

Factors Contributing to Students Poor Performance in Mathematics in Public Secondary Schools in Tharaka South District, Kenya

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Abstract

The performance of students in mathematics in K.C.S.E has been generally poor as compared to other subjects in Kenya and in particular Tharaka South district. This study was initiated to find out the factors that lead to students' poor performance in mathematics in the district. The study adopted a descriptive survey research design to establish the factors that lead to students' poor performance in mathematics. The study was carried out in Tharaka South District, Kenya, which has a total of 14 public secondary schools. The target population was 2,332 respondents. The population was sampled using the stratified sampling technique so that all categories of schools were included in the study and then proportionately sampled to give a sample size of 248 respondents. The study used 4 questionnaires, the head teachers', and heads of Department, teachers and students questionnaires. Split-half technique using Spearman Brown Prophecy formula was used to check the reliability of the questionnaires and experts from the department of education validated the instruments. Coefficients of 0.702, 0.741, 0.753 and 0.707 were realized for the head teachers, heads of departments, mathematics teachers and students' questionnaires respectively. Data collected was analyzed using Statistical Package for Social Sciences (S.P.S.S) version 11.5 windows and then presented in form of frequency tables and percentages. The significant factors leading to poor performance included inadequate teaching force, students' absenteeism, poor entry marks, poor assessment techniques and poor teaching methods. The intervention strategies suggested included completing the syllabus in time, provision of adequate and qualified teaching force and in-service programmes. The study is significant as its findings will be used by education policy makers and pre-service training of teachers.

Key Words: Factors, Performance

Introduction

Improving access to education has been accorded a high priority in Kenya's education policies. Studies have shown that lack of education leads to high fertility rates, low life expectancy and high illiteracy rates which in all affects national development (Wasanga, 1997). Performance in mathematics in many countries has been low. Colwell (2000) studied the performance of American students in the international mathematics tests and noted that they were performing poorly. In Kenya, the performance has been below average (K.N.E.C, 2008).

In recognition of the value of mathematics, the Ministry of Education, Science and Technology (MOEST) in Kenya has made mathematics a compulsory subject in both primary school and secondary school (Republic of Kenya, 1964). The performance of students in the subject at Kenya Certificate of Secondary Education in Kenya has remained poor (Costello, 1991; Riley, 2000). The performance of students in mathematics in Tharaka South District has also been below average hence the reason for this study.

In Kenya, previous studies on performance in mathematics concentrate on the direct effects such as students' background factors and school environment, students' attitudes and type of instruction on performance. The dismal performance in the subject in Nairobi and Rift Valley provinces has been attributed to a number of factors like social background factors, competitive structured classrooms which raise the level of anxiety and stress while learning mathematics and specialized mathematical language (Githua, 2002). The quality of text books, negative attitude towards mathematics and unsuitable teaching methods have been viewed as possible factors responsible for dismal performance in Nairobi Province and Rift valley Provinces (Githua, 2002). Tharaka South district is an ASAL region characterized by drought. This study sought to establish the significant factors contributing to the students' poor performance in mathematics in Tharaka South District.

MOEST has conducted annual in-servicing of teachers mainly through the SMASSE Project across most of the districts in the country. The aim of SMASSE was to equip the mathematics teachers with suitable strategies which would aid in improving students' achievement in the subject (Oyaya & Njuguna, 1999). The SMASSE program has been implemented in the district but the performance in the subject is still below average. This calls for systematic studies to find out the factors that lead to students' poor performance in Mathematics in the district, hence an impetus for this study.

The Kenya National Examination Council (K.N.E.C 2004, 2003, 2002, 2001) which is responsible for National Examinations at all levels except university suggests the following remedies for continued good performance in secondary mathematics:

- i. Complete coverage of the syllabus.
- ii. Involvement of learners in practical activities.
- iii. Acquisition and use of mathematics text books.
- iv. Ensuring thorough mastery of the subject content.

This study determined the extent to which these remedies had been adopted in schools in Tharaka South district and whether the above remedies if adopted would raise the students' performance in mathematics in Tharaka South district. The overall mean grade for the subject in the district from 2005 to 2008 has been a grade D despite the interventional measures by the government. This raised the concern as to what factors contributed to the students' poor performance in mathematics. Reasons for the poor performance in mathematics in the district had not been identified and documented, hence the reason for this study.

Statement of the Problem

Mathematics plays an important role in scientific and technological development of a nation. The fundamental role of mathematics lies in its day to day application in most social sciences, business, economics, medicine and management studies. Indeed, mathematics is vital as it is training in itself, where development of new techniques and concepts are scientific, economic and sociological in its consequences to the societal development needs. The performance of students in mathematics among secondary schools in Kenya has remained poor for many years with an average score less than 20% (K.N.E.C, 2008). Tharaka South district is an ASAL region with 14 public secondary schools and persistent poor performance has been noted over the years. Studies have been conducted on the student's poor performance in mathematics in a number of districts but no studies have been done to find out factors that contribute to student's poor performance in the subject in Tharaka South District hence the impetus for this study.

Objectives of the Study

To achieve the purpose of this study, the researcher investigated the following objectives:

- i. Find out the factors that contribute to the students' poor performance in mathematics in public secondary schools in Tharaka South district.
- ii. Determine the challenges experienced by teachers in the teaching and learning process of mathematics.
- iii. Establish the strategies that can be adopted to improve the students' performance in mathematics in public secondary schools in Tharaka South district.

Conceptual Frame Work

From the related literature the variables of the study were conceptualized as shown in Figure 1.

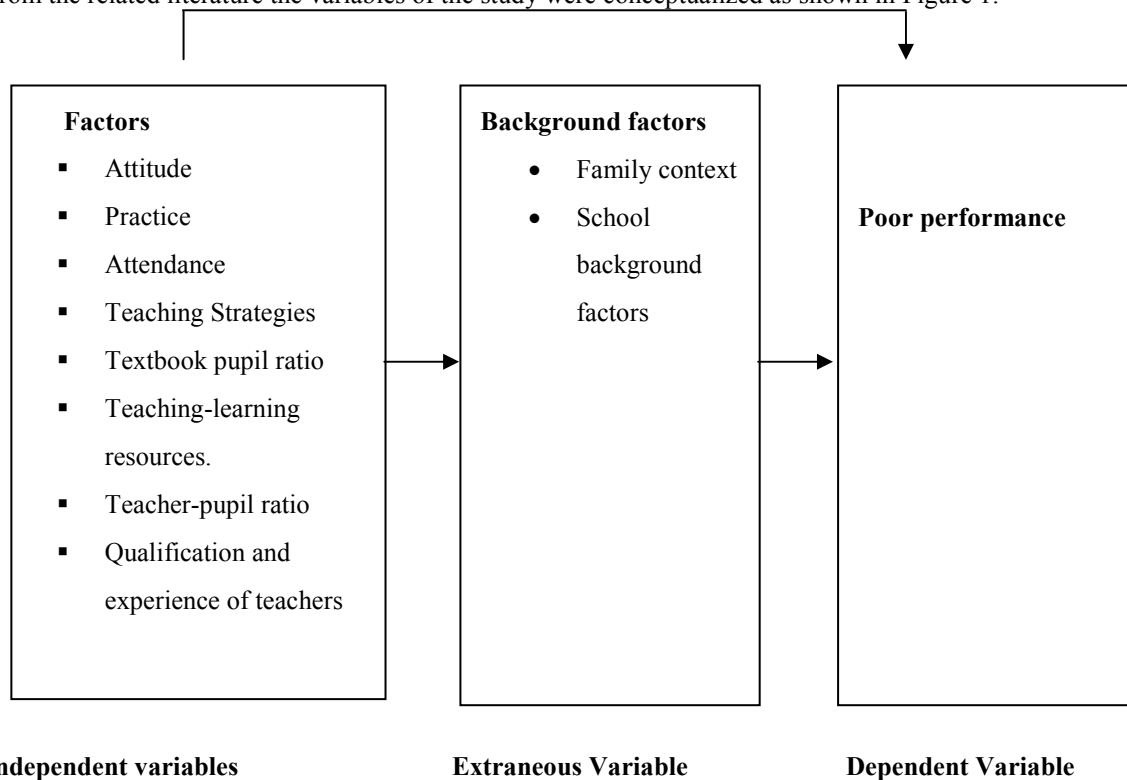


Figure 1. Factors Contributing to Students' Poor Performance in Mathematics

Poor performance by students and in this case attaining a grade D and below at K.N.E.C examinations have been consistently recorded in Tharaka South District in the last four years. This study sought to find out the kind of interaction taking place in schools with regard to students' performance in mathematics and attempted to come up with strategies that would be put in place to improve the performance in the subject. The conceptual frame work shows that there are various factors that contribute to poor performance in mathematics. It is conceptualized that by investigating the factors indicated, poor performance in mathematics can be mitigated. Sampling was done to take care of the extraneous variables in the study.

Methodology

This study was conducted using a descriptive survey research design. The target population of this study comprised of fourteen head teachers, twenty four mathematics teachers and two thousand, two hundred and ninety four students. However, the accessible population was fourteen head teachers, twenty four mathematics teachers and five hundred and eighty students giving an estimated frame population of six hundred and eighteen respondents. A total of 248 respondents participated in the study. The head teachers' questionnaire, the questionnaire for the head of department (mathematics), the questionnaire for mathematics teachers and the students' questionnaire sought information based on the objectives of the study. A correlation coefficient of 0.702, 0.741, 0.753 and 0.707 were realized for the head teachers, heads of department, mathematics teachers and students' questionnaires respectively using the SPSS version 11.5 for windows.

Findings

Factors/Challenges Contributing to Students Poor Performance in Mathematics

The purpose of the study was to find out the factors that contribute to students' poor performance in mathematics in public secondary schools in Tharaka South District.

Inadequate Mathematics Teachers.

Teachers play a central role in the coverage of the syllabus, preparation of students for evaluation and motivation of learners. The quality of teaching mathematics is affected by the methods of lesson presentation by the teacher trainees in the subject. The responses from Tharaka district varied because some of the schools had adequate mathematics teachers while others had inadequate mathematics teachers. In some schools, there were no professionally trained mathematics teachers as the schools had employed form 4 graduates and university students to facilitate learning of mathematics.

The study further sought to establish from the head teachers the enrollment of teachers by gender and subject combination. The findings are presented in Table 1.

Table 1

Head Teachers' Responses on Teachers' Enrolment

Subject	Male		Female		Total %
	F	%	F	%	
Math / B/studies	6	100	0	0.0	100
Math / Physics	10	71.4	4	28.6	100
Math /Biology	0	0.0	0	0.0	100
Math / Chemistry	2	100	0	0.0	100
Math /Geography	0	0.0	0	0.0	100
Total	18	81.8	4	18.2	100

Gender plays a great role in opinion/attitude building and hence there is need to check on gender balance especially in girls' schools. The gender disparity is observed across all subject combinations with 100% of business studies/mathematics being male. It is also observed that mathematics/physics combination has the highest number of teachers in the district. The students at secondary level should be motivated to take mathematics positively and adopt it as a career subject. The girls possibly lack role models to emulate and there is need for recruitment of more female teachers to assist in motivation of girls in secondary school.

Interclass Discussion.

Interclass discussions promote interaction amongst students and encourage constructive competition. The findings of the study revealed that 37.5% of the students hold interclass discussions once a month with no school holding interclass discussions weekly. The study noted that 37.5% of the respondents claim that discussions are held once a year and 25.0% agreed that inter-class discussions are held once per term. The frequency of interclass discussions needs to be raised as discussion foster greater understanding amongst the students and this would lead to improved performance.

Teaching Methods and Approaches.

When the students were asked about the most frequently used teaching approaches, 44.7% of the students said that demonstration is the most frequently used teaching approaches followed by class discussion approach with 25.7%. Another 18.1% of the students said that lecture method is the most frequently used technique adopted by the mathematics teachers while only 11.5% felt that presentation is often used.

Assessment Techniques.

Assessment is a means by which the quality of an individual work/performance is judged against. Assignments constitute of class duties that a teacher gives to the students (Costello, 1991). He noted that majority of the teachers give assignments on a daily basis and this is also the phenomena in Tharaka South district.

The study sought to establish from the students the main assessments techniques commonly adopted by the mathematics teachers. The findings are presented on Table 2.

Table 2

Students' Responses to the Main Assessment Techniques Used

Technique	Frequency	Percentage %
Teacher-made test	114	50.4
Home assignment	61	27.0
Overall exam	42	18.6
Other	9	11.5
Total	226	100

When asked about the main assessment techniques adopted by mathematics teachers, 50.4% responded that the teacher made tests are used, while 27.0% agreed that home assignments are used as assessment techniques. Another 18.6% of the students responded that the overall exam technique was used while 11.5% cited that other forms of assessment such as quizzes are normally adopted. The study concludes that teacher made tests is most frequently used to assess students. The teachers need to employ all forms of assessments to be able to identify the student's strengths and weakness. The mathematics department in all the schools should ensure that setting moderation of internal examinations is done. Marking of examinations is co-ordinated and records of all assignments are properly kept.

Textbook Pupil Ratio.

Teaching and learning resources are of great factor to be considered for meaningful teaching and learning. Inadequate teaching and learning resources such as text books and revision materials especially in upcoming schools deny the students the opportunity to revise broadly. Table 3 shows the head teachers' and students'

responses on the textbook to pupil ratio.

Table 3

Head Teachers' and Students' Responses on Textbook: Pupil Ratio

Respondent	1:2		1:3		1:5		Total %
	F	%	F	%	F	%	
Head teachers	2	50.0	2	50.0	0	0.0	100
Students	121	53.5	59	26.1	46	20.4	100
Total	123	53.5	61	26.5	46	20.0	100

An average of the head teachers (50%) felt that the textbook pupil ratio is 1:2 while the other 50% felt that the textbook to pupil ratio was 1:3. When the students were asked to respond to the same, 53.1% of students said the textbook to pupil ratio is 1:2 while only 20.4% of students felt that the ratio is 1:5. This indicates that a lot has been achieved in terms of textbook acquisition since the introduction of affordable secondary education. The greatest challenge goes to the mathematics departments as they have the responsibility of ensuring textbooks and other resources are well maintained and repairs done on damaged books.

The study established from the head teachers that a ratio of 1:2 exists in forms 1, 2 and 3 while a ratio of 1:1 was mainly in form 4. This may be attributed to the fact that ministry of education provides funds for tuition and acquisition of text books in the schools. Going by these findings it can be established that textbooks are not a significant cause to the students' poor performance in mathematics.

The study sought to establish the other factors contributing to students' poor performance in mathematics. Findings from the study show that 43.8% of the teacher respondents considered students negative attitude as a major cause of students poor performance. Another 31.3% felt that low entry marks at form one level contributed to students' poor performance in mathematics and 25.4% considered inadequate teaching force as a major factor contributing to students' poor performance. Other factors cited by the teachers included chronic absenteeism of students, inadequate revision materials, cheating of students in assignments to create a perception that they can do well and therefore are not able to perform in exams among others.

Other challenges identified by teachers included inadequate teaching force and the unsteady enrolment such that students who cover a prequisite syllabus are not the same ones that the latter syllabus. The inadequate teaching force causes the teachers to handle a large class size. This large class size in turn affects the quality of teaching and learning as the teachers are not able to deal with individual differences. The ratio of text book to pupil is also likely to be reduced.

Strategies to Raise Students Performance in Mathematics

The other research objective in this study was to suggest possible strategies which would be adopted to raise the students' performance in mathematics in public schools in Tharaka South District. From the findings of the study, 44.5% of the students considered the creation of positive attitude towards mathematics a very important strategy that needs to be done to enhance students' performance in the subject. Subsequently, 35.4% of the students cited active participation of the students in regular and supervised group discussions as a possible strategy that would raise students' achievement in mathematics. Another 6.5% of the students felt that taking assignments seriously by students could boost their performance. Other strategies that students could adopt include creating a positive attitude towards their teachers, formation of mathematics clubs, promotion of inter school discussions and adopting more tests and examinations among others. From the findings, the study found out that 36.1% of the students cited that teachers ought to give adequate assignments to students and mark them to enforce the taking of assignments by students seriously as a measure that could be adopted by the mathematics teachers to boost the students' performance in the subject. Another 19.9% of the students felt that teachers administering more examinations and quizzes could significantly raise the students' performance in the subject. From the findings of the study, 62.5% of the teachers felt that giving more assignments and monitoring them would be significantly in enhancing students' achievement in mathematics. There is need to monitor the progress of students continuously in the course work and much of this is achieved in daily assignments. Findings from Table 20 indicated that the highest percentage of teachers (80.1%) gave assignments daily. Then there is need to monitor the progress of the day to day assignments. Another 50.0% of the teachers felt that the development of a positive attitude towards mathematics is significant in boosting the students' performance in mathematics. Another 50% of the head teachers had a similar opinion. From the study, 43.8% of the teachers considered motivation of performing students as a remedy that would be adopted to encourage them perform even better in the subject. The study established that 37.5% of the teachers cited provision of adequate teaching – learning resources as a significant remedy in boosting the students' performance in mathematics while 13.3% of the teachers cited the completion of the syllabus in time to create more time for revision as a remedy that could be adopted as a policy in the district.

SMASSE and other seminars on the teaching and marking of mathematics are insets that provide the teachers with the required skills to teach and motivate learners. SMASSE inset has been attended by 62.5% of the teachers and 87.5% of the teachers agreed that the SMASSE attendance boosts the quality of teaching and learning of mathematics. Other significant factors highlighted by the respondents include provision of adequate teaching resources, giving adequate assignments and marking them and using a variety of teaching methods.

From the findings of the study, revealed that 54.4% of the students pointed out that the provision of adequate revision materials and teaching resources as significant in boosting the performance of students' performance in mathematics. Another 30.1% of students had the opinion that the school administration should ensure there is adequate and qualified teaching force so that the students are handled professionally. The students claimed that the teachers are usually inadequate and untrained teachers are employed to teach mathematics. The study established that 19.5% of the students felt that the school administration needed to encourage and sponsor interschool discussions to help in exchange of ideas and promote revision and in turn boost the performance in the subject. Another 8.8% suggested that the school administration should monitor lesson attendance by teachers and the syllabus coverage. Close monitoring by the school administration ensures performance by the departments in meeting set targets. From the findings of the study, 9.3% of the students felt that the school administration could boost their performance by motivating the students together with the teachers. Other ways mentioned included encouraging the formation of mathematics clubs, inviting motivational speakers.

Table 4
HOD'S Responses on Ways the School Administration Could Boost Students' Performance

Way	F	Percentage %
Allow students to attend symposiums	1	16.7
Check on chronic absenteeism	1	16.7
Admission criteria of new students enforced	1	16.7
Provide adequate teaching-learning resources	2	33.3
Ensure there is adequate teaching force	1	16.7
Facilitate in service seminars and workshops	2	33.3
Encourage inter-school discussions	1	16.7
Motivate students and teachers	3	50.0

The study findings established that 33.3% of heads of department felt that the school administration should ensure provision of adequate teaching learning resources and similarly facilitate workshops and in service seminars as a way of helping in improving their students' performance in mathematics. Another 50.0% felt that the school administration would help boost the performance in mathematics by motivating the teachers and the students. Motivation is crucial in building confidence in the students and creating a special liking for the subject. Other ways highlighted in the findings included checking on chronic absenteeism allowing students to attend mathematics symposiums, encouraging interschool discussion and enforcing strict admission criteria for new students.

Conclusions

From the findings, this study draws the conclusion that significant factors contributing to students' poor performance in mathematics include: inadequate teaching force, low entry marks at form one, student's negative attitude, chronic absenteeism of students and an overcrowded syllabus. This confirms the views by Githua (2002) who went further to mention that the quality of textbooks, students' negative attitude towards mathematics and unsuitable teaching methods as responsible factors for dismal performance in Nairobi and Rift Valley provinces. These factors also contribute to the dismal performance in mathematics in Tharaka South District.

Remedies to improve performance of students in mathematics as mentioned in the findings of the study include: proper guidance to change the students' negative attitude towards mathematics, use of a variety of teaching methods, guided group discussion, inviting motivational speakers. The formation of mathematics clubs in the schools would be a great booster to the achievement of students in the subject. Frequent in-service seminars and provision of adequate teachers by TSC would significantly improve the performance of students in mathematics. Review of the overcrowded syllabus is another strategy which if adopted would make the mathematics syllabus student-friendly and motivate students to perform better.

Recommendations

From the findings of the study the following recommendations were made:

- i) The Teachers Service Commission through the D.E.O, Tharaka South District to balance mathematics teachers in all the schools and recruit more teachers in schools where there is acute shortage.

- ii) There is need to organise mathematics trips for the students. They need to participate in inter-school contests, inter-school discussions and science congress.
- iii) The ministry of education needs to provide bursary schemes for students in Tharaka South district to alleviate the chronic absenteeism of students due to high poverty levels.

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