma only" (T1)

"I didn't further my studies I only have secondary teachers diploma" (T2)

"Secondary teachers' diploma is the only qualification I have." (T3)

"I don't have degree I only have secondary teachers diploma." (T4)

"I have secondary teachers' diploma." (T5)

"Me, I have secondary teachers diploma only." (T6)

Evidently, the results of this study revealed that all the respondents had attained at least a teaching diploma from a teachers' training college. This result suggests that the majority of teachers teaching mathematics only had attained basic teaching qualifications. In the case of Mafukata (2016:74) in his study involving physical science, at least there were approximately 3.8% of the teachers who had attained an education beyond Secondary Teachers Diploma (STD) because some of these teachers had attained first degrees.

### **4.2.3 Teacher's professional development and in-service training in mathematics**

The participants were asked to state if they had furthered their educational levels beyond their teachers' training college educational level which they had already attained. The results of this study revealed that all the participant teachers had not furthered their education beyond their current levels.

The responses of the interviewed teachers were as follows:

As teacher 1 from school A explained, "I don't have time so I never attended"

One teacher responded "I can't get time to do that; I am a busy man" (said teacher 2).

Teacher 3 added "there is no need ... for I know mathematics well"

Teacher 4 said "Money is my problem... you pay so much, and get nothing at the end"

Teacher 5 also stated "It is a complete waste of time and money. What will you get out of it"

Teacher 6 said "I find it worthless to attend university course, in fact what for?"

The results of this study suggest the following trends among teachers:

- the majority (100%) of mathematics teachers are de-motivated for studying further
- the majority of the teachers had issues of time (2), money or benefits (3), whereas (1) teacher felt it was useless to improve qualifications.

The results of this study are in sharp contrast with those reported by Mafukata (2016:74) who found that approximately 57.7% of physical science teachers have had further education to improve their subject knowledge and current developments in the subject. However, Mafukata (2016:74) still found that approximately 42.3% of physical science teachers have not had any further educational development in the subject. The results reported from the current study might be postulating that teachers in mathematics were discouraged and uninspired. Further probing revealed that teachers felt that further training was not important because there were no meaningful incentives for them to do so.

### **4.2.4 Class size**

Participant teachers were asked to state the number of learners they taught in one particular day in their subjects. This was done to evaluate the class size and its potential impact on the

performance of teachers, and subsequently the performance of the learners in mathematics. The responses of the teachers were structured as follows:

Teacher 1 said “We have 40 learners who are in mathematics stream”

Teacher 2 said “mathematics literacy is killing, forty learners take mathematics proper”

Teacher 3 furthermore explained “the place is rural and learners are afraid of mathematics; only 40 learners are doing mathematics.”

Teacher 4 said “We have very few learners, only 25 of them”

Teacher 5 added that “Our learners are afraid of mathematics; only 25 learners are doing it”

Teacher 6 said “This school is small, and we have only 25 learners in mathematics stream.”

The results of this study as indicated above suggest the following trends in mathematics:

- the majority of teachers who teach mathematics have a fair number of learners ranging between 25 and 40 learners per class
- the majority of the teachers are expected to have average work-load per day

The results of this study are in sharp contrast with those reported by Mafukata (2016:74) who found that there were schools with enrollments of as little as six learners per year in physical science, and sometimes that number increasing up to a maximum of 28 learners per year. Some of these schools as Mafukata (2016:74) reported discontinue the subject for low number of learners.

#### **4.2.5 Teacher's perception of mathematics**

The participants were expected to reflect whether they enjoyed teaching mathematics or not. The following were the teachers' responses:

Teacher 1 said “There is lot of work in mathematics; and I hate teaching mathematics”

Teacher 2 from school A revealed “Our learners are lazy to practice on their own. I hate teaching mathematics because it makes me to have lot of work.” Teacher 3 also mentioned that “Most of the learners here have poor background of mathematics that is why they don't understand it. This is the reason why I hate teaching mathematics”. “Mathematics is difficult I don't want to teach it” (stated teacher 4). Teacher 5 also added that, “Learners hate

mathematic that's why I hate teaching this subject". "In our school there is poor background of mathematics. Learners don't know it; I also hate teaching this difficult subject" (concluded teacher 6). The participants' responses where this:

"There is lot of work in mathematics, which is why I hate teaching mathematics." (T1)

"Our learners are lazy to practice on their own. I hate teaching mathematics because it makes me to have lot of work." (T2)

"Most of the learners here have poor background of mathematics, which is why they don't understand it. This is the reason why I hate teaching mathematics" (T3)

"Mathematics is difficult I don't want to teach it" (T4)

"Learners hate mathematics that's why I hate teaching this subject." (T5)

"In our school there is poor background of mathematics. Learners don't know it; I also hate teaching this difficult subject" (T6)

The results of this study as indicated above suggest the following trends in mathematics:

- the majority of teachers did not enjoy teaching mathematics
- the majority of teachers hated the subject because it is demanding
- the majority of the teachers thought that the subject was difficult
- the majority of teachers thought that learners de-motivated them because they hate it
- there is also an element of laziness on the side of the teachers

#### **4.2.6 Learner motivation in mathematics**

The participants were requested to detail their motivational strategies and tools to learners: The responses of the teachers were structured as follows:

As teacher 1 from school A explained, "we motivate our learners by explaining to them the importance and benefits of doing mathematics as a subject." Other teachers responded as follows: "we motivate them by giving them presents; those who have done well." Teacher 3 mentioned that "we motivate them by giving them love which encourages them that they can make it". Teacher 4 added that "our learners are motivated by giving them incentives

when they perform well in mathematics.” “We motivate our learners by giving them weekly tests” (Said teacher 5). Teacher 6 added that “learners are motivated through physical and emotional support that teachers are giving them”.

One respondent indicated that learners are motivated through explaining to the importance and benefits of doing mathematics, the other respondent mentioned that they motivate learners by giving them presents. Another three respondents indicated that they give them love and encourages them that they can make it. The researcher concludes that the respondents motivate the learners in different ways to make it in mathematics.

The results of this study as indicated above suggest the following trends in mathematics:

- the majority of teachers did have learner motivational tools and strategies

#### **4.2.7 Support by principal**

This question required the participants to show whether their principals supported them or not in their mathematics teaching. All six participants indicated that the principal did not provide any physical/material support that would enable them to improve teaching and learning in the classroom.

As teacher 1 from school A explained, “Our principal care less about how the teachers are teaching in their classes but only interested in the good results”. Teachers 2 responded by saying, “We never get support from our principal for he hardly shows any interest in the mathematics subject”. Teacher 3 also stated that, “we would love to have the support from our principal than only giving us critics about us not being good teachers.” “Our principal never comes to out mathematic classes to support or see how we are progressing” (said teacher 4). Teacher 5 reflected that, “we miss the support from our principal”. Teacher 6 elaborated that, “As teachers we also need to feel appreciated and have all the support from our principal, and we are not getting that at all.”

The six respondents mentioned that they do not get enough support from the school principals. The researcher concludes that the school principal do not give support to their mathematics teachers. Lack of support from principals might be pointing to poor leadership skills among principals. Despite great programmes such as the Mathew Goniwe School of Leadership initiated by government to promote leadership development among principals

for example, schools continue to have ineffective and incapacitated heads of school (Mampane, 2012:77).

The results of this study as indicated above suggest the following trends in mathematics:

- All the participants lacked support from their principals
- Teachers lacked physical/material support that would enable them to improve teaching and learning in mathematics.

#### **4.2.8 Perception of teacher on learner poor performance in mathematics**

This appears to be the only question that was asked through semi-structured interviews. It allowed the participants to detail their views and for the researcher to explore the in-depth data she wanted.

The participants responded in the following way. All the respondents (100%) agreed on the following as the causes of poor performance in mathematics; the teachers agreed that laziness on the side of the learners play a vital role in the poor performance of mathematics. The findings of the study show similarity with those of Tsanwani (2009). P24 which holds that attitudes and beliefs of the learners plays an important role if the learners should achieve in mathematics.

According to the participants, the other cause of poor performance in mathematics given was that the learners had poor interest in mathematics. The learners have developed the negative attitude towards the study of mathematics. This was supported by Zecharia, et al. (2012:88) that the causes of most failures in schools might not be only due to insufficient or inadequate instruction but by active resistance by learners.

The third cause that was mentioned by the respondents was that of lack of independence self-practice, the learners lacked practice that they did on their own; they only participated on the classes that they were offered them at school.

The fourth cause that was stated by the respondents was that of lack of self-discipline by the learners. The learners in most cases approach mathematics procedurally and role-oriented. They are not self-disciplined enough to practice mathematics as well as taking it as the serious subject.

Furthermore, the respondents picked poor background in mathematics as the cause of poor performance in mathematics. The learners are not well rooted in mathematics since in their lower grades were not taught well and not groomed enough to be able to perform well in Grade 12.

The respondents added that as teachers they also did not have interest in teaching mathematics as learners are performing poorly.

#### **4.2.9 Other support received towards learning mathematics**

The above question required the respondents (teachers) to state whether the principal gave them and their learners enough support. All the respondents (100%) revealed that they rarely receive any form of support from their principal, agreeing that the principal cared less about mathematics. The respondents further mentioned that the teachers that put more effort and are committed in teaching mathematics are not being appreciated for the good work they are doing. The principals are not willing to outsource mathematics teachers to help learners who are struggling in mathematics and this discourages teachers who have learners that are struggling. And as for the learners, the respondents stated that the principals were not motivating learners to be interested in mathematics and those who would have done better; no awards were given to them. The respondents stated that if awards would be given to learners they can be motivated and encouraged to work harder. They further say that if they (the teachers and learners) have enough support from their principal, the performance of learners in mathematics can improve.

#### **4.3 INTERVIEWS WITH SCHOOL MANAGEMENT TEAMS (SMTs)**

School Management Teams (SMTs) were interviewed in order to determine existing perception on factors affecting performance of Grade 12 learners in mathematics in their respective schools. The interviews sought to extract data based on the following variables:

- Performance of mathematics learners
- Qualification levels of teachers in mathematics
- Moderation of teachers work
- Support given to teachers in the form of workshops
- Motivation of learners to take mathematics as an important subject

A brief description of each sub-theme is presented here-under:

#### **4.3.1 Performance of mathematics learners**

The question required the respondents to rate the performance of their mathematics learners. All of the four SMT members in Nzhelele East Circuit conceded that learner performance in mathematics low and poor. The responses were structured as follows:

“Performance of learners is bad; remember these learners are lazy” (SMT 1).

“Is shocking, the performance is very poor” (SMT 2).

“Generally performance is bad” (SMT 3).

“Generally performance is not well” (SMT 4).

#### **4.3.2 Teacher qualifications in mathematics as opined by SMTs**

This question required the respondents to state whether their teachers were qualified to teach mathematics. All of the 4 participants responded to the question and indicated that their teachers were qualified.

“Our teachers are qualified” (Said SMT 1 from school A). Other responses from participants were as follows: SMT 2 from school A, “Qualifications of teachers are good.” “Our teachers are learned” (said SMT 3 from school B) SMT 4 from school B also stated that, “Teachers in this school are well qualified. ”Responses where this:

“Teachers are well qualified” (SMT 1).

“Qualifications are good” (SMT 2).

“Teachers are learned” (SMT 3).

“Teachers in this school are well qualified” (SMT 4).

#### **4.3.3 Moderation of teachers work**

On this question, the SMT members were expected to state whether they do moderate their teachers work satisfactorily or not. All the participants agreed that the work of their teachers were moderated but not enough at all times.

“We do moderate work sometimes” (said SMT 1).

SMT 2 stated that, “At our school we do moderate work but not always.”

“We moderate work but not all the time” (said SMT 3) and SMT 4 added that,

“We do moderate their work sometimes” (SMT 4).

#### **4.3.4 Teacher assistance and support through workshops**

This question required the respondents to reveal whether they have done session of workshops with the mathematics teachers. All the participants’ responded to this question.

As SMT 1 from school A explained, “We have done enough workshops”. “Yes, we have done workshops with mathematics teachers”. (Said SMT 2) SMT 3 also stated that, “workshops have been done but not enough.” “Few workshops have been done” (said SMT 4). This is how they responded:

“Yes, we did” (SMT 2).

“We have done workshops, but is not enough” (SMT 3).

“Few workshops have been done” (SMT 4).

#### **4.3.5 Learner motivation tools and strategies employed by SMTs**

In this question, the participants were expected to indicate how they motivate their learners. All four participants indicated that they have done absolutely nothing or are doing nothing in order to motivate learners to do mathematics.

SMT 1 indicated that, “Nothing is done, learners must be self-motivated” and other members indicated the following: “We do nothing to motivate learners“(SMT 2). SMT 3 added by saying, “The school do nothing; learners must be self- motivated” “Learners must be serious nothing more can be done “(SMT).

### **4.4 GROUP INTERVIEWS WITH LEARNERS**

As it was the case with the individual interviews, the group focus interviews were transcribed and analysed in a chronological order from question one to nine. Themes were induced as they emerged from data and the participants who shared same idea, view or experiences on different themes were identified as to be able to later relate the qualitative views and perceptions to different categories of participants.

- Responses from focus group interviews

In this section, the discussion focuses on factors affecting Grade 12 learners performance in mathematics at Nzhelele East Circuit: Vhembe District in Limpopo derived from two focus group interviews with learners.

The following are the themes and responses from the 20 respondents in which 10 learners were from school A and the other 10 from school B who participated in the focus group interviews: Participants 1-10 are from school A and participants 11-20 are from school B.

#### **4.4.1 Parents/guardian's highest qualifications**

The participants were expected to indicate their parents' highest qualifications. The majority of learners indicated that their parents do not have Grade 12. Other learners are orphans whereas others have single parents.

The majority of parents had only attained Grade 10, 11 or 12, and this may not be sufficient to assist the learners in their education. Some of these parents, although they had attained Grade 12 level of education could not assist the learners because they too lacked appropriate knowledge of the subject. In addition, some of the parents never took mathematics as a subject while still at school.

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of parents were semi-illiterate, and/or totally illiterate with regard mathematics
- Some of the parents never took mathematics as a subject while still at school

#### **4.4.2 Parental involvement**

In this group, learners agreed they lack support from their parents. Even if they have a task which is difficult, their parents are not in a position to help them as most of them do not have Grade 12.

Learner 3 from school A said, "My parents' highest qualification is grade 10. The majority of these parents lacked appropriate knowledge of mathematics. This is compounded by the fact that most of these parents would have learned a different mathematics which can be either functional mathematics.

The other participant was concerned that she is an orphan she said “I don’t have parents; I stay alone.” (Learner 5 from school A). This learner is taking care of four siblings and had no parent to support her in her education. One learner remarked “I don’t have a father but my mother have grade 5” (learner 12 from school B). “My parents highest qualification is Grade 11” (learner 15, 16 and 17 from school B) “My father died when I was in Grade 1 and my mother’s highest qualification is Grade 12” (learner 18, 19 and 20 from B). From the data collected, the study found out that the performance of learners are mostly affected by their parents/guidance qualification, as most of them do not have formal qualifications – especially in mathematics.

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners have semi-illiterate parents who lacked capacity to assist the children with home works as expected in modern education
- The majority of learners lacked parental support in mathematics
- There is a considerable number of learners who stayed by themselves

#### **4.4.3 Learner supplementary studies in mathematics**

The two group focus interview participants also elaborated on their attendance of mathematics’ Saturday classes or winter school to supplement school learning. This was measured by determining if the learners attended Saturday supplementary lessons or winter school lessons meant to assist the learners.

##### **4.4.3.1 Attendance of Saturday and winter school classes**

The results of this study revealed that there were some participants who attended both the Saturday classes and winter school lessons to improve their mathematics. The responses of the interviewed learners were as follows:

“I started attending both winter school and Saturday classes since I was doing Grade 9” (said learner 1 from school A). Learners 4, 6, 7 and 8 from school A revealed that they too had been attending Saturday classes and winter school for the past three years. However, learner 9 from school A indicated that she was unable to attend the Saturday, but only the winter school classes “I only attend winter school because Saturdays I have other commitments” “I have never missed the Saturday classes or winter classes ever since I was

in Grade 9.” These were comments from learners (13, 14, 15 and 16 from school B) whereas learners’ number 17, 18, 19 and 20 from school B also indicated that, for the past three years, these learners have been attending Saturday classes as well as the winter school.

These learners also indicated that they have never attended any winter school or Saturday classes:

“I have never attended Saturday classes and winter school” (said 2, 3, 5, 10 from school A and 12 from school B).

There are learners who have been attending Saturday classes and winter school for the past three years. (Learner 4, 6, 7 and 8 from school A)

“I only attend winter school because Saturdays I have other commitments said (learner 9 and 11).

The results of this study as indicated above suggest the following trends in mathematics:

- There are various programmes designed and implemented by the education authorities in the region. Such programmes include among others; Saturday enrichment programmes and winter school lessons to assist learners
- Attendance of such enrichment programmes is mixed. There are learners attending, and there are learners not attending such programmes
- Some learners had choices on the enrichment programmes – for example, some learners would attend the Saturday programme only, while others would attend the Saturday programme only.

#### **4.4.3.2 Learner perception of mathematics**

All the learner respondents were not keen in studying mathematics because they thought it was a difficult subject. In addition, they did not enjoy the subject.

#### **4.4.3.3 Attitudes of learners towards mathematics**

Responses from participants indicated that they have negative attitude towards mathematics.

Ten participants from school A and 15 from school B said that they do not enjoy mathematics classes; they hate mathematics lessons.

Participants 1 and 9 from school A indicated that they do not enjoy mathematics lessons as they do not understand it.

Participants 11, 12, 13 and 14 from school B stated that mathematics was not their favourite subject; therefore do not enjoy its classes.

Participants 16 and 17 from school B mentioned that they never enjoyed mathematics classes because they never understand the subject even when they are taught.

Participants 18, 19 and 20 from school B indicated that they do not enjoy the mathematics classes because the subject is so complicated and difficult.

The study has found that lack of interest from mathematics is a major contributing factor towards poor performance in the subject (mathematics).

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners did not like mathematics
- The majority of learners thought that mathematics was a difficult subject
- If given an option, the majority of learners would opt out of mathematics

#### **4.4.3.4 Future ambition of the learner**

All the 20 participants who responded to the question indicated that they do not value mathematics as important and indicated that it is difficult subject to pass.

#### **4.4.3.5 Learner relations with mathematics teacher(s)**

This was measured by testing the attitude of the learners towards mathematics teachers. In this question the participants were expected to elaborate on how they related with their mathematics teachers of which the following were their comments:

This study established that participants 1, 2, 7,8,10 from school A and 14 from school B had bad relations with their mathematics teachers. One student even remarked “I hate my mathematics teacher because he is unfriendly...he punishes the learners when we fail to understand what he is teaching.

“Our relationship with our teachers is not very good and we are not free to consult the teachers on the topics that we do not understand as the teachers are not friendly” Said participants (3, 4, 5 and 6 from school A).

Participants 11,12,13,15 and 17 from school B revealed that, “their relationship with their mathematics teachers was not good because the mathematics educators did not care on whether their learners understand what they were teaching but just rush in order to finish the syllabus.”

Participants 16,18,19 and 20 from school B elaborated that, “their relationship with their mathematics teachers was not good as their teachers did not make any effort to know all their learners’ weak point and strength so that they can be able to assist them individually because the way they understand things are not the same.

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners did not like the mathematics teacher
- Poor teaching skills among teachers affects teacher-learner relations
- It is evident that teachers were arrogant and abusive to learners
- Teachers with poor knowledge of mathematics tend to bully and harass the learners

#### **4.4.3.6 Day-to-day learner practice of mathematics**

This study made use of two sub-themes to investigate issues of learner practice of mathematics in the participant schools. First, this study investigated how learners managed their time. Secondly, the investigation was based on learner's perception of efficiency in mathematics.

##### **Time management**

The participants were expected to state whether they do practice mathematics on their free time and the following are their responses: Participants 1,3,5,6 and 10 from school A stated that, “they don’t practice mathematics on their own because they don’t know what they must do.” Participants 2,4,7,8 and 9 from school A added that, “we never put an effort to practice alone since we do not know how to go about it and we don’t have tutors who can assist us on our free time.” Participants 11 and 13 from school B added that, “they never practice

mathematics at their free times because they really don't like the subject at all." Participants 12, 14, 15 and 16 from school B were of the view that they were too lazy to practice mathematics at their free time and they would rather study other subjects than practicing mathematics as they know they cannot pass it. Participants 17, 18, 19 and 20 from school B said that they have never tried to practice mathematics on their free time because it is difficult.

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners were discouraged of mathematics
- The majority of learners never practice mathematics after normal school hours
- The majority of learners lack knowledge of what to do during the practice of mathematics
- The majority of learners lacked personal motivation in mathematics
- How do you rate your performance in mathematics?

This question expected the participants to rate their own performance in mathematics where by learners 1 and 7 from school A were of the same view that their performance were very poor as they always get less than 20% in tests. "I rate my performance as in between as sometimes my marks reach up to 50%" (Said learners 8 from school A). "We rate our own performance as poor," said participants 14 to 17 from school B "as we have never exceeded 25% in tests" and lastly participants 18 to 20 from school B stated that "their performances were very bad and they have never passed mathematics test since they started school."

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners did not perform well in the subject
- The majority of learners thought they were poor in mathematics
- The majority of learners obtained low scores during tests
- The majority of learners felt they were too bad for mathematics

#### **4.4.3.7 Causes of learners' poor performance in mathematics**

Participants 1 to 6 and 8 from school A viewed the causes of their poor performance in mathematics as the subject mathematics being difficult and teachers are unable to teach learners well.

Participants 7 and 9 from school A to 12 from school B indicated that the causes of their poor performance in mathematics were that their teachers were not capable to breakdown the subject to them in order to understand it as they just rush to finish syllabus.

Participants 17 to 20 from school B added that the reason why they perform poorly in mathematics was that they were never given much time when righting the question paper, since the mathematics question paper was hard and long, it should be given more hours, at least four hours.

The results of this study as indicated above suggest the following trends in mathematics:

- The majority of learners did not perform well in the subject because the subject was difficult
- The majority of learners were frustrated that the teachers lacked sufficient knowledge of the subject so much that the learners actually learn nothing from the teachers. In other words, teachers did not inspire confidence with the learners
- Mathematics needed to be given more time during tests and examinations because learners would not finish answering all the asked questions

#### **4.4.3.8 Strategies which could improve learner performance in mathematics**

Learners should be motivated by giving them rewards at least when they have performed better. The view is that this approach might encourage the learners to work harder. Motivation through rewards makes the learner feel appreciated (Participants 1 and 10 from school A opined).

Participants 11 and 14 from school B suggested that if their principal could have time to motivate them, attend some of the classes they have with their teachers, see how the teachers delivered the lessons, and can be helpful.

Participants 15 and 18 from school B added that their performance in mathematics could be improved if only the questions were being simplified and more time is given to answer the question paper.

Participants 19 and 20 from school B suggested that the sections of how the question paper is set should be reduced as it has lot of sections and questions to answer in only three hours. More so, the teachers who teach mathematics should get more training about teaching the subject as they choose simple sections and ignore some sections which are difficult to them.

The first group consisted of 10 learners from the same school. All learners were in Grade 12. Learners in this group were from the same village. Most of the learners in this group were very lazy. They have negative attitude towards mathematics. It was clear from the discussion that they lacked intrinsic motivation in mathematics. The three learners said the following during the interview:

“I cannot pass mathematics; it is very difficult. My mother told me that the reason why she does not have Grade 12 is because she failed mathematics and accounting hopelessly. She said mathematics is not for girls, maybe boys can try. I only want to be a police woman. In this village most girls are police women” (Learner 4).

“One thing that discourages me is that in this school results in mathematics are deteriorating. Even our mathematics teachers are not friendly. They think we are not serious and are always angry with us “(Learner 6).

“This subject is difficult I cannot pass it. I have resolved to concentrate in other subjects instead of wasting my time practicing and at the end of the day I fail “(Learner 9).

Lack of self- motivation was the main reason learners were not performing well. Focus group interview responses with this group suggested that learners themselves be motivated. They must have intrinsic motivation and not expect extrinsic motivation only.

When asked on a follow-up question about some causes of poor performance the other learner responded thus:

“If I was a teacher, I was going to have good relationship with learners. Our teachers don’t love us and in turn learners hate them. Learners cannot understand lesson of a teacher they don’t love. It is difficult to pass if you do not love and respect your teacher”

Learners in this group also recognised that their parents did not have grade 12 mathematics, which is another reason why they are not motivated. Teachers were not missing their classes but learners were negative as they did not intend to further their studies in mathematics. In this regard, the negative attitude in the side of learners was making them to hate mathematics teachers and their period. The negative attitude of learners is illustrated by this comment.

“Our teacher told us we are lazy; we don’t want to work hard. I hate him. I wish he can be sick for the whole year so that we can forget about this maths thing”

“I don’t want to be a Doctor; I will rather be a security guard. All my friends told me that they didn’t pass mathematics because the same mathematics teacher told them they can’t. Then he also told us that we can’t pass then there is no need to struggle”

“Most of the learners here know that when we write tests they will get zeroes and most of learners do not practice any more. When the lesson is on, some will be asleep not listening. Some learners spread bad news that mathematics is difficult, no matter what you do you will not pass.”

Most learners indicated that they were sometimes humiliated by teachers. Learners cannot ask questions in class because they were reticulated. The following comment supported the statement:

“We are afraid of our mathematics teacher. When you ask him a question you always get a negative response especially when he does not know the answer”

#### 4.4.3.9 Summary of focus group interviews

In general, learners from school A expressed negative perception of their teachers. Majority of the learners interviewed felt they were trying hard but in vain; they hated their teachers and had negative attitude towards mathematics. They were intrinsically unmotivated.

- Group 2 from school B

The second group consisted of 10 learners. Most of the learners in this group were against the attitude of teachers. They explain how good relationship between teachers and learners can produce good results. The comments of two learners explain this fact:

“Lack of good relationship between teachers and learners is the cause of these poor results. How can a teacher teach a learner who does not respect him? I personally witnessed a learner exchanging words with his mathematics teacher in this school. The problem is deeper than you are thinking. You can't force it to drink water if it does not want. In this class 80% of learners don't attend Saturday classes. Another problem is that when our teachers arrange extra classes they don't attend. Learners are also the cause of this problem; must not only blame teachers.”

According to this group, there are teachers that did not enjoy teaching mathematics, and as a result, they have negative attitude towards both the subject matter and learners. This attitude did not improve teacher-learner communication and affect learning of mathematics. Learners again pointed out that there are teachers who do not know how to teach properly.

“There are teachers who teach topics they know only and say that other topics will be taught in winter or Saturday classes. In our school we were not taught linear programming in Grade 11”

According to this group, another serious problem is of teachers who skip their classes for no serious reason. When they come to class they do not mark learners work but just give other learners so that they mark their peers work.

“I think if teachers can mark learners’ work they can see their problems and correct them in time. Teachers must respect their contact time and stop wondering around until the period is over”

- Summary of focus group interview of group 2 school B

In general the majority of learners in Group 2 expressed the following perceptions of factors affecting performance in mathematics:

- Negative attitudes towards mathematics in learners;
- Laziness of learners
- Unfinished syllabus
- Low motivation from teachers
- Negative attitude of learners; and
- Low self-esteem of learner

## **4.5 THE FINDINGS**

As indicated in the previous chapter, related questions were grouped together into themes in order to make findings relevant to the research questions. This resulted into four themes, namely; Theme 1 which addresses issues relating to the home environment; Theme 2 which addresses teacher attitudes and competence; Theme 3 which addresses learner attitudes towards mathematics; and Theme 4 dealing with strategies to improve learner performance in mathematics. Here-under follows an exposition of the research findings drawn from responses to questions posed to the categories of respondents mentioned earlier.

### **4.5.1 Theme 1: Influence of the home environment**

The study found that the majority of parents had attained educational levels less than Grade 12. Therefore, it was not surprising that no learner mentioned any academic support from parents regarding their school work. Some learners were coming from single-parent families while a few other (two) learners were heading families. Child-headed families are common

in the study area. In a study conducted prior to this, Mafukata (2012:1-479) also found that there were a number of households which were child-headed.

Therefore, it is clear that the home environment of the majority of these learners does not assist in the learning of mathematics. In addition, the fact that the majority of the parents were also illiterate or coming from semi-illiterate backgrounds exacerbated the matters even further. The value of mathematics in society might not be appreciated as such, largely because of the low level of education of parents – and their understanding of certain issues of education. The burden on learners from single-parent and child-headed families is enormous as such children might have to juggle between their studies and taking care of other family members such as younger siblings. Given these circumstances, it could be postulated that the psychological aspect of the environment is also a negative factor of improvement of the situation. The family background is the major factor in determining the academic performance of learners because in-organised family structures are known to contribute towards poor performance of learners in school work in general.

#### **4.5.2 Theme 2: Teacher attitudes and competence**

The study found that all mathematics teachers interviewed had at least a Secondary Teachers' Diploma (STD) qualification from a teachers training college as the highest academic qualification. However, contrary to findings reported by others such as Mafukata (2016:68-79), teachers in mathematics unlike in physical science for example had not attained education beyond a National Diploma. None of the mathematics teachers in this study area had a degree for instance. In addition, none has ever attempted to further their education – either in mathematics or otherwise. School Management Team members generally agreed that teacher development workshops conducted were few and inadequate. Furthermore, teachers also claimed that they did not receive any support from their principals. The study found that the teacher-learner ratio for mathematics is 1:40. It was also found that teachers' work is not adequately quality-assured by members of the school management teams. This finding could be corroborated by the assertion of learners who argued that the teachers' ability to teach mathematics was highly questionable and suspect. The results of this study revealed that almost all the teachers indicated in their responses that they lacked that passion and intrinsic motivation to teach mathematics. Teachers' motivation was eroded because:

- There was too much work in mathematics teaching
- The subject was difficult for them
- Learners were lazy
- Learners lacked motivation in mathematics to an extent of even hating the subject
- Poor background among the learners in mathematics

From the findings presented above, it is evident that the teachers' competence levels in teaching mathematics are in doubt, both from their own admission and the insinuations made by the learners. Lack of support from principals and school management committees, methodology they use in teaching mathematics, lack of in-service training of teachers furthermore exacerbated the situation. Considering the centrality of an educator in teaching and learning, such dearth in the necessary skills is bound to negatively impact on learner performance. This study also found that the teachers' attitude to both the subject and learners is negative. The majority of teachers do not enjoy teaching the subject. This attitude is sometimes expressed verbally but also in behaviour. Observational learning places great store on the impact on shaping both behaviour and attitude of others – especially the learners. The negative attitude that teachers display may therefore be a causal factor of the low performance levels attained by learners in mathematics in this observed areas.

#### **4.5.3 Theme 3: Learners' attitudes towards mathematics.**

This study found that learners experienced negative feelings about being in a mathematics class for various reasons including:

- That mathematics is not their favourite subject
- That mathematics is a difficult and complicated subject
- That learners do not understand the subject while being taught.
- That the learners do not see any future value of mathematics in their future
- That teachers were not friendly to learners
- That learners lacked passion in mathematics

#### **4.5.4 Theme 4: Strategies to improve learner performance in mathematics**

It is rather regrettable that questions regarding strategies that can improve learner performance in mathematics were directed to learners only. One can still infer some strategies from responses by teachers and school management team members. The learners' responses made the following propositions about how performance can be improved: rewards, motivation by principals, class visits by principals, simplifying questions and allocating more time for responses to them, reducing the scope as there is too much work and more training for teachers. It was also found from other respondents that there is inadequate supervision of teachers.

#### **4.6 CONCLUSION**

This chapter discussed the findings of the research and the following chapter is conclusion and recommendations.

## **CHAPTER 5: CONCLUSION AND RECOMMENDATIONS**

### **5.1 INTRODUCTION**

This chapter presents the conclusion and recommendations drawn out from this study. The main aim of this study was to investigate socio-cultural and psychological factors affecting Grade 12 learners' performance in mathematics. This study was conducted in two secondary schools in Nzhelele East Circuit, Vhembe District of the Limpopo Province, South Africa. This study was qualitative in nature since the aim of the study was to explore the socio-cultural and psychological factors affecting Grade 12 learners' performance in mathematics at Nzhelele East Circuit. A total of thirty (n=30) respondents were selected for questionnaire-based survey, Focus Group Discussion and Key Informant Interviews (KIIs). The respondents were selected from various stakeholders such as learners (n=20), School Management Teams (n=4) and teachers (n=6). Before the presentation of the results, first, this study presented the theoretical framework and literature review. In addition, the research design and methodology employed to undertake the study were also presented. The conclusions of this study were presented in four categories; general observations; learner-based factors; teacher-based factors; and School Management Teams (SMTs) factors.

### **5.2 THE CONCLUSIONS EMANATING FROM THIS STUDY**

The conclusions arrived at for this study are reported in general observations,

#### **5.2.1 General observations**

First, I present the observations based on the nature of this study, and how it was undertaken. It is evident that the study was faced with a number of limitations. First, the study was only limited to learners, teachers and School Management Teams (SMTs) of the two participant schools selected for the purpose of this study whereas the stakeholder base was broad and vast. In other words, the study excluded a host of other stakeholders such as parents, circuit managers and school governing bodies among others. The omission of these crucial stakeholders put a massive challenge on the quality of the results of this study since

the results would have generalization challenges among others. However, the results revealed quality characteristics as compared to other studies conducted elsewhere prior to this one. The study concludes thus:

- Mathematics is believed to be a critical school subject in most regions of the world in general, and Sub-Saharan Africa in particular.
- A plethora of governments – especially those in developing economies where governments are targeting industrialization and technological development believe mathematics is crucial for facilitating development and advancement of the general populace of their regions.
- Mathematics is a compulsory subject in most education systems around the world.
- There are a variety of complexities and constraints affecting the teaching and learning of mathematics in most regions of the world.
- There is poor learner performance in mathematics. This is indicated by high failure rate in mathematics during end-of-year learner assessments.
- The reasons for the poor performance of learners in mathematics in the selected schools were vast and intertwined.
- Efforts have been made at international level to intervene with regard finding solutions to complexities and constraints affecting teaching-learning environment in mathematics.
- The complexities and constraints affecting the teaching-learning environment of mathematics in South Africa stem from South Africa's past era of apartheid education.
- Mathematics has been a major target of improvement and transformation by the post-apartheid government in South Africa.

- Regardless of the efforts made by the post-apartheid government in South Africa to improve and transform teaching-learning environment in mathematics, there are perpetual complexities and constraints still hindering progress, and this affects learner output in mathematics.
- Mathematics is one of the poorly performing subjects in the post-apartheid education system in South African schools – especially those schools which are based in formerly disadvantaged areas such as homelands and townships.
- There is a growing body of literature investigating the complexities and constraints affecting the teaching-learning of mathematics in South Africa.

Apart from the conclusions based on general observations, the study furthermore concluded that critical learner-based factors, teacher-based factors and SMT-base factors contributed to the state of affairs in the selected participant schools. This study therefore concluded thus:

### **5.2.2 Learner-based factors**

Mathematics learners were poorly prepared in the lower grades for senior grades. In other words, learners lacked proper foundation and background in mathematics. Learners were not well taught the basics of mathematics in previous grades. Furthermore, mathematics learners lacked assistance with homework for example because the majority of parents were illiterate and therefore not involved in supervision of learners beyond school environment. Learners showed negative attitude towards their teachers and the subject. Learners were not self-motivated in mathematics.

### **5.2.3 Teacher-based factors**

Teachers did not have enough workshops on how to teach mathematics, and also on content knowledge improvement. Less creative teachers were teaching mathematics. Teachers lacked support from their principals. The majority of teachers lacked passion in mathematics.

#### **5.2.4 School Management Teams (SMTs) factors**

This study concludes that mathematics teachers were not receiving adequate support from the School management Teams (SMTs). Lack of teacher support by SMTs stems from poor organisation of supervisory roles expected from SMTs. Teachers' work is not being properly monitored and supervised.

### **5.3 RECOMMENDATIONS**

Based on the conclusions drawn from the study, the following recommendations are crucial, and they have to be implemented:

#### **5.3.1 Recommendations to the Department of Education**

This study recommends that the Department of Education should monitor or revisit the methods of teaching and learning of mathematics. Assessment should also be revisited to ensure that the mathematics paper is not too long for the learners during examinations. Enlisted service providers who facilitate teacher workshops for mathematics must be conversant with content requirements of mathematics. Considerations should be made to simplify the mathematics question paper. The Department of Education should also provide necessary resources such as textbooks timeously. Knowledgeable mathematics specialists and advisers could be enlisted to visit regular visits to schools to assist teachers and learners throughout the year.

#### **5.3.2 Recommendations to the School Management Teams (SMTs)**

The SMT should ensure that their educators are adequately qualified to teach mathematics as a subject as well as being able to teach their learners in a way that they understand the subject. In addition, teachers who are knowledgeable in teaching mathematics should be appointed to teach mathematics. The SMTs should also ensure that compulsory workshops are provided for mathematics teachers at school level. Furthermore, the SMTs should ensure

that educators are able to identify learners that are under-performing, monitor the utilisation of study time and assist in resolving problems regarding the poor performance of such individual learners. School Management Teams shall facilitate additional after-hours lessons and sessions to assist learners identified as lacking in home environment assistance for example. Moreover, SMTs should also encourage all Grade 12 mathematics learners to participate in supervised extra mathematics lessons and extra-mural activities in order to develop and build their self-confidence and positive self-esteem. In addition, the SMT members should be more supportive to their mathematics teachers. Continuous moderation of teachers' work should be encouraged. School Management Teams (SMTs) should also develop motivational programmes and instruments to encourage and motivate learners in their respective schools. For example, performing learners could be awarded with prizes in public – especially during school organised functions which might include learners, teachers and parents.

### **5.3.3 Recommendations to the teachers**

The teachers should make it a point that they attended mathematics workshops as organised by various stakeholders. Teachers' interest in mathematics could be improved by improving their knowledge of subject content in mathematics, and personal recognition by authorities. Performing teachers could also be recognised and awarded with prizes publicly at school gatherings and meetings. Teachers should also be encouraged to obtain further qualifications and skills in mathematics.

### **5.3.4 Recommendations to the learners**

Efforts should be made to improve learners' attitudes towards mathematics, and in addition to their mathematics teachers. Learners should be made aware of national target for mathematics education and the implications thereof. This could be achieved by utilising educators – especially those who teach Guidance as a subject to learners to provide more convincing evidence of the spin-offs of obtaining good passes in mathematics in South Africa.

#### **5.4 SUGGESTION FOR AREAS NEEDING FURTHER STUDY**

There is a need to conduct follow-up research on:

- Applied strategies and instrument to improve learner attitude towards mathematics.
- Establishing whether the complexities and constraints affecting learner performance in mathematics affect both girl and boy learners the same considering that their circumstances and conditions might materially differ.

#### **5.5 CONCLUSION**

It is hoped that this study, its findings and recommendations will shed more light on the causes of poor learner performance in mathematics not only in Nzhelele East Circuit but across the entire education system in Limpopo Province in general, and Vhembe District in particular. Lessons learnt from this study might be applicable in the entire education system in South Africa in general.

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APPENDIX 1

Permission letter

PERMISSION LETTER

To: The District Senior Manager  
Vhembe Department of Education

P.O.BOX 248  
NZHELELE  
0993.  
20 JUNE 2014

**REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN NZHELELE EAST  
CIRCUIT SCHOOLS**

The matter above refers

I am a principal at Dzata Secondary School and a Masters Degree student at the University of South Africa. I intend to find relevant information regarding factors affecting grade 12 learners' performance in mathematics at Nzhelele East Circuit. Vhembe

The information obtained will constitute part of my research and is essential. I therefore seek written permission for use when I visit schools in Nzhelele East Circuit.

Participants will be SMT, teachers, and Learners.

Please note:

1. Participants answers will be regarded as strictly confidential and be used for research only.
2. The name of schools will be kept confidential.
3. The participants will receive a summary of findings on request.
5. There are no costs involved.
6. Recording device will be used.

For any information required pertaining the study contact me at 0722708587 or [sinyosiliba@gmail.com](mailto:sinyosiliba@gmail.com) or contact my supervisor at 012 429 6883 or [mohapsj@unisa.ac.za](mailto:mohapsj@unisa.ac.za)

Your permission will be appreciated

Kind regards

Sinyosi Livhalani Bridget (Researcher)

Signature: *Sinyosi*.....

Date: *20-06-2014*.....

E-mail: [sinyosiliba@gmail.com](mailto:sinyosiliba@gmail.com)









APPENDIX 6

**Mushaathoni Secondary School**



Tell: (015) 9737 105  
Fax: (015) 9737 105  
Cell: 082 5170 277

Dear Sir/Madam

PERMISSION TO DO RESEARCH AT MUSHAATHONI SECONDARY SCHOOL

This letter serves to inform you that we accept your request and with great pleasure the school gives you permission to do your research.

As a school who think the results of this research will help us to solve the problems of poor performance in mathematics especially in grade 12.

Yours in Education

MR THIBA F.M

(PRINCIPAL)







## **EDITING AND PROOFREADING CERTIFICATE**

7542 Galangal Street

Lotus Gardens

Pretoria

0008

### **TO WHOM IT MAY CONCERN**

This letter serves to confirm that I have edited and proofread Mrs L.B. Sinyosi's dissertation entitled: **"FACTORS AFFECTING GRADE 12 LEARNERS PERFORMANCE IN MATHEMATICS AT NZHELELE EAST CIRCUIT: VHEMBE DISTRICT IN LIMPOPO."**

I found the work easy and enjoyable to read. Much of my editing basically dealt with obstructionist technical aspects of language which could have otherwise compromised smooth reading as well as the sense of the information being conveyed. I also formatted the dissertation. I hope that the work will be found to be of an acceptable standard. I am a member of Professional Editors Group and also a lecturer in the Department of English at the University of South Africa.

Thank you.

Hereunder are my particulars:

  
\_\_\_\_\_

Jack Chokwe (Mr)

Department of English (Unisa)

Contact numbers: 072 214 5489 / 012 429 6232

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**EDITORS**  
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