

Factors Affecting the Interest and Attitude of Pupils towards Learning Mathematics in Selected Schools of Eastern Province, Zambia.

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ABSTRACT

The National Numeracy framework document (2015) highlighted the consistent poor performance in mathematics. The document cited the National Assessment surveys results, noting that the trend of poor performance by learners at all levels of our educational system has remained the same. The National numeracy framework documented and itemised a number of challenges that could be contributing to poor performance by pupils in schools among them attitude of learners towards mathematics. This study sought to assess the nature and factors affecting interest and attitudes of pupils towards learning mathematics. The research used a survey design with a combination of quantitative and qualitative methods when collecting data from 120 Grades 10, 11 and 12 pupils and 16 teachers teaching mathematics. A questionnaire for pupils and the other for teachers were administered. The questionnaires contained closed and ended questions. A focus group discussion for teachers and pupils was also conducted to consolidate the data. Data collected from the first two parts of pupils' questionnaire and the first part of teachers' questionnaire (with closed questions) was analysed quantitatively. The last parts of the questionnaire containing open ended questions and focus group discussion were analysed qualitatively by categorizing, describing and explaining, while the mean; bar charts, standard deviation, percentages and frequency distribution were also used to illustrate the analysed data.

According to the research findings the nature of interest and attitude of high school pupils showed that pupils had interest and had positive attitude towards learning mathematics. The research also showed that pupils lost interest and developed negative attitude, mainly due to the teachers apart from other factors. The study recommended that teachers approach to teaching and learning and the way they interact with learners should be reviewed; concepts which can be applied in real life situation to arouse interest and influence positively pupils' attitudes in the subject should be encouraged.

Key words: Attitudes, Interests, learning mathematics, teachers.

INTRODUCTION

Most of the high schools in Zambia have experienced a continuous high failure rate in mathematics at school certificate level for quite some time (e.g. Examination Council of Zambia (ECZ) reports of 2015, 2016, 2017 & 2018), Phiri & Ndhlovu (2019), Mwape, Ndhlovu & Malambo (2019), etc). The ECZ performance review report reported persistent failure of more than 50 percent by candidates who sit for the examinations at Grade 12 level, (An average of 43.3% pass rate). Eastern province has not been spared with this state of affairs. The performance of pupils in mathematics has remained low, despite more qualified teachers continuously being recruited and deployed in schools.

The Ministry of Education (1996) in the policy document "Educating our future" acknowledges that this is a

challenge that requires urgent attention and major interventions. The Ministry of Education embarked on interventions for example, the Zambian Mathematics and science Teachers Educators project (ZAMSTEP), the Bachelor of Education degree programme in mathematics and science (BEDMAS) and the Fast Track Teacher Education Programme (FTTEP) at the University of Zambia (UNZA); the development of the National Numeracy Framework (NNF) (2015) as a strategy of teaching numeracy and the Zambia Education Enhancement Project (ZEEP)(2018) with focused on Teacher Quality among other interventions all in order to try and improve the pedagogical skill of qualified teachers in Mathematics so that they teach effectively in high schools. The Ministry of Education has been trying to reverse this trend by further organizing programmes, seminars and workshops for mathematics teachers at school, zonal, district provincial and national level but pupils' performance at school certificate level has remained undesirable. The failure in mathematics might have serious implications on the economy and social life of the people. There might be very few citizens taking up jobs which need mathematical knowledge and the mathematical reasoning and skill might be reduced in our society.

STATEMENT OF THE PROBLEM

Mathematics is one of the key subjects the policy document, acknowledged records low achievement at school certificate level which requires serious interventions Ministry of Education (MOE,1996). Other studies and National assessments over the years (e.g. Examination Council of Zambia Reports (2015, 2016, 2017, 2018), Haambokoma et.al (2004) have reaffirmed this. The low achievement has been attributed to many factors like self-esteem, behaviour value and recently affect and anxiety (e.g. Mwape, Ndhlovu & Malambo (2019), Phiri & Ndhlovu (2019). Heinze et.al (2005), Sauer (2012) in separate studies that explored mathematics achievement and interest as well as the association between the variables found that interest towards mathematics learning was a contributor to academic performance. Researchers e.g. Hashim et.al (2021) found that among students' factors, attitude was found to be the key contributor to academic performance in mathematics. A study by Xu et al. (2016) which investigated the relationship between students' interest and attitude in learning mathematics found that interest affected students' attitude in the subject. The study found that students' interest in learning mathematics subject influenced students' attitude in learning Mathematics. Thus lack of interest and negative attitude towards learning mathematics was attributed to a large extent to low achievement in the subject.

Lack of interest by pupils should not occur in class as effective learning might not take place. Meanwhile cultivating and maintaining student interest in mathematics is a major problem for the teacher as he/she knows that loss of interest is one of the principle causes of student failure (Sidhu (2002). The attitude of a pupil towards mathematics should be positive to enable a pupil to be ready to learn mathematics. Students' attitudes play a vital role in the learning of mathematics (Ingram, 2015; Kele & Sharma, 2014, Carguelutti et.al 2017, Chang & Beilock, 2016).

The study was, therefore designed to assess the nature and factors affecting pupil's interest and attitude towards learning mathematics at high schools in Eastern province.

Purpose of the study.

The purpose of the study was to assess the nature and factors affecting pupils 'interest and attitudes' towards learning mathematics in high schools.

Objective of the study.

The objectives of the study were to:

- assess the nature of interest pupils show towards learning mathematics at high schools.

- assess the attitude pupils have towards learning mathematics in high schools.
- determine the factors that contribute to pupils developing such interest and attitude towards learning mathematics at high schools.

Research questions

The study was guided by the following research questions.

1. What is the nature of interest pupils show towards learning mathematics at high schools
2. What attitude do pupils have towards learning mathematics at high schools?
3. What factors contribute to pupils having such interest and attitude towards learning mathematics in high schools?

Significance of the study

The study is vital in mathematics education in several ways. Firstly it could provide information to mathematics teachers on why pupils lose interest and develop negative attitude in learning mathematics so that they can take steps to instill interest and positive attitudes towards learning mathematics. Secondly it could provide information to teacher training institutions on how to arouse interest and maintain positive attitudes in pupils which could in turn be shared with trainee teachers. Thirdly it would provide information to the Ministry of Education (MOE) about the factors affecting interests and negative attitudes in learning mathematics so that they formulate programmes and policies that foster interest and positive attitudes in Schools. Fourthly the Curriculum Development Centre (CDC) might formulate and implement syllabi and learning materials that arouse interest and positive attitude in learning mathematics. Lastly the findings of the study would contribute to the existing mathematics education literature and provide information for further studies.

Theoretical Framework

The study was guided by social cognitive theory which emphasizes that learning occurs within a social context and therefore pupils are active agents who can both influence and are influenced by their environment. Thus in this study pupils are active agents in the development of interest and attitudes as influenced by their environment. Han and Carpenter (2014) state that attitudes consist of cognitive, affective and behavioural reactions that individuals display towards an object or the surrounding based on their feelings or interest. Social cognitive theory argues that people actively influence their learning by interpreting the outcomes of their action, which, in turn, affects their environments and personal factors, informing and altering subsequent behavior (Schunk, 2012).

Thus, pupils develop a sense of agency and exert control over the important events in their lives, they develop interests, attitudes from the experiences gained within their environment. This sense of agency and control is affected by factors such as self-efficacy, outcome expectations, goals, and self-evaluation (Bandura, 1989).

METHODOLOGY

The study's design was a survey utilizing a questionnaire as a major data collection instrument. According to Creswell & Creswell (2018), Kothari (2014), information about peoples' attitudes, opinion, habits, or any of the variety of education or social issues could be collected using a likert scale and other qualitative data collection tools such as interviews, observations and Focus Group Discussions. The study employed a questionnaire which had both closed as well as open-ended questions. The study focused on interests and attitudes of senior secondary school pupils in learning mathematics. It was also aimed at collecting

information from teachers of mathematics. Thus the study utilized both quantitative and qualitative survey designs.”

Target population

The target was Grade 10, 11 and 12 pupils and mathematics teachers in high schools in Eastern province. The estimated population was 400 pupils in Eastern province, Chipata District.

Study sample

The study sample comprised a population of 120 pupils and 16 mathematics teachers from four high schools. The sample for pupils had an equal number of girls and boys (i.e. 60 of each). While the sample for teachers were all males. There were no female mathematics teachers in all the sampled schools.

Sampling procedure

A stratified random sampling technique was used to ensure all grades 10, 11 and 12 pupils were equally represented for each selected high school. Random sampling was then used for each grade, where pupils were picked from class registers by picking the first ten odd numbers for each school. According to Best et al (2009), “At times it is advisable to subdivide the population into smaller homogeneous groups to get more accurate representation.” Hunt et al (2001) describes stratification as the process of dividing members of the population into homogeneous subgroups before sampling. The study used systematic sampling within each stratum.

Teachers were selected purposively, that is; teachers offering mathematics to grades 10, 11 and 12. Purposive sampling allows the researcher to select those participants who will provide the richest information (Best et al (2009)).

Research instruments

The research employed semi-structured questionnaires which had three parts. The first parts consisted of 14 fixed questions on interest and the second part had 14 fixed questions on attitude then two questions were open ended. The respondent had five points likerts scale (strongly agrees, agree, uncertain, disagree, and strongly disagree). The teachers’ questionnaire had two parts; 19 fixed questions and 3 open ended questions then a focus group discussion for teachers and pupils were conducted. The questions were meant to determine the attitudes and interests of pupils and factors that affect them. While for teachers it determined how they taught the subject and interacted with pupils; also their opinion on why pupils lacked interest and developed negative attitudes towards mathematics was sought.

Data collection

A pilot study was done with 30 pupils and four teachers before being administered to the sample of pupils and teachers this was done in schools which were not part of the sample to check accuracy in capturing the phenomenon being researched. The pilot helped to sharpen the questions and to guide on the time for the data collection. For the study the researchers worked with the guidance teachers in the 4 selected schools to pick the pupils for the sample. Immediately after collecting the questionnaire from the pupils, a focus group discussion was conducted with 10 pupils and an interview with one teacher at a time.

Data analysis

The qualitative data was analysed through descriptions and explanations from the open ended questions on the questionnaire and focus group discussions. The quantitative data from the first parts of the

questionnaires were analysed using simple statistical procedures; the mean, standard deviation percentages, frequency and bar charts. The data collected from the questionnaires on interest and attitude was presented using frequencies and percentages.

RESULTS AND DISCUSSION

Pupils' interest in mathematics

The study sought to find out the interests of pupils in the mathematics as a subject. The results are presented in figure 1.

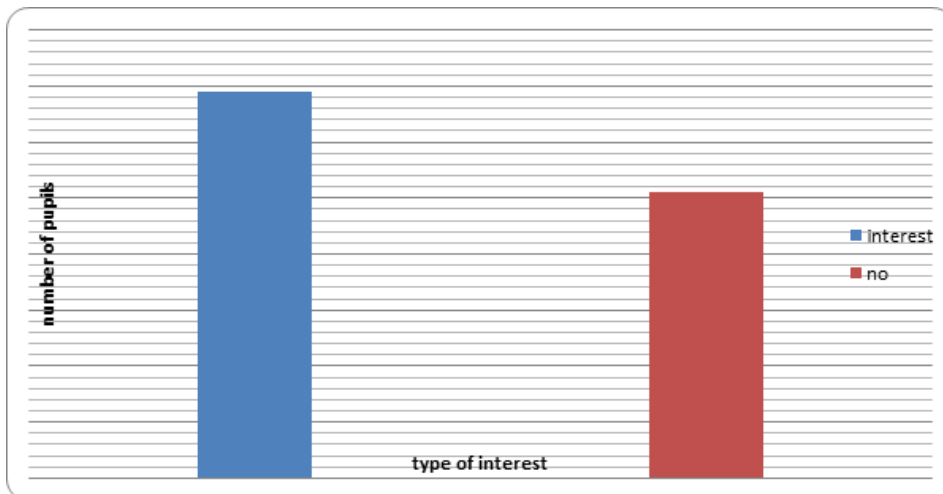


Figure 1: Interest of pupils in mathematics

Figure 1 shows that 57.5% (69) of pupils had interest and 42.5% (51) of pupils had no interest in learning mathematics.

These results showed that the majority of pupils had interest in mathematics.

Figure 2 below shows the contrast between rural and urban schools in terms of interest in mathematics

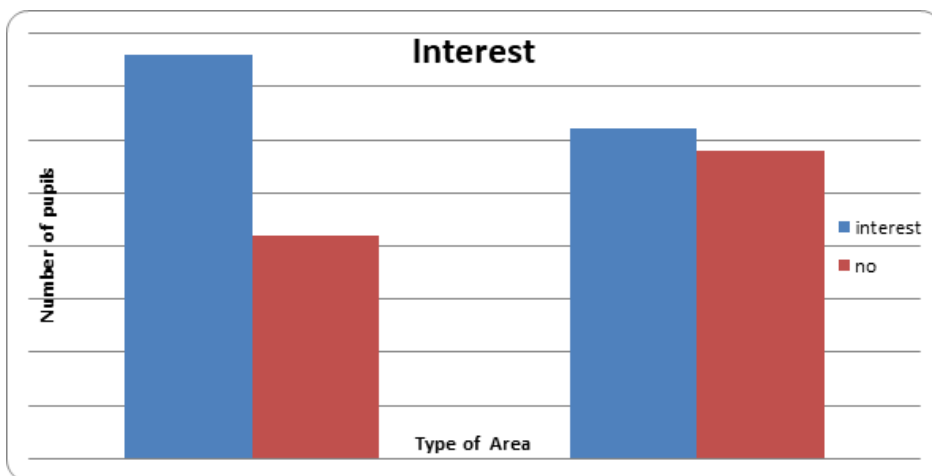


Figure 2: Interest of pupils Rural versus Urban schools

The rural high schools showed that 57.7% (31) of pupils had interest and 48.3% (29) of pupils had low or no interest. While urban high schools indicated 63.3% (38) of pupils had interest and 35% (21) of pupils had

low or no interest.

Pupils' attitude to school mathematics

The attitudes of pupils was also investigated through a series of questions which pointed to their state whether positive or negative.

Figures 3 and 4 indicate responses on nature of attitudes

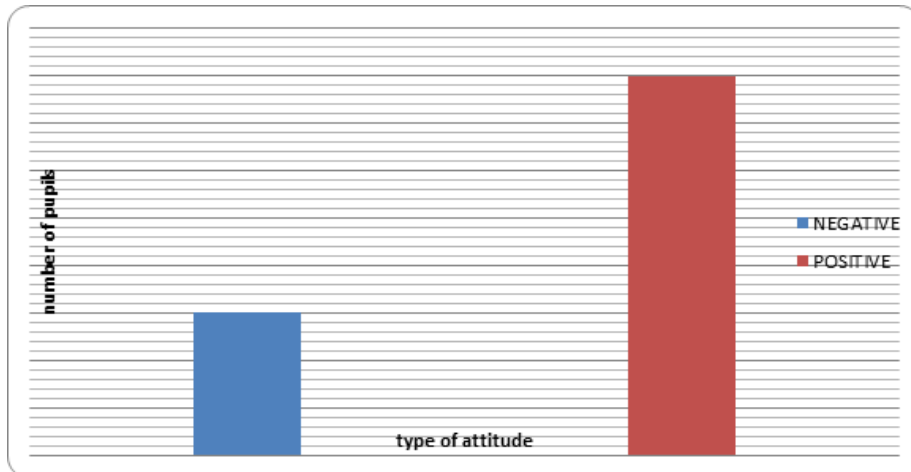


Figure 3: Nature of attitude towards mathematics by pupils

Figure 3 showed that 42.2% (59) pupils had positive attitudes and 50.8% (61) pupils had negative attitudes.

Figure 4 shows the picture of numbers of pupils exhibiting positive or negative attitudes between rural and urban schools.

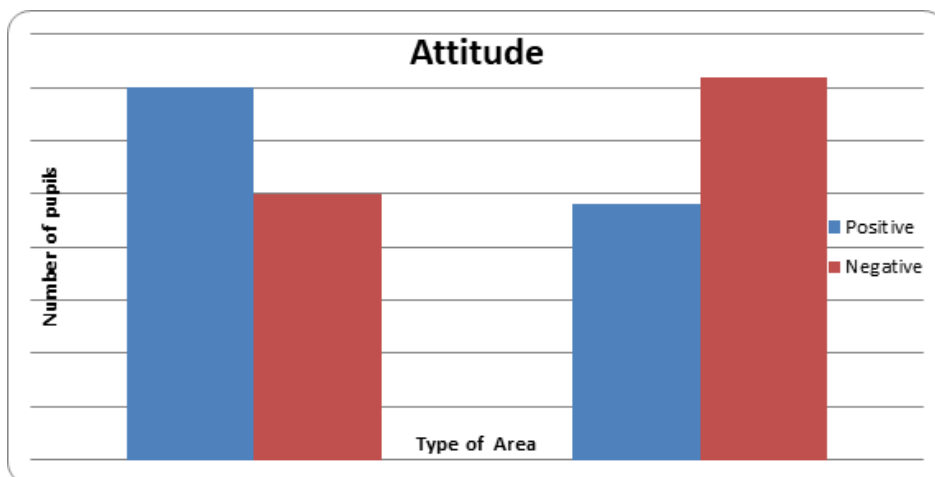


Figure 4: Nature of attitudes; comparison between Rural and Urban schools

The rural high schools indicated 40% (24) of pupils had positive attitudes while 60% (36) pupils had negative attitudes. While urban high schools had 58.3% (35) pupils with positive attitudes and 41.7% (25) pupils with negative attitudes.

Mean and Standard Deviation (S.D) of interest and attitude.

From the 120 pupils the mean interest was 27.3 and S.D=8.2 while the mean attitude was 26.7 and S.D=

7.74 respectively

The mean interest response showed that pupils had interest in mathematics despite their large difference as indicated by the large standard deviation. The mean attitude also indicated that pupils had a positive attitude towards learning mathematics in spite of their large differences from each other as shown by the standard deviation.

Factors contributing to the nature of interest and attitudes of pupils towards mathematics

The teachers and the pupils were engaged through focused group discussions (Pupils) and interviews for teachers. During the discussion it was observed that teachers contributed a major part in pupils' lack of interest and negative attitude. This was in the way how they conducted their lessons and interacted with pupils. The pupils also indicated that lack of reference books, lack of mathematics clubs, lack of mathematics contests to motivate them and frequent missing of lesson by some teachers disturbed continuity. There were also demands of certain topics to be removed from the syllabus as these were thought to be long and difficult to follow. The following excerpts from the focus group discussions capture some of the candid reactions from some pupils;

P1: Our teacher is fast, he does not want to repeat something, he just tells us to copy and practice was written on the board

P6: we do not have books to read on our own –

P14: There is a lot to learn in mathematics, we forget some of it. It is difficult to remember everything.

P10: Some topics we do not understand but the teacher just talks and when you get the sum wrong he punishes you

The focus group discussions of open ended questions for pupils in the 4 high schools collaborated the information from the questionnaires; pupils indicated that they were unable to understand most mathematics concepts due to the way mathematics teachers presented their lessons.

It was stated that teachers used expository methods and were fast, harsh, and unfriendly. There were instances where they even refused to accept questions or answer questions from some pupils. Pupils also indicated lack of textbooks had contributed to their loss of interest and negative attitude. There were also demands of removing some topics from the syllabus as they were long and rather difficult to follow. In all pupils attributed the loss of interest and negative attitudes to mathematics teachers. This tallies with the what Ingram (2015) found, that pupils students might have formed a negative meaning in their minds about what they may have previously heard from other students or due to their unfavourable experiences in mathematics class, in this case their teachers. The affective component of attitude is the feeling or emotions of the individual associated with learning mathematics as the social cognitive theory explains pupils or individuals interact with the environment or external social context thereby creating mindset that becomes constant over time – influencing the feelings towards the learning of mathematics.

That teachers could be contributing in a major way was reaffirmed through a questionnaire for teachers which were designed to investigate how they (teachers) taught and interacted with pupils in their mathematics lessons. The teachers' questionnaire with responses ranging between 38 to 95 points was meant to indicate poor method of teaching and poor interaction with pupils; while the questions ranging between 19 to 38 points were meant to indicate good classroom management and good rapport with pupils during lessons. The responses by the teachers in the four high schools fell in the range between 38 and 95 showing poor management of classrooms and poor rapport with pupils during lessons. This might be one of the

attributes that might be considered to be the reason why pupils lost interest and developed negative attitude towards learning mathematics. The mean for individual schools showed that their responses ranged between 47 and 55, and standard deviation from 5 to 7.

Meanwhile teachers blamed pupils for their lack of interest. As one teacher put it,

T4: These pupils are not serious, they don't work hard, and they do not ask questions where they do not understand – you have to force them to do their work.

According to the teachers pupils failed to seek clarification on concepts which were challenging to them. Teachers also suspected that some pupils received wrong advice from peers and parents that mathematics was difficult. In general the teachers blamed pupils for not putting in much effort to overcome their challenges in learning mathematics.

CONCLUSION AND RECOMMENDATIONS

Pupils generally had a strong interest and positive attitude towards learning mathematics. The loss of interest and development of negative attitude was perpetuated mostly by teachers. This was due to the way the teachers delivered lessons and interacted with pupils in the mathematics lessons. Peers and parents had also been indicated as contributors to the lack of interest and negative attitudes through the wrong advice they gave pupils. The research found that an area where a school was situated also might affect interest and attitude towards learning mathematics. The following recommendations were made:

1. The Continuous Professional Development (CPD) activities in schools should focus and emphasize appropriate interactions between and among pupils and teachers
2. Ministry of Education through curriculum development centre to develop mathematics textbooks which incorporate practical application of mathematics concepts to arouse pupils' interest and contribute to change in attitudes.

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