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The Influence of Senior Secondary School Learners' Attitudes Towards Mathematics on Their Performance in Selected Rural Secondary Schools in Vhembe West District

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Abstract
The study investigated the influence of learners' attitudes on their Mathematics performance in some selected secondary schools in Vhembe West District. The researcher used a mixed methods approach in this study. The study's design was a sequential explanatory mixed method design. Closed-ended questionnaires and a semi-structured interview were used for data collection. The reliability of the instrument was tested using the Cronbach coefficient and a pilot study was conducted to check validity. Convenience sampling was used to select the five schools that participated in the study. The one hundred and thirty (130) learners who participated in the quantitative stage were randomly sampled. The Statistical Package for Social Sciences (SPSS), Version 25 was used to analyse the responses from the quantitative data, and was presented in frequencies and percentages, generated to explain all variables under study. Qualitative data analysis was through content analysis. Findings of the study indicated that the majority of the learners have a positive attitude towards the study of Mathematics. The study found that learners' attitudes are influenced by various factors that range from a teacher-centred method of teaching to a learner's method of learning. In addition, lack of material (such textbooks, computers and display of physical objects) for learning Mathematics and lack of motivation generates a negative attitude, while poor learner performance in Mathematics leads to dislike for the subjects. The study concluded that learners' motivation to learn, affected their attitude towards Mathematics, due to lack of learning materials. In conclusion, most learners believed that Mathematics was difficult, and it took a long time to understand the concepts, since there were no physical objects/materials displayed by the teachers during teaching and learning to support the meaning of the concept taught. The study recommends that the Department of Education (DoE) should provide enough learning-friendly materials for learners to make the learning of Mathematics enjoyable.

Key words: Mathematics, learners, performance, attitudes and performance, Department of Education

Introduction

The focus of the study was to investigate the influence of learners' attitudes on their performance in Mathematics in selected senior secondary schools in the Vhembe West District of South Africa. Tsanwani's

(2009, p.19) investigation shows that, "factors such as learners' and teachers' commitment and motivation, attitudes and self-concept, learners' career prospects, learners' perceptions of peers and teachers, and teachers' perceptions of learners appear to influence disadvantaged learners' decisions to persist and achieve in Mathematics, in spite of their difficult circumstances". This study's selection of the schools aimed to ascertain the attitudes of learners towards Mathematics in selected senior secondary schools in the Vhembe West District.

Background to the Study

The study of Mathematics can be considered as critical beyond simply one's focus at obtaining a school or college qualification in academics, in the sense that despite every learner's choice of their career paths, Mathematics does prepare learners towards their prospective lives (Davis & Hersh, 2012). Limin (2008) states that Mathematics education prepares students to cope successfully with real life. Mathematics prepares learners to be doctors, musicians, engineers, farmers, and many other careers. This means that everyone needs Mathematics in everyday life. However, globally, both teachers and learners have certain attitudes about the teaching and learning of Mathematics (McEnrue & Groves, 2006; Mohamed & Waheed, 2011).

Mathematics has been captioned as one of the "Killer" subjects in the National Curriculum Statement (NCS) of the country (Curriculum Assessment and Policy Statement, CAPS, 2011). The majority of learners in the senior secondary schools in the country are unable to reason logically to solve simple Mathematics problems and this influences their performance in the study of the subject (CAPS, 2011). The low performance of learners in Mathematics, their attitudes towards studying the subject and other factors, constituted the subject of investigation of the current study. An aversion to Mathematics can be and has been classified in numerous ways. Studies have demonstrated that the concept of attitudes consist of different components such as cognitive, affective, and behavioural reactions which has influence on the life of an individual towards an object (Han and Carpenter, 2014; Sanchal & Sharma, 2017). Thus, how an individual thinks, believes and the tendency to respond or react towards learning of mathematics based on the response he/she receives from the teacher or peers when he/she faces a mathematical problem in the school environment (Mensah, Okyere, & Kuranchie, 2013). Furthermore, Elçi (2017) also defined attitude as a tendency preparing a person to behave towards something; in this case a subject that one learns or studies and it has some perceptive, cognitive and behavioral component in this tendency. The findings of a study conducted by Elçi (2017), revealed that "the students' attitudes towards Mathematics varied by gender, field, and Mathematics score, but not by grade and that the teachers' approaches and activities impacted the students' attitudes towards Mathematics in some aspects." This means that attitudes are usually formed as a result of maybe the kind of either teaching or learning experience learners go through in their educational lives. However, it is clear that these studies mentioned above and other related ones in the literature have failed to address issues that are aligned to learners' mathematical dislike and the contribution of these attitudes to low or high performance in the subject. This implies that positive attitudes influence learners to achieve well in Mathematics. Negative attitudes influence learners to achieve poorly in Mathematics. Findings by Zan and Martino (2007) and other related studies, such as Elçi (2017) fail to dwell on learners' attitudes, and their contribution to poor performance in Mathematics. This realization further led to the current study.

According to Thorndike et al. (1991), when a favorable attitude is displayed in view of the learning of a subject, pupils tend to work hard and perform relatively well in that subject. Thorndike et al. (1991) further asserts that positive attitudes towards Mathematics are important, because they affect learners' motivation to learn, and may increase the tendency to select Mathematics as a subject in high school and/or college, leading to the pursuit of careers in Mathematics and Mathematics-related professions.

Generating positive attitudes towards the study of Mathematics among learners is an important goal of Mathematics education. According to research that have been conducted over the last two decades, positive attitudes can impact on learners' preference to enroll for advanced studies and to consider careers in Mathematics and Mathematics-related fields (Trusty, 2002).

Further TIMSS (2002) data from Canada found attitudes towards Mathematics as a strong determinant of students' likelihood to participate in advanced courses in Mathematics (Ercikan et al., 2005). In another study conducted in south-western Nigeria, Chacko and Crowe (2001) found that teachers' attitudes towards teaching of Mathematics in schools predicted students' attitudes in a significant level, as well as the likelihood to study Mathematics in the near future.

Problem Statement

The study of Mathematics can be considered as critical beyond simply one's focus at obtaining a school or college qualification in academics, in the sense that despite every learners' choice of their career paths, Mathematics prepares learners towards their prospective lives (Davis & Hersh, 2012). The current research was prompted by the fact that at one school with 80 out of 426 learners who were doing Mathematics at the time of the study, the researcher was surprised to learn that only 20 out of 80 Mathematics learners in that school passed their first term examination. Thus, all 60 out of 80 learners who were doing Mathematics, failed their first term examination at that particular school. Furthermore, others in the schools involved, are repeating grade 9 repeatedly, because for them to proceed to grade 10, they need to score 40% in Mathematics and this leads them to drop out from the school. Many learners are migrating from Mathematics to do mathematical literacy, because of low performance in Mathematics. Therefore, the researchers decided to investigate learners' attitudes and their contribution to low performance in Mathematics. To the best of my knowledge as a researcher, not much research focusing on learners' attitudes and their contribution to low or high performance in Mathematics have been conducted in the Elim Circuit of Vhembe West Education District of South Africa, hence the current study.

Main Research Question

What are the attitudes of senior secondary school learners towards the study of Mathematics and its influence on their performance in Mathematics?

Theoretical Literature Review

This section highlights the theoretical frame work that was used, followed by the literature reviewed in this study. An orientation to the study was given for the background of the study. The focus of literature review is on literature concerning learners' contribution of their attitudes to low achievement in Mathematics. First, the literature presented is in line with the research questions. Secondly, the study's theoretical framework is presented to outline the theories that framed the study.

In an attempt to explore how learners' attitudes to Mathematics influenced their achievement, theories dealing with the cognitive levels of the learner were blended with the theory of emotional intelligence to frame this study. The current study, therefore, was underpinned by the constructivist theory and the theory of emotional intelligence (Bada, & Olusegun, 2015; Mayer & Salovey, 1997). The constructivist theory is rooted in psychology, and is premised on the manner people acquire knowledge, suggesting that experience is the source of human construction of knowledge and meaning.

Emotional intelligence, on the other hand, is the one responsible for looking after our physical and mental health and well-being, through to our capability to motivate and guide. In most cases, the concept of attitude is based on the emotions and the feelings of a person, be it good or bad. McEnrue and Groves (2006) is of the opinion that if a learner has a good feeling towards the study of the subject, his / her attitude may be affected positively towards that goal and vice versa.

It is further established that if the attitude towards a task is positive, the individual will be willing and excited to do it and succeed. The findings a study conducted by Maria de Lourdes Mata et al. (2012) revealed learners attituded towards mathematics has something to do with intrinsic motivation as well as the emotions and feelings, thus the positive predictors of intrinsic motivation are more strongly related to learners' attitudes towards mathematics. Hence, the need to be sensitive to learners' intrinsic motivation when it comes to selection of school subjects where mathematics is included/involved. This means that the concept attitude is based on the emotions and the feelings of a person that helps to achieve the end results

positively or negatively based on intrinsic motivation. If a learner has a good feeling towards the study of the subject Mathematics, his/her attitude may be affected positively towards achieving that goal in Mathematics and vice versa. The most important thing in constructivism theory is that in the learning process, the learner should get the emphasis on whatever he/she is studying in order to achieve its purpose. Learners must actively develop their knowledge, not others. Learners must be responsible for their learning outcomes. Their creativity and liveliness will help them to be independent in their cognitive life (Suhendi & Purwarno, 2018). However, constructivism does not assist one's emotional control, which affects formation of attitudes. Therefore, the study also used the emotional intelligence theory.

Emotional Intelligence

According to Mayer and Salovey (1997), emotional intelligence is the ability to monitor one's own emotions to guide one's thinking and behavior. Studies have shown that how one manages his/her emotions to achieve success, determines the level of one's emotional intelligence. Individuals with high levels of emotional intelligence are those who control their feelings and behaviors so that their ability to think wisely is not impaired (McEnrue & Groves, 2006). The researcher is of the view that learners who have the skills to overcome their emotions, perform better in any kind of task assigned to them.

According to Bar-On (2005), learners' level of emotional intelligence is necessary to contribute to their Mathematics achievement. Learners' attitudes in this case include habits, problem-solving behavior, Mathematics anxiety and attitude towards Mathematics. The use of the theory of "emotional intelligence" in this study is necessary, because emotional intelligence plays a significant role in learners' Mathematics achievement and mastering of certain Mathematics concepts. Therefore, emotions of the learners need to be controlled to make learning of Mathematics interesting and attractive, in order to improve the performance of learners. Learners' emotions, attitudes towards Mathematics and study habits, their experience of the teaching and learning of Mathematics, the classroom atmosphere and their family life, all play a significant role in their Mathematics achievement (Maree, 2014).

Attitudes of Senior Secondary School Learners towards Mathematics

Attitude towards the learning of Mathematics in schools can be traced back to a number of causes. They included teacher-learner relationships, beliefs and attitudes, peer pressure and learner motivation, among others. These are presented in the section below:

- **Teacher-learner relationship**

Newman and Schwager (1993, cited in Tsanwani, 2009, pp.24-25), "found that at all grades a sense of personal relatedness with the teacher is important in determining a learner's frequency in seeking help from the teacher. They further state that this aspect of the classroom climate has been shown to be related to good academic outcome". Tsanwani (2009) also acknowledges, in the same vein as Dungan and Thurlow (1989), who stated that the extent to which learners like their teacher, influences their liking of the subject.

- **Beliefs and attitudes**

Tsanwani (2009, p.26) notes that, "In Mathematics education, most of what is known about beliefs and attitudes of the learners towards Mathematics is based upon large-scale survey data (Martin et al., 2000). For example, the National Assessment of Education Progress in the United States of America has shown that African American learners constantly express the most positive attitudes towards Mathematics among all learner groups. Other studies show that many African American learners identify Mathematics as their favorite subject. Similar studies in South Africa show that most of the learners have positive attitudes towards Mathematics (Howie, 2001).

- **Association between learners' attitudes and their performance in Mathematics**

In a study in Portugal, "Fraser and Kahle (2008) have highlighted the aspect in research, which shows that learning environments at home, at school, and within the peer group accounted for a significant amount of variance in student attitudes and, furthermore, that class ethos had a significant impact on the scores achieved by students for these attitudes" (Mulala, 2015, p.4). Kufakunesu (2015) cites Rammala (2009, p.19) who notes that, "negative attitudes towards learning could result in learners performing poorly, thereby preventing them from obtaining the results required for a university entrance. This means that the 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 that subject or task". This implies that negative attitudes can lead to low performance, and vice versa.

- **The role of positive attitude in influencing students**

These are factors associated with the students themselves (e.g. mathematical achievement, anxiety, self-efficacy and self-concept, motivation, and experiences at school); factors associated with the school, teachers, and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards Mathematics, guidance, beliefs); finally factors from the home environment and society (e.g., educational background, parental expectations). "Attitudes can be seen as more or less positive" (Mata et al., 2012, p.2). According to McLeod (1992 cited in Knowles, 2004, p.78), "factors such as attitudes and beliefs play an important role in Mathematics achievement. 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 Mathematics".

A positive attitude towards Mathematics reflects a positive emotional disposition in relation to the subject and, in a similar way, a negative attitude towards Mathematics relates to a negative emotional disposition (Zan & Martino, 2007). These emotional dispositions have an impact on an individual's behavior, as one is likely to achieve better in a subject that one enjoys, has confidence in or finds useful. For this reason, positive attitudes towards Mathematics are desirable since they may influence one's willingness to learn, as well as the benefits one can derive from Mathematics instruction (Eshun, 2004 cited in Imasuen & Omorogbe, 2016). Thuo (1985) notes that in Kenya, learners' attitude towards Mathematics' (Imasuen & Omorogbe, 2016) expectations and aspirations contributed to achievement. The learners who showed negative attitudes in Mathematics spent less time in the subject and performed badly. A learner who is negative feels it as time consuming to spend too much time on a subject in which they do not perform well. On the other hand, learners who showed a positive attitude in Mathematics spent more time on the subject and they performed well. Different socio-economic factors, lack of basic Mathematics skills and lack of resources, influenced performance of learners in the teaching and learning of Mathematics (NCTM, 2000).

Efklides (2009, cited in Arends et al., 2017, p.2) argues that "students' problem-solving difficulties are not always as a result of lack of mathematical knowledge, but commence from ineffective activation of student knowledge, since students lack the metacognitive skill needed to control, monitor and reflect on the solution process". "As a result, cognitive / meta-cognitive difficulties cause many students to develop negative feelings towards Mathematics, thus hindering learning and achievement" (Efklides, 2011; Efklides & Petkaki, 2005 in Arends et al., 2017, p.3). The next section presents the research methodology.

Research Methodology

According to Igwenagu (2016, p.5), research methodology "is a set of systematic techniques used in research." This simply means a guide to research and how it is conducted. The researcher used a mixed methods approach in this study. According to Ivankova (2006, in Shorten & Smith, 2017, p.74), "Mixed methods research requires a purposeful mixing of methods in data collection, data analysis and interpretation of the evidence. The study made use of a sequential explanatory mixed method design, whereby the quantitative data collection was followed by the qualitative. The study's target was senior secondary school learners in the Elim Circuit in the Vhembe West Education District of South Africa. The target population of this study involved public secondary schools within the Elim Circuit in Vhembe West

District, with a total number of eight public secondary schools. All public secondary Mathematics learners in FET in these selected schools were the target of the study. The target population was therefore 600 Mathematics learners selected from the Elim Circuit of the Vhembe West Education District.

Population and Sampling

The study used both random and convenient sampling for the selection of the schools and learners. Five public secondary schools were conveniently selected to take part in this research. Only 130 learners within these five schools voluntarily participated in this study. The selected 130 learners, who responded to the questionnaires in the quantitative stage were randomly sampled, whereby every learner of the larger population of 600 had an equal chance of being selected, but based on the characteristics (age and gender) under consideration, the simple random sampling technique was used to obtain 130 learners out of the larger population. The questionnaires had two parts. The first section solicited learners' demographic information and the second section consisted of Mathematics questions where learners were asked how often they practiced Mathematics or how did they comprehend Mathematics when they were being taught and so on.

All learners were visited in their schools by the researcher, and their educators administered the questionnaires after school so that there were no interruptions of teaching and learning during school periods. In all the sampled schools, the researcher approached the Mathematics Heads of Departments whereby the questionnaires were administered directly to the learners under the supervision of their Mathematics teachers so that when they finished completing the questionnaires, it was handed back to me. Only those learners who were willing to take part in this research after their teachers explained it to them, were the ones that completed the questionnaire. All participants completed informed consent forms before participating. Under-age learners had their parents completing informed consent forms on their behalf.

Validity and Reliability

In this study, Cronbach alpha coefficient was used to test the reliability of the instrument. The overall Cronbach alpha value was 0.61, showing that the questionnaire was valid and reliable. On the other hand, a pilot study was conducted to validate the instruments.

Analysis

Quantitative questionnaires were analyzed using the SPSS Version 25. SPSS generated descriptive statistics, such as frequency tables, percentages, means and standard deviations that were used to explain all variables under study. For analyzing qualitative interviews, content analysis was applied. Under this section, the researcher identified key words and ideas, which were used repeatedly by the respondents. The items were graded using the following keywords, as used by Yang et al. (2013): "Strongly Agree was awarded 5 points, Agree 4 points, Uncertain 3 points, Disagree 2 points and Strongly Disagree 1 point". Alternative items were graded in the opposite with reversed keys so that Strongly Agree was 1 point, Agree 2 points, Uncertain 3 points, Disagree 4 points and Strongly Disagree 5 points. All ethical considerations were observed in this study.

Data Presentation and Discussion

Considering that a mixed method approach was adopted, a description of the broad categories, produced from the learners' qualitative data is presented simultaneously with quantitative findings, in line with the adopted research design. In this study, the narrations of the interviewed learners were presented together with learners' quantitative responses in light of the objectives of the study. The section starts by presenting biographical information of all the participants (See Table 1). Responses from interviews are presented with pseudonyms L1, L2, L7, etc. to refer to Learner 1, Learner 2, Learner 7, etc. respectively.

Biographic Data of the Learner Participants

The mathematics learners who volunteered to participate in the study were 130. Table 1 presents biographic characteristics of participating learners.

Table 1:
Biographic data for learners

Variable		Characteristic	Frequency	Percentage
Grade 10	Gender	Male	6	4.6
		Female	7	5.3
	Age (years)	14-17	12	9.1
		18-21	1	0.1
Grade 11	Gender	Male	37	27.5
		Female	39	30.3
	Age (years)	14-17	45	33.8
		18-21	35	26.7
Grade 12	Gender	Male	24	17.6
		Female	16	11.5
	Age (years)	14-17	5	3.6
		18-21	35	26.8

Table 1 depicts that 52.3% (68) of the learners were males, whereas 47.7% (62) were females.

This implies that this category appears to have more male learners than female learners doing Mathematics in those selected schools. Furthermore, 30% of the learner participants were Grade 12s, whereas 58% were Grade 11s. The rest were Grade 10 learners. In addition, 47% of all the participants were learners within the 14 to 17 year age range, while the rest were between 18 and 21 years.

Attitudes of Senior Secondary School Learners towards the Study of Mathematics
There are many sources of learners' development of certain attitudes towards Mathematics, and they range from teacher-centered methods of teaching to learner-centered methods of learning as presented below.

Lack of enough Material for Learning Mathematics
Learners' views about availability of enough material for learning Mathematics and how it could affect their attitude are presented below.

Table 2:
Lack of enough material for learning Mathematics (N=130)

Response	Frequency	Percentage
Strongly disagree	40	30.8
Disagree	28	21.5
Neutral	16	12.3
Agree	25	19.2
Strongly agree	21	16.2
Total	130	100

In Table 2, 52.3% of the respondents were of the view that there were inadequate Mathematics materials. Mathematics learning material portrays crucial role in the learners' achievement in any subject with Mathematics included. Therefore, the findings of this study tally with the findings of Daso (2012) and Sa'ad et al. (2014) who realized that the creation of a positive attitude concerning Mathematics, delivery of instructional materials, delivery of libraries and laboratories, as well as methods in teaching Mathematics, were other means to improve learners' Mathematics achievement. The studies further found that developing a positive attitude, motivation and proper guidance towards Mathematics, using proper methods of teaching the subject, provision of relevant teaching materials, additional classrooms and furniture, provision of

libraries and mathematical laboratories, were of the ways of improving learners' performance in Mathematics.

Reasons Learners quit Mathematics for Mathematical Literacy

Based on the qualitative analysis, the learners pointed out some factors that actually contributed to their negative attitude towards Mathematics and how it may gradually lead to their poor performance in the subject of Mathematics. This is what some of them had to say: L6 mentioned the issue of learners being too lazy to think and calculate and that they prefer easy things, which has L7 mentioned that, "they come with a negative attitude toward Mathematics which makes it difficult for them to cope during teaching and learning". L2 added and said the reason is that "they said Mathematics is difficult and mathematical literacy deals with everyday life. It covers all subjects". L1 said "the learners of nowadays are not hard workers, their vocabulary are less participating in education". L3 responded saying "they are misinformed by parents and educators who are not competent in Mathematics". L4 said, "those are the challenges that they come across while dealing with Mathematics, as it needs them to think critically". L5 also said, "they are most interested in using calculators to do much work as they would have been given". L8 said, "learners need supervision and support from the community and other stakeholders to pursue their goals". L9 said, "learners do not like Mathematics because it challenges their thinking, learners are lazy to reason, and they don't like to focus". T10 said, "mathematical literacy is easy. Pure Mathematics is more difficult". L11 also said, "the lack of enthusiasm". T12 said that learners do mathematical literacy "so that they can get help easier, since most of those who study Mathematics end up in universities". L14 said, "learners don't want to practice Mathematics", while L15 said, "basic background is very poor". L6 responded saying, "because they are lazy to think and to calculate", while L7 said, "they are lazy to think and want to do easy things". This means that for learners to develop positive attitudes towards Mathematics and improve performance in the subject, requires both material and human support from the community, including parents and teachers as already demonstrated in a study conducted by Daso (2012) and Sa'ad et al. (2014).

- **Teaching styles and learning motivation**

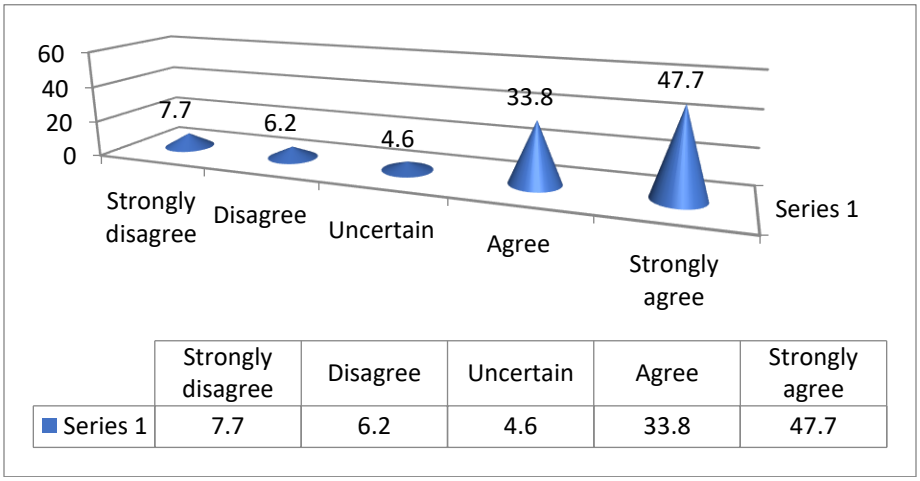
Table 3:

Comparing teaching styles and learners' motivation to learn (N=130)

Response	My educator in Mathematics goes the extra mile to explain concepts in the subjects		My educator teaches the subject very well, but I do not have an interest in it	
Response	Frequency	Percentage	Frequency	Percentage
Strongly disagree	16	12.3	51	39.2
Disagree	13	10.0	30	23.1
Neutral	19	14.6	13	10.0
Agree	45	34.6	23	17.7
Strongly agree	31	24.5	13	10.0
Total	130	100	130	100

It was interesting to note in Table 3 that 63.1% agreed and strongly agreed that their educators in Mathematics went an extra mile to explain concepts in the subject. Research concluded that this can lead to good learners' Mathematics achievement. Table 2 also depicts that 62.3% were of a view that their educators did not teach the subject very well. Then, 27.7% were of opinion that their educators taught the subject very well, but they just did not have an interest in Mathematics. Both cases, however, have negative results on learners' interests in Mathematics. Tsanwani (2009) notes that the extent to which learners like their teacher influenced their liking of the subject.

- **Teacher allows us to ask questions and gives us clarity on things we do not understand**



	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
Series 1	7.7	6.2	4.6	33.8	47.7

Figure 1: *Teacher allows us to ask questions and gives us clarity on things we do not understand*

In Figure 1, 81.5% (N=106) of the learners were of the view that their Mathematics teacher allowed them to ask questions and gave them clarity to the things they did not understand. This helped them to develop positive attitudes towards Mathematics and vice versa. However, 13.9% (N=18) of the learners denied that their Mathematics teacher allowed them to ask questions or provided clarity on the things they did not understand. Only 4.6% (N=6) of learners were uncertain of this issue. This view is consistent with Van de Walle (2007) who emphasized that educator-learners' relations, in which learners get vigorously involved in creating mathematical acquaintance, as well as thoughtfulness, is critical to enhance learning. Discovery learning leads to learners developing problem-solving skills. If educators adopt this approach, chances that learners would think better and in real terms are very high, and learners are likely develop positive attitudes and interest towards Mathematics.

- **Class space is conducive for me to learn Mathematics with the rest of the class**

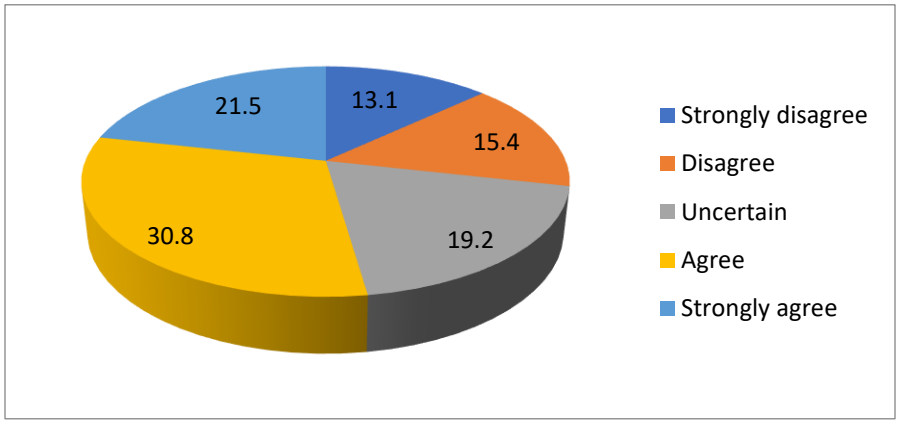


Figure 2: *Class space is conducive for me to learn Mathematics with the rest of the class*

In Figure 2, 28.5 % (N=37) of learners responded to say that the classrooms in their schools were not conducive to learn Mathematics, while around 52% viewed their class sizes as conducive for learning. School and class sizes have been displayed to have an influence on learners' performance. Hannah (2013) emphasized that the classroom environment plays an important role in keeping students occupied and permitting them to be successful within the classroom. Congested Mathematics classes cause bad performance in the subject. Lee et al. (1997, p.128) noticed, "Larger schools have a negative impact on

academic success in secondary school Mathematics". Kufakunesu (2015, p.100) cites Patrick, Ryan and Kaplan (2007), who found "a strong positive correlation between learners' levels of motivation and their perceptions of the classroom environment, as being socially supportive".

Effect of Learners' Attitudes towards Mathematics Achievement

There are different ways through which learners' attitudes affect their Mathematics achievement, including the following:

- **Learners' likeness of Mathematics**

The graph below shows the extent to which learners like Mathematics.

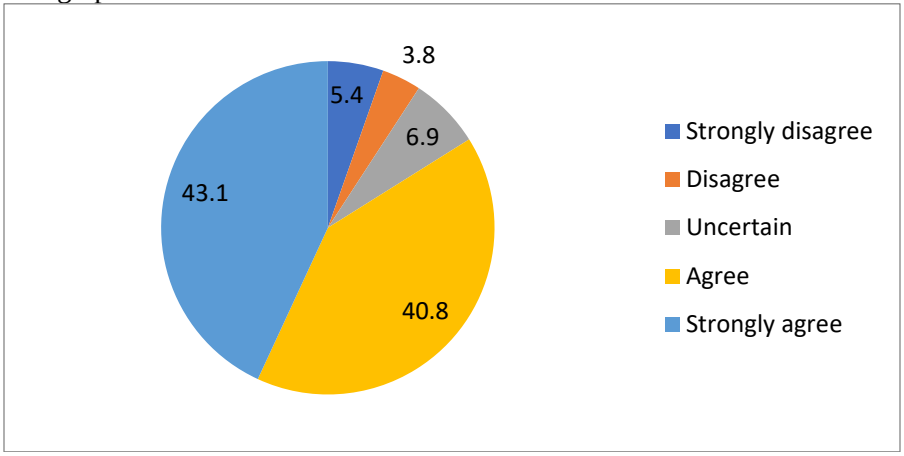


Figure 3: *Learners' likeness of Mathematics*

In Figure 3, 83.9% (N=109) of the learners responded that they liked Mathematics. On the other hand, only 9.2% responded that they did not like Mathematics. Therefore, it was obvious that the attitude of learners towards Mathematics was positive, though that did not play a positive role in the performance of learners.

- **Learners' enjoyment of Mathematics**

Table 4:
Learners' enjoyment of Mathematics

Response	Frequency	Percentage
Strongly Disagree	14	10.8
Disagree	14	10.8
Uncertain	17	13.1
Agree	48	36.9
Strongly Agree	37	28.5

In Table 4, out of 130 learners who participated, 28 (21.6%) of the learners responded by saying that they did not enjoy Mathematics, with 17 learners responding that they were uncertain, and the majority of learners saying that they were enjoying Mathematics. This is in line with Mamali (2015) who argues that "Learners who enjoy and have an ability in Mathematics, achieve better than those who hate it". Ma (1997:17 in Mamali, 2015) notes that "in the case of trigonometry learners, the attitude that geometry was significant and pleasant, was significantly linked with success in Mathematics".

- **Not enjoying Mathematics because of lack of understanding**

The study also established whether a lack of understanding during lessons made learners not to enjoy Mathematics. Regarding the question asked if learners enjoyed Mathematics because of a lack of understanding, Figure 4 depicts that 54% of the learners were in disagreement in relation to them not enjoying Mathematics, because of a lack of knowledge. However, about 40% agreed that they did not enjoy Mathematics, as they lacked understanding, hence were prompted to develop undesirable attitudes concerning the subject.

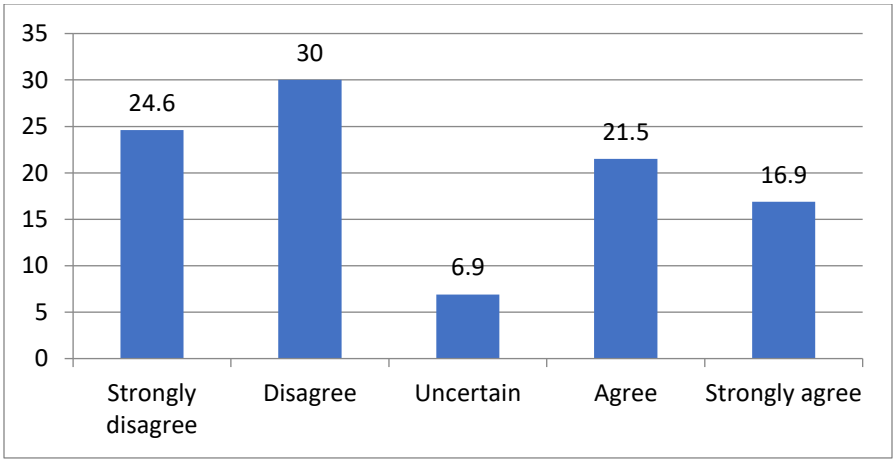


Figure 4: *Not enjoying Mathematics because of lack of understanding*

- **I keep trying repeatedly to complete work in Mathematics without achieving the desired results**

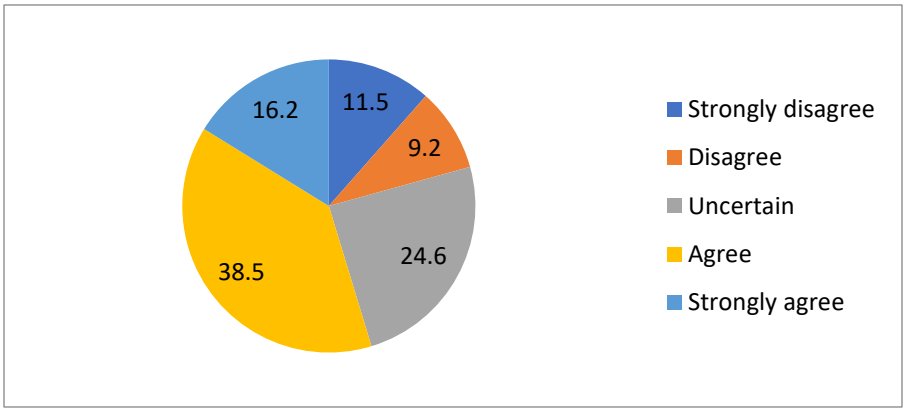


Figure 5: *I keep trying repeatedly to complete work in Mathematics without achieving the desired results*

In Figure 5, 54.7% (N=71) of the participants said that they stopped trying repeatedly to complete work in Mathematics if they did not achieve the desired results. This meant learners were not persistent enough, based on their responses. On the other hand, only 20% believed that if they put in more effort, they would achieve the desired results. This is in line with Mensah et al. (2013, p.132) who are of the view that "it has been realized that many students have developed negative attitudes towards the study of Mathematics, because of mass failure of students of the subject".

- **My educator teaches the subject well, but I find it difficult to understand**

In Figure 6, 46.2% of the respondents were of the view that their educators did not teach Mathematics well, with 42.1% agreeing that their teachers knew the subject very well and admitted that they found it difficult to understand Mathematics.

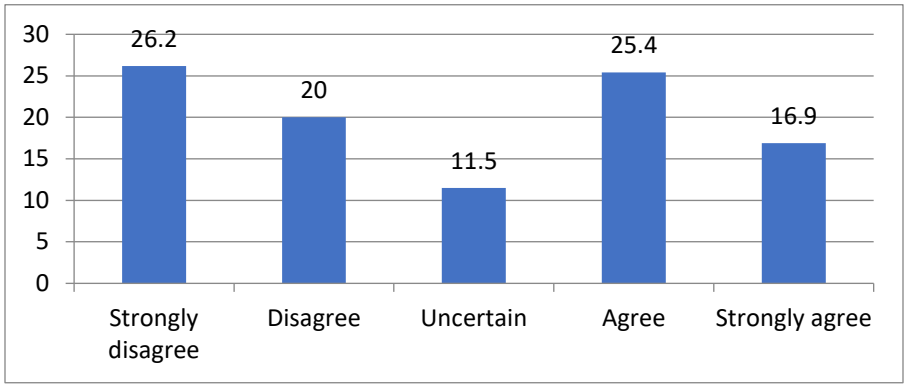


Figure 6: *My educator teaches the subject well, but I find it difficult to understand*

The outcome of this study corresponded with the findings of Alkan et al. (2004) who found that a lot of students believed that Mathematics was a difficult subject and they were worried that they could not be successful in Mathematics, which disturbs the attitudes concerning Mathematics in a negative way.

- **My educator in Mathematics does not know the subject, so the subject is boring and difficult**

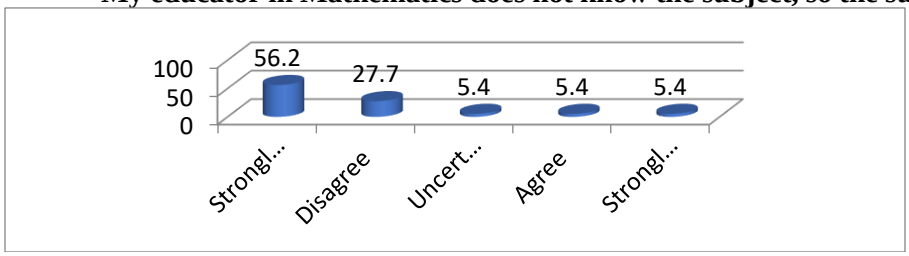


Figure 7: *My educator in Mathematics does not know the subject, so the subject is boring and difficult*

In Figure 7, 83,8% of learners strongly disagreed and disagreed that their educators in Mathematics did not know the subject, and that they found subject to be boring and difficult. However, 10.8% of learners agreed to that view, while 5,4% of the learners were uncertain.

According to Sun et al. (2010, p.70), "Elementary teacher education programs are in great need of consolidating the content and pedagogy courses to meet the requirements of living in the 21st Century. Meaningful Mathematics instruction needs a subject matter context and often times there is insufficient time for science instruction. Thus, elementary school teachers need to be able to create integrated Mathematics and science instruction" to which high school Mathematics has not been in immune.

Middleton and Goepfert (2002) said that the methods that are used to teach educators need to be reconsidered. For instance, in a traditional Mathematics class, the teacher would start with correcting the previous homework, then procced with an overview of new concepts, mainly with the educator as lecturer, and the learners in the listening role, possibly taking notes. When the lesson is about to end, a few examples are practiced, and then in the final 15 to 20 minutes, the learners remain practicing a set of problems from the text book on their own. This method of learning does not encourage the learners.

- **Mathematics is difficult, and it takes time to understand the concepts**

Learners' views about the above are presented in Figure 7.

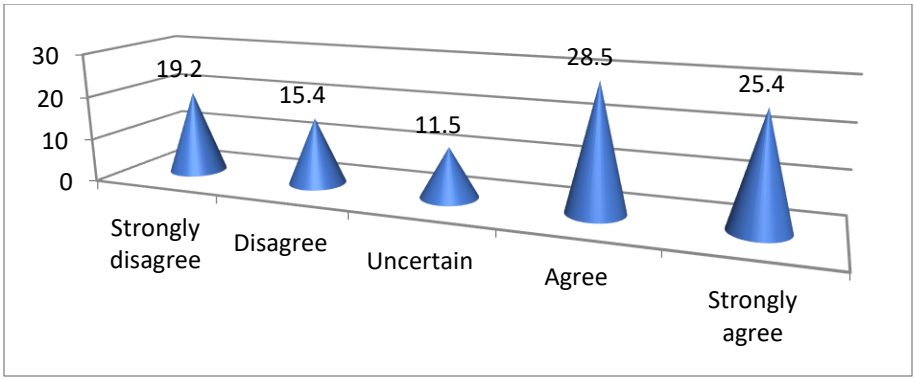


Figure 8: *Mathematics is difficult, and it takes time to understand the concepts*

Figure 8 shows that 53.9% (N=70) of the learners were of the view that Mathematics was difficult, and it took time to understand the concepts. On the other hand, 34.6% did not consider Mathematics as a difficult subject. The outcome of this study related with findings by Gafoor and Kurukkan (2015), who opined that Mathematics is regarded as a difficult subject by the majority of the learners, because of an aversive teaching style, understanding the instruction, difficulty in understanding the Mathematics, and difficulty in memorizing its equations and techniques to solve problems.

- **Home influence versus teacher effort and learner attitude**

It is interesting to note that Table 5 shows that 88, 5% of learners indicated that they were not forced to choose Mathematics, with 3.8% saying they were not sure if they were forced or not. It was 7.7% of the learners who said they were forced by parents or guardians to study Mathematics. Shafika (2007, p.13) emphasized that, "parents have an influence on students' choice of major. The evidence regarding the influence of others, for example, parents and friends, is also inconclusive".

Table 5:
Home influence versus teacher effort and learner attitude

Response	My educator in Mathematics goes the extra mile to explain concepts in the subjects		My educator teaches the subject very well, but I do not have an interest in it	
	Frequency	Percentage	Frequency	Percentage
Strongly Disagree	84	64.6	57	43.8
Disagree	31	23.8	41	31.5
Uncertain	5	3.8	10	7.7
Agree	7	5.4	13	10.0
Strongly Agree	3	2.3	9	6.9

Studies, such as Tan and Lasward's (2006, p.24) indicate, "Parents, followed by instructors, had a strong influence on learners' choice of major". Table 4 also shows that 75.4% of learners responded that their educators did not teach Mathematics well, but they did not have an interest in Mathematics. While 7.7% were uncertain, 16.9% of learners said their teachers knew Mathematics well.

Contribution of the Study to the Literature

- Learners' attitudes are triggered by various factors that range from teacher-centered to learner-centered.

- Learning how to teach Mathematics in a class that includes learners with special needs is important and also using physical objects to demonstrate the meaning of a concept in teaching and learning helps to improve their understanding and performance.
- Lack of guidance and inadequate material provided by either the government or parents for learners in learning of Mathematics generates negative attitudes.
- Unable to meet the needs of excited and bored learners in Mathematics classes during teaching and learning, diminishes learners' interest in the subject, hence influences their performance.

Conclusion

The findings of the study led to the conclusion that there were different ways through which learners' attitudes influenced their performance in Mathematics. Some of these ways were learners' likeness of Mathematics, not enjoying Mathematics because of a lack of understanding, guidance offered to learners affect their motivation to do Mathematics, provision of physical objects for illustration, libraries and mathematical laboratories, encouraging leaners to do Mathematics facilitated positive results, and learners repeatedly trying to complete the Mathematics without achieving the desired outcome.

Suggestions

In line with Tsanwani (2009), the research outcomes of this study are crucial for both Mathematics teachers and learners at schools and tertiary institutions. Therefore, the following recommendations from this study may contribute to the improvement of performance of learners in Mathematics.

- The DoE may consider ensuring that a manageable number of learners are in the classroom to minimize overcrowded conditions. Overcrowding makes it difficult for teachers to be effective as they may not be able to mark work for every learner or monitor each learner's performance.
- DoE could also provide enough learning materials, including physical objects for teaching and learning and consider utilization of electronic materials to save paper, money and the
- Parents may consider supporting the teachers by being involved in their learner's education; they should guide and buy their children Mathematics materials, assist them with homework and arrange extra classes for them. If teachers and parents work together to assist these learners, their performance can improve.

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