

Factors That Impact on Grade Nine Academic Achievement in Mathematics at Kikombe Day Secondary School

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Abstract

This study was done to find out the factors which impact grade nine learners' academic achievement. It was conducted at Kikombe Day Secondary School, located in Solwezi of the North-Western province of Zambia. The target population for the study was the entire grade nine learner population of the school. The school had a population of about 300 grade nine learners. From this population, a sample of 150 learners was drawn for the study. A systematic simple random sampling technique was used in drawing the sample. The choice of the sampling technique was because the researcher had access to a complete list of all grade nine learners at the school. The data was collected from the drawn sample using a questionnaire which consisted of two sections namely five-point Likert scale and open-ended. The other open-ended questionnaire for teachers was also prepared and an achievement test for learners. To test the validity and reliability of the instruments, a pilot study was first conducted and had its results analysed. The appropriate changes were made to the instruments before the main study was conducted. A sample of 50 participants was drawn from the target population for the pilot study. The main study was then done by using the corrected instruments. The data which was collected was analysed with the help of the statistical package for social sciences (SPSS). The analysis process included 'factor analysis' and 'Cronbach's alpha tests' for verifying validity and reliability respectively. The other technique used in data analysis was linear regression analysis which was used for determining which of the factors were responsible for the learners' academic achievement. Following the literature reviewed, the researcher had hypothesised five different factors as being responsible for learners' academic achievement at Kikombe Day Secondary

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1. Introduction

The study was necessitated by the continued high failure records of grade nine learners at Kikombe Day Secondary School in Solwezi District of the North Western Province of Zambia. Despite effort by both the management and the teaching staff, to improve performance, the failure rate was persistently high at the school. Records of grade nine learners' academic achievement, particularly in mathematics, at the school showed that the pass percentage had been very low as compared to the failure percentage. All subjects had a significant contribution to the overall learners' achievement. However, Mathematics particularly seemed to be one of the most challenging in which learners' achievement had been very poor year by year. The grade nine pass rate for the school in the years 2016, 2017, 2018 and 2019 was 22%, 24%, 21%, and 72% respectively (School statistician, Kikombe Day, 2020). The record is shown in table 1 below.

Table 1: Mathematics Grade 9 examination results analysis

Year	School	Overall Pass Percentage.
2016	Kikombe Day Secondary	22%
2017	Kikombe Day Secondary	24%
2018	Kikombe Day Secondary	21%
2019	Kikombe Day Secondary	72%

Source: (School statistician, Kikombe Day Secondary School, 2020).

Although the latest pass rate (2019) was relatively higher, the fact that achievement in Mathematics had been persistently very poor, with the cause to that unknown, was a matter of serious concern.

Other schools in the same district have had their achievement stable and high, such as Kabitaka Secondary School, which recorded 100% pass consistently for the same period that was; 2016, 2017, 2018 and 2019.

It, therefore, meant that there exist certain factors that contribute to learners' poor academic achievement, and these must be investigated and be known, in order for institutions like Kikombe Day Secondary School to better their achievement.

Previous studies, however, suggests that there are numerous factors that could possibly impact on learners' academic achievement ranging from teachers' factors, learner factors, school (learning materials) factors, and parental factors (Amunzu, Ankalibazuk & Abdulai, 2007).

Unfortunately, the cause of high failure rate in mathematics in the case of Kikombe Day Secondary School remained unknown. There were speculations as to what could be the factors leading to this failure; methodologies used, teacher qualifications, learner access and use of books and equipment, school infrastructure or teacher incentives, and family background of learners.

Hence this study investigated the factors that were responsible for the academic achievement in Mathematics among grade nine learners at Kikombe Day Secondary School.

the researcher sought to find out the factors which impacted grade nine learners' academic achievement at Kikombe Day Secondary School.

2. Literature Review

This section consists of a literature review. It presents a comprehensive and detailed understanding of what was studied by other scholars in relation to the achievement of learners in Mathematics. Several studies have been undertaken to that effect, and this chapter reveals scholars have broadly categorized the possible factors impacting learners' academic achievement into two groups; externally based and internally based.

2.1 Externally Based Influence

Skouras (2014) pointed out that it had been established by research that student achievement in Mathematics was affected by several contextual variables, outside a learner. Among such variables are teacher attributes, training, textbooks, school resources, family, school, and the social environment that surrounds the learners (Skouras, 2014), (2014).

Although Skouras (2014) listed seven variables, the researcher in this study compressed them to only three in the way they seem to be related. For example, a teacher and his training as well as the school as the first variable, textbook and school resources as the second variable, and finally family and the social environment that surrounds the learners as the third variable.

2.1.1 Teacher as an external factor

Despite this multiplicity of factors affecting learners' achievement in Mathematics, the teacher and the related variables was considered to have a major impact, and many educators emphasize that the teacher is one of the resources determining the academic success of learners. (Chetty, Friedman, & Rockoff, 2014; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004).

Fung et al,(2017), claim that because a teacher's practices and professional traits are important factors affecting student achievement there has been a great emphasis on improving teachers' effectiveness as a way to enhance student learning and understand of Mathematics (Fung & Tyler, 2017).

Literature reveals that the traits of the teacher, together with the level of academic and educational qualification, training courses received, and years of experience, are related to the achievement of learners in Mathematics (Rivkin et al., 2005; Swinton, Thomas, Benjamin, & Howard, 2010).

In addition, Akyuz & Berberoglu (2010) in their study found that in general, the variables associated with the teacher, such as gender, experience, and academic level, influences achievement in mathematics (Akyuz & Berberoglu, 2010).

Burroughs et al (2019) pointed out that high-quality teachers are often seen as playing a key role in producing good results for their learners. They claimed that, even though curricula and textbooks were important, the teachers must be well-prepared, distinguished in their performance, and have high educational competencies, translating into practices that enhance the performance of learners.

Summing it up, literature shows that, it is believed that teachers' traits, such as teaching experience and professional development, are linked to student achievement in Mathematics (Al-Zoubi, Malkawi, & Mikdadi, 2018).

2.1.2 Family as an external factor

Although much emphasis was put on teachers, parents' involvement is important to the educational success of a young adolescent (Epstein, 2005; Jackson & Andrew, 2004). Parent involvement as defined by Adenikea and Oyesojia (2010) is having an awareness of and involvement in learners' schoolwork (Adenikea & Oyesojia, 2010). It involves having an understanding of the interaction between parenting skills and student success in schooling, as well as having a commitment to consistently communicate with educators about a learners' progress. Adenikea and Oyesojia (2010), particularly described parents' involvement in the education of young adolescents as activities by parents in support of learning at home, in school, and the community. Another study by Adeyemo (2005) stressed that there was a need to foster home-school partnerships (Adeyemo, 2005). Stressing the importance of parent involvement in learners' achievement in Mathematics, Adenikea and Oyesojia (2010) claimed that it was a general belief in the society that parents were children's first teachers who needed to play a critical role in their children's educational experiences.

2.1.3 Resources as an external factor

Resources included all that the school provides to aid the learning of Mathematics. The studies by Burroughs et

al (2019) revealed that resources are necessary for a learners' academic achievement but could not on their own be a factor. Burroughs et al, (2019) claimed that, although resources such as curricula and textbooks were important in a learners' achievement, they needed the competence of a high-quality teacher who must be well-prepared and distinguished in their performance, to translate resources and use them to enhance the performance of learners.

2.2 Internally Based Influence

Literature also shows that what influences a learner's academic achievement in mathematics can also be based on a learner himself. The studies by Morony, Kleitman, Lee, Stankov, (2013) revealed that internally based influences on a learner's academic achievement were either cognitive measures or non-cognitive measures (Morony, Kleitman, Lee, & Stankov, 2013).

According to Morony et al, (2013), cognitive measures were linked to the past cognitive activities of a learner. In Stankov's views, academic achievement in Mathematics was most strongly linked to the judgement of the quality of one's recent cognitive activity. The cognitive activities referred to the confidence of a learner about the test performance built over time (Morony, Kleitman, Lee, & Stankov, 2013).

In particular, Morony et al, (2013) claimed that "Predictor of achievement in Mathematics should be the long-term outcomes of previous cognitive performance such as the acquired self-efficacy or anxiety".

2.2.1 Self-Efficacy and Anxiety (Intrinsic Motivation)

According to Buket and Cabakcorb (2013), self-efficacy can be defined as a learner's evaluation of his capability to deal with a particular problem (Buket & Cabakcorb, 2013). Pimta (2009) argued that self-efficacy is a factor in increasing motivation which Bruner (1961) earlier defined as intrinsic Motivation (Pimta, 2009). Pimta (2009) further argued that self-efficacy affects the four fundamental psychological processes which are fundamental in human life, and these Pimta (2009) identified as cognitive processes, motivational processes, emotional processes and choice processes (Pimta, 2009).

Usher and Pajares (2009) conducted a study with a view of examining the sources of learners' self-efficacy in mathematics. In their findings, Usher and Pajares (2009) concluded that course placement and learners' self-regulated learning were vital elements in self-efficacy (Usher & Pajares, 2009).

In another study, Cleary and Chen (2009) studied the effects of students' self-regulation and motivation on their mathematics achievement. They studied with a sample of 880 suburban students. In their findings, they concluded that motivation and self-regulation played an important role in a learner's mathematics achievement (Cleary & Chen, 2009).

The very opposite to Mathematics self-efficacy is Mathematics anxiety. According to Hoffman (2010), Mathematics anxiety is a belief of learners that they will not be able to solve the mathematical problems they face. It depicts the absence of intrinsic motivation.

Buket and Cabakcorb (2013) argued that the fact that mathematics anxiety is significantly affecting learners' mathematics achievement negatively, has led researchers in mathematics education to examine the reasons for this issue. Hoffman (2010) further claimed that the most common reason for mathematics anxiety was the low perception of skills (Hoffman, 2010). The other reasons identified by Buket and Cabakcorb (2013), included previous lack of success, non-adaptive behaviours, inadequate studying, lack of ability to prepare for tests, and genetic characteristics like perception.

2.2.2 Learners' Attitude

The studies of Morony, Kleitman, Lee, & Stankov (2013), also revealed that learners' academic achievement in Mathematics was internally predicted by non-cognitive measures. By non-cognitive measures, Morony et al, (2013), referred to measures such as depression, well-being and social attitudes, all of which constitutes a learner's attitude towards Mathematics (Morony, Kleitman, Lee, & Stankov, 2013).

Attitude, as defined by Buket & Cabakcorb (2013) is a learner's "inclination which is shown before the behaviour and which is related to his knowledge and experience against objects, incidents or situations around himself". Mathematics is one of the subjects towards which many learners exhibit a negative attitude (Tarver, 2015). In the study by Uğurluoğlu (2008), the reasons for learners' negative attitudes towards mathematics were attributed to mathematics education and teaching methods used; attitudes of teachers; attitudes of parents; and effects of the social and cultural environment (Piperrea & Mierinab, 2017).

Poropat (2009) was another scholar who focused his studies on finding out what factors were responsible for a learners' academic achievement in Mathematics. His studies revealed that the individual performance of learners in Mathematics developed in the context of both background factors and internal factors. The background factors according to Poropat (2009), were traditionally linked with the socioeconomic status that relates to an individual's opportunity to perform. The internal factors on the other hand consisted of motivation, cultural norms, and personality that were related to the willingness to perform, and they built up one's attitude towards Mathematics

While exploring the role of mathematics self-beliefs, as well as personality traits, social attitudes and well-

being in students' mathematics achievement, Piperrea and Mierinab, (2017) also claimed that learners' academic performance might be predicted by the willingness to perform as well as the opportunity to perform. They described willingness to perform as one's motivation and that it included all traits such as personality, well-being, social attitudes and academic (mathematics) self-beliefs (Piperrea & Mierinab, 2017). In another study conducted by Caprara (2011), it was revealed that personality and self-beliefs could both be viewed as important for the academic achievement of learners (Caprara, 2011).

Despite many studies undertaken in search of the global cause of poor academic achievement in mathematics, it is evident both in Literature and at Kikombe day Secondary School that the problem is persistent. This compelled the researcher in the current study to focus on finding out the factors which impact grade nine learners' academic achievement at Kikombe Day Secondary School, located in Solweezi of the North-Western province of Zambia

3. Methodology

3.1 Research Design

To obtain information, the researcher used a questionnaire that consisted of two sections namely a five-point Likert scale part and the part where learners stated the other factors which might have not been catered for in the Likert scale section and an achievement test. The teachers were also given the questionnaire to state what they thought could be the factors impacting learners achievement in mathematics at grade nine level. The survey research design was used in conducting this study. Both the qualitative and quantitative methods were applied in data collection. The questionnaire helped in collecting qualitative data on a five-point scale which was converted to a quantitative form in the process of data analysis with the help of the PCA on SPSS. Achievement tests on the other hand were used to collect quantitative data in the form of learners' scores in a test from a possible 100%

3.2 Population and Sample

This descriptive study was conducted by using a survey method. The population was all the grade nine learners and teachers of Mathematics at Kikombe Day Secondary School. The school had a total of about 300 grade nine learners and nine teachers of Mathematics. The targeted sample size for the study was 153 participants, drawn from this population.

3.3 Sampling Procedure

Systematic simple random sampling technique was used in the selection of the sample. This procedure was chosen because it provided each element in the population an equal chance to be selected as the study sample. The research utilized five-point Likert questionnaires (as the main instrument) to get accurate responses from the respondents. It was more convenient and appropriate for those who were busy that they could not provide the information there and then.

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3.4 Research Instruments

The research instruments which were used in the collection of data for the study were as follows:

3.4.1 Achievement Test

A test to measure the learners' achievement in grade nine Mathematics was administered. The performance level in the achievement tests was rated from 0% to 100%. Blooms Taxonomy of learning outcomes was taken into consideration when constructing the test items.

3.4.1 Questionnaire

Questionnaires to investigate factors that impact learners' achievement in Mathematics were also used in the study. The type of the questionnaires was a 'five-point Likert scale' with response valued from 1 = strongly disagree (or equivalent), to 5 = strongly agree (or equivalent). The constructs which were measured included Family factors such as Parental assistance in the learners' mathematical work done at home, as well as their supervision of the work; Learner factors such as learners' punctuality to mathematics lessons, learners' attitude towards mathematics classwork and learners' attitude towards their Mathematics teachers; Learning Material factors such as availability, accessibility and usability of the studying materials; and Teacher factors such as the frequency of checking learners' work, promptness of giving feedback to learners, and assistance to weaker learners in Mathematics. The fifth construct to be measured was Motivation, which was determined to show how various learners were intrinsically or extrinsically driven to study Mathematics.

The questionnaire, therefore, consisted a total of thirty questions divided in five groups of construct each being addressed by six question as follows: six questions to measure learner factor, six questions to measure learning material factor, six questions to measure teacher factor, six questions to measure family factors and six

questions to measure motivational factors.

In addition, the questionnaires had a section for open-ended questions. These were meant to allow respondents to bring out the factors which the Likert scale may have left out.

3.4.2 Validity and Reliability of an Achievement Test Instrument

The validity test of the Achievement test instrument, was done in two ways; the first was the face validity while the second one was the content validity. Both were done by the researcher and other experts in the field of mathematics. The other experts included the Head of Mathematics department at Kikombe day Secondary School and a seasoned teacher at the same school. In face validity, the validators looked at the structure of the question paper in comparison with the national examination paper for grade nine, and in content validity, they looked at the number and depth of concept covered in the achievement test paper. The validity test resulted in adjusting the content of the test and some item constructs.

The reliability of the achievement test was done through a ‘test retest reliability test’. Before using the instrument for the study, the paper was used in the pilot study. The same test was used three times and the results were analyzed for consistence. The instrument was found to constantly measuring what it was meant to measure, and so was considered valid and was used for the main study

3.4.3 Validity and Reliability of an the Questionnaire

The validity test of the questionnaire was done using the Principle Component Analysis (PCA) with varimax rotation by subjecting all the questionnaire items to factor analysis for dimension reduction. Factor analysis was able to identify five clusters of items which accurately measured the five constructs. The PCA also identified the items which could not accurately measure the constructs and were considered unfit. The items that were found unfit were, therefore, adjusted and some were removed from the questionnaire before conducting the main study. The whole process was done in SPSS.

The questionnaire items that passed the validity test were also tested for reliability before using them in the main study. Cronbach’s alpha was used as a test for reliability. The questionnaire items were subjected to the Cronbach’s alpha, as five clusters (groups) representing the five categories of factors (i.e. learner factors, motivation factors, learning material factors, teacher factors and family factors). With the help of SPSS, the Cronbach’s alpha coefficient for each factor was calculated and compared with the acceptable level of 0.7. Only the items that passed the reliability test were used for data collection in the main study.

The validity and reliability tests were concluded with a screening process using the data collected from the main study. The screening process ensured that both validity and reliability were verified on the collected data before using it for data analysis. The summary of the reliability and validity test was as presented in table 1 below

Table 1: Validity and Reliability test of Constructs

Construct (Variable)	Items	Factor loadings	Cronbach’s alpha
Learner Factor	Q3	0.767	0.705
	Q2	0.718	
	Q5	0.683	
	Q4	0.679	
Motivation Factor	Q11	0.807	0.720
	Q12	0.799	
	Q10	0.739	
Material Factor	Q13	0.726	0.720
	Q18	0.670	
	Q16	0.648	
	Q15	0.643	
	Q14	0.602	
Teacher Factor	Q17	0.580	0.776
	Q21	0.834	
	Q19	0.755	
	Q22	0.753	
Parent Factor	Q23	0.659	0.860
	Q27	0.821	
	Q29	0.805	
	Q28	0.789	
	Q30	0.788	
	Q26	0.767	

4. Data Analysis

Data analysis was done in two ways;

Firstly, quantitative data analysis was done with the help of computer software called ‘Statistical Package for Social Sciences’, abbreviated as SPSS. The package was used to generate frequencies for demographic data and to test the research hypotheses. The Multiple Linear Regression Analysis was a statistical technique used in this study to test the research hypotheses.

Secondly, qualitative data analysis was done with the help of another computer software called the QDA miner lite. In qualitative data analysis, the steps taken involved the creation of transcripts for all textual responses, creating codes from the transcript, creating themes by grouping related codes, analyzing the code frequencies, and finally generating a grounded theory based on the patterns observed in the frequencies.

The analysis was directed towards addressing the main research objective; ‘To determine factors that impact on grade nine learners’ academic achievement in Mathematics at Kikombe Day Secondary School’. This was possible by focusing on each of the specific research objectives.

4.1 Demographic Data

The total number of participants in the study was one hundred and fifty (150), consisting of only grade nine learners and teachers. The distribution of participants is however given in terms of their gender by frequency. Table 2 below shows the distribution of participants of the study.

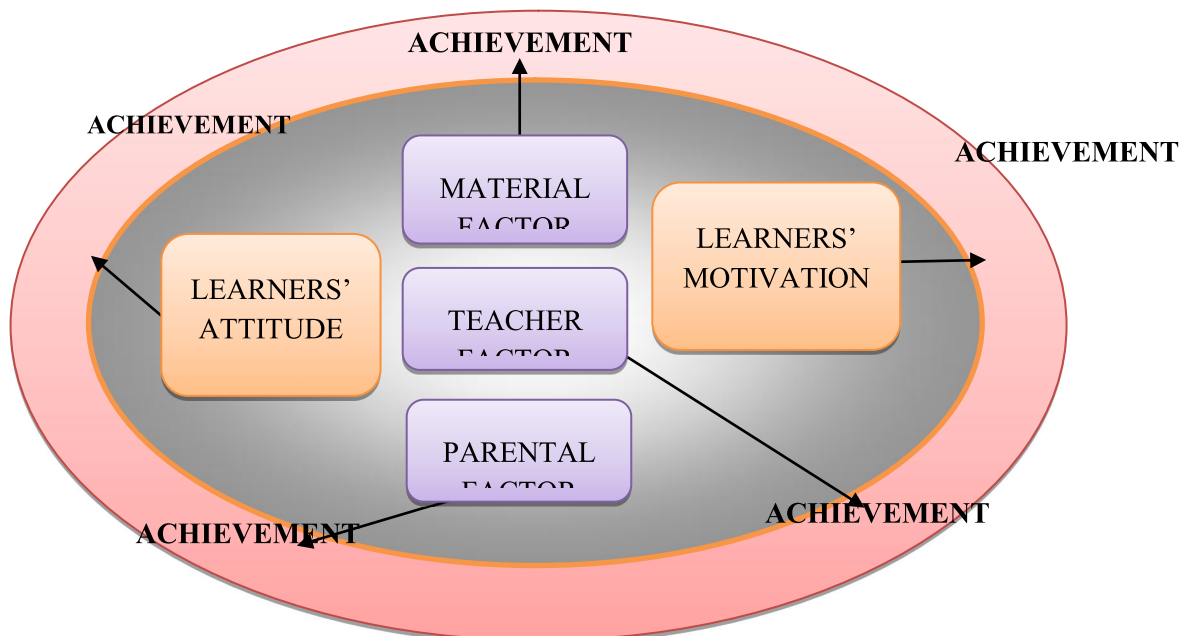
Table 2: Research Participants by Gender (N = 150).

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	73	48.7	48.7	48.7
	Female	77	51.3	51.3	100.0
	Total	150	100.0	100.0	

Table 2 shows that a total of 150 participants were involved in the study. 73 of the participants were male and 77 were female. In terms of percentages, male participants constituted 48.7%, whereas, female participants constituted 51.3% of all the participants.

4.2 Analysis of Quantitative Data

The research hypotheses were tested using the Multiple Linear Regression Analysis. The hypotheses test was meant to answer the main research question which was stated as “What are the factors that impact on grade nine learners’ academic achievement in Mathematics at Kikombe Day Secondary School?”. The hypotheses were tested at a 0.05 level of significance. The dependent variable of the test was *learners’ Academic Achievement* were as the independent variables were the possible factors.



The five research hypothesis tested were;

- H₁**: *Material factors* (MF) influence learners’ academic achievement in Mathematics.
- H₂**: *Teacher factors* (TF) influence learners’ academic achievement in Mathematics.
- H₃**: *Parental factors* (PF) influence learners’ academic achievement in Mathematics.
- H₄**: *Motivation factors* (MOF) influence learners’ academic achievement in Mathematics.
- H₅**: *Learner factors* (LF) influence learners’ academic achievement in Mathematics.

Table 3 below presents the results of multiple linear regression analysis used in testing the first set of hypotheses.
 Table 3: Multiple Linear Regression Analysis

Model		Unstandardized Coefficients		Standardized	T	Sig.
		B	Std. Error	Coefficients		
1	(Constant)	16.729	9.942		1.683	0.095
	MATERIAL	0.263	0.268	0.084	0.980	0.329
	TEACHER	-0.212	0.501	-0.041	-0.423	0.673
	PARENT	0.230	0.261	0.077	0.881	0.380
	MOTIVATION	1.283	0.526	0.207	2.439	0.016
	ATTITUDE	0.280	0.564	0.046	0.496	0.621

a. Dependent Variable: ACHIEVEMENT

The results in table 3 above show that the regression coefficient representing the relationship between the material factor and a learner's academic achievement was 0.263 with a p-value of 0.329 ($p = 0.329 > 0.05 = \alpha$). Therefore, the researcher failed to reject the null hypothesis and concluded that the *Material factors* had no statistically significant influence on learners' academic achievement. Similarly, the regression coefficient representing the relationship between teacher factor and a learner's level of academic achievement was -0.212 with a p-value of 0.673 ($p = 0.673 > 0.05 = \alpha$). Therefore, the researcher failed to reject the null hypothesis again and concluded that the *teacher factor* had no statistically significant influence on learners' academic achievement in Mathematics. Furthermore, the regression coefficient representing the relationship between the parental factor and a learner's level of academic achievement was 0.230 with a p-value of 0.380 ($p = 0.380 > 0.05 = \alpha$). Therefore, the researcher failed to reject the null hypothesis and concluded that the *Parental factors* (PF) had no statistically significant influence on learners' level of academic achievement in Mathematics. The results here meant that the activities of parents could not directly influence the level of academic achievement of a learner at Kikombe day Secondary School in Mathematics. The other outcome in Table 3 showed that the regression coefficient for the relationship between motivation factor and a learner's level of academic achievement was 1.283 with a p-value of 0.016 ($p = 0.016 < 0.05 = \alpha$). The researcher rejected the null hypothesis and concluded that the *Motivation factors* (MOF) had a direct statistically significant influence on learners' level of academic achievement in Mathematics. Finally, the regression coefficient for the relationship between learners' attitude and their level of academic achievement in Mathematics was 0.280 with a p-value of 0.621 ($p = 0.621 > 0.05 = \alpha$). Therefore, the researcher failed to reject the null hypothesis and concluded that the *Learners' attitude* (LF) had no statistically significant influence on learners' level of academic achievement in Mathematics.

4.3 Analysis of Qualitative Data

Qualitative data analysis was done with the help of computer software known as the QDA minor-lite. Five steps were taken in this analysis; the first step involved writing a transcripts using the written text from the responses to the question which sought participants' opinion on what they perceived as factors affecting academic achievement in mathematics. Two transcripts written; one from teachers' responses and the other from the learners' responses. This was followed by the second step which involved creating codes from each of the transcript. The codes were the underlying meaning perceived by the researcher in the respondents' responses. The third step on the other hand was the formation of themes using related codes. Codes which were related were given a common name called a theme. A total of sixteen codes of learners' responses, only six themes were generated. The code groupings and their respective themes were as follows;

The first group of codes had parents, siblings, and household chores as the factors affecting learners' academic achievement in mathematics. The three were related in that they were all about the influence a learner gets from home and therefore, they were given a theme as 'Home'.

The next group of codes had noise from peers in class, and general disturbance from peers, as the factors affecting learners' academic achievement in mathematics. The two codes were related in that they were both about the influence a learner gets from peers. Therefore, they were given a theme as 'Peers'

The third group of codes had teachers checking and marking work, as well as offering disciplinary measures. The two codes were related in that they were both about the influence a learner gets from a teacher. Therefore, they were given a theme as 'Teachers'

The fourth group of codes had learners' absenteeism, learners' timidity, and learners' attitude, as the factors affecting learners' academic achievement in mathematics. The three codes were related in that they were both about how a learner is affected by himself. Therefore, they were given a theme as 'Learner'.

The fifth group of codes had hot weather and rainy weather as the factors affecting learners' academic achievement in mathematics. The two codes were related in that they were both about the effects of weather on a learner. Therefore, they were given a theme as 'Weather'.

The last group of codes had availability of study materials, accessibility of study materials and usability of study materials as the factors affecting learners' academic achievement in mathematics. The three codes were related in that they were all about the effects of study materials on a learner's academic achievement. Therefore, they were given a theme as 'Material'.

The codes generated from the teachers' questionnaire were few and unrelated. Therefore, no themes were made from them. Only eight distinct factors were identified from the respondents' responses, of which the researcher gave eight distinct codes. The respondents perceived that the academic achievement of learners in mathematics was influenced by their attitude, punctuality, language barrier, misconceptions, enrolment, staffing, teachers' approaches, and availability of resources.

The fourth step in qualitative data analysis was the computation of code frequencies. Two frequency distributions were generated respectively. Figure 1 and figure 2 show the frequency distribution of codes. The frequencies were computed using the QDA minor-lite.

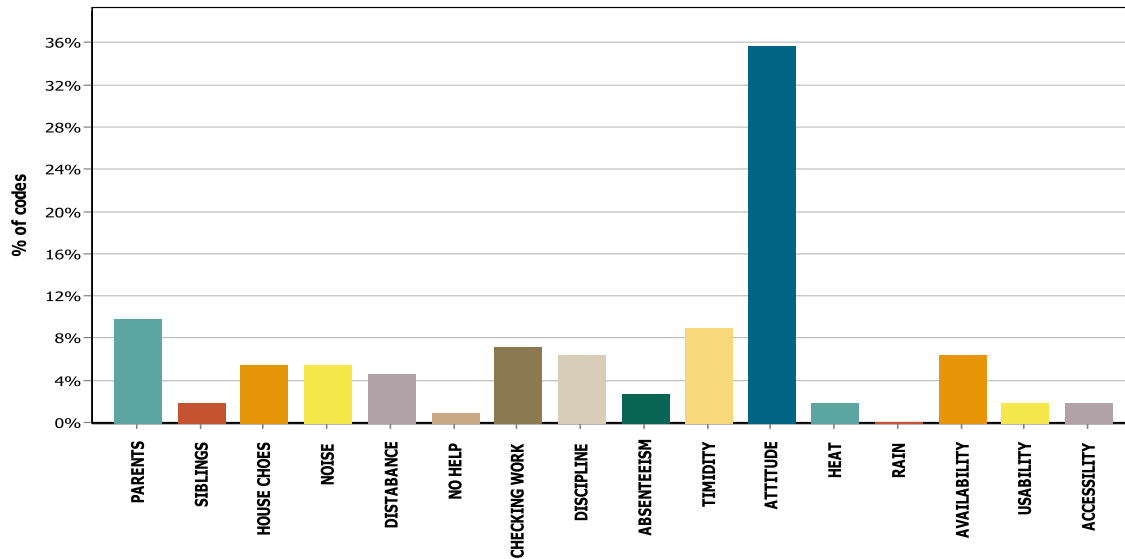


Figure 1: frequency distribution of Learners' coded responses

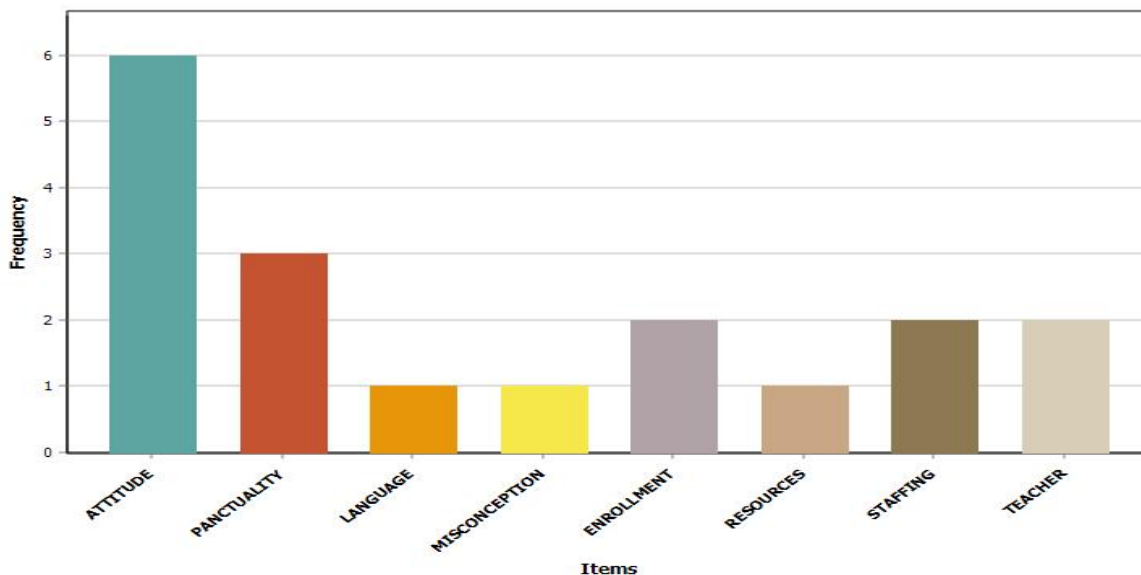


Figure 2: frequency distribution of Teachers' coded responses

Both figure 1 and figure 2 show that attitude had the highest frequency in the distributions. The interpretation of the outcome is that both learners and teachers attributed academic achievement of learners in Mathematics to the learners' attitude towards the subject. The fifth step was finally a conclusion drawn from the frequencies and stated as a general theory called a grounded theory.

Grounded Theory

The concluding theory, therefore, grounded on the data in this study was that; 'Academic achievement in

Mathematics among grade 9 learners at Kikombe day secondary school was a product of a learner's **attitude** towards the learning of the subject'.

5. Discussion of Research Findings

The study was set out to identify the factors that impacted grade nine learners' academic achievement in Mathematics at Kikombe Day Secondary School. The results of the study as revealed in the hypothesis test showed that learners' academic achievement in mathematics at Kikombe day secondary school was directly impacted by the learners' level of motivation to learn and study mathematics. These results imply that, if a learner at Kikombe Day Secondary School is to have good academic achievement in mathematics, they first needed to be motivated to learn mathematics, otherwise, they will not be able to attain good academic achievement in mathematics. The results mean that the opposite of motivation (anxiety) would certainly bring about poor academic achievement in mathematics. The findings of this study also showed that achievement was dependent on the learner's attitude towards the learning of mathematics. These findings were indicated in the output of the QDA Miner analysis. These findings imply that learners at Kikombe Day Secondary are likely to have a good academic achievement in Mathematics if the attitude towards the subject is good. The reverse also is true as far as the findings in this study are concerned. In a nutshell, the findings of this study revealed that learners' academic achievement in mathematics was directly dependent on both their level of motivation to learn mathematics and their attitude towards the subject. Teachers and parents must therefore ensure that they help learners to have good attitude towards the subject and to get motivated to learn it.

The results of this study are also in agreement with those of Poropat (2009). Poropat (2009) also focused his studies on finding out what factors were responsible for a learners' academic achievement in Mathematics. In his findings, it was revealed that individual performance of learners in Mathematics developed in the context of both background factors and internal factors. The internal factors according to Poropat (2009), consisted of motivation, cultural norms, and personality that were related to the willingness to perform, and they built up one's attitude towards Mathematics. The results of this study are also consistent with findings in the studies of Morony, Kleitman, Lee, & Stankov (2013), which also revealed that learners' academic achievement in Mathematics was internally predicted by a non-cognitive measure such as depression, well-being and social attitudes, all of which constitutes a learner's attitude towards Mathematics (Morony, Kleitman, Lee, & Stankov, 2013). In another study conducted by Caprara (2011), it was found out that personality and self-beliefs could both be viewed as important for the academic achievement of learners in mathematics (Caprara, 2011).

6. Conclusion

In conclusion, the findings of this study revealed that learners' academic achievement in mathematics was directly dependent on learners' level of motivation to learn mathematics. The findings, however, revealed that motivation in a learner was as a result of a learner's attitude unless it was intrinsic in which case, it would bring about a good attitude towards the learning of mathematics in a learner. The findings of the study also showed that a good attitude could be cultivated in a learner mainly by a teacher of mathematics or by the involvement of parents in a learner's academic work. Ultimately, teachers and parents need to focus on cultivating a positive attitude in learners to bring about good academic achievement in mathematics.

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