

The Influence of Teachers' Use Resources on Students' Attitudes towards Mathematics among Secondary School Students

Mbuthia Ngunjiri
Laikipia University, Kenya

Abstract: - This study examined the influence of teachers' use of resources on students' attitudes towards mathematics in Laikipia County, Kenya. Descriptive research design was utilized in the study. The target population consisted of 8357 Form Four students from 113 secondary schools in the County. Simple random sampling was employed to select the sample schools, sample classes, and respondents. A sample of 412 respondents consisting of 392 students and 20 mathematics teachers was selected from the sample classes using Krejcie and Morgan's table of sample sizes. A self-administered questionnaire was used for data collection. Cronbach's alpha was used to determine the reliability of research instruments. Data was analyzed using Pearson's correlation coefficient and simple regression analysis at .05 level of significance. The study revealed that teachers' use of resources makes a significant contribution in the development of students' attitudes towards mathematics. The study concludes that for development of positive attitudes, teachers should make available a variety of relevant resources in teaching and learning.

Keywords: Attitude towards mathematics; Teachers' use of resources.

I. INTRODUCTION

Mathematics is a fundamental part of human thought and logic, and integral to attempts at understanding the world and ourselves. Furthermore, mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigor. In addition, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art (Cockroft, 1982).

In Kenya, great emphasis has been placed on industrial and technological development, and mathematics is seen as a vehicle of development, and improvement of a country's economic development (Kenya Institute of Curriculum Development (KICD), 2020). Moreover, KICD posits that by learning mathematics, learners develop understanding of numbers, logical thinking and problem solving skills. Therefore, it has been made compulsory in primary and secondary levels of schooling in Kenya.

In the move towards scientific and technological advancement, Kenya needs nothing short of good performance in mathematics at all levels of schooling. However, despite the prominence laid on mathematics, poor performance in the subject has been consistent as reflected in

the Kenya Certificate of Secondary Examinations (KCSE) statistics compiled by the Kenya National Examinations Council (KNEC, 2020). The KNEC statistics gives the national grand mean score of 2.630, 3.161, 3.205, and 3.385 from the year 2016 to 2019 respectively where the maximum mean score is 12 points. The recurring poor performance in mathematics experienced nationally is also registered in the KCSE results for Laikipia County as seen in Table 1.

Table 1: KCSE mathematics mean performance by gender from 2016 to 2019 in Laikipia County

year	Boys	Girls	Overall
2016	2.859	2.699	2.779
2017	3.350	3.123	3.236
2018	3.560	3.322	3.441
2019	3.739	3.459	3.599

Note: mean ranges from 0 to 12. Source: KNEC (2020).

The KCSE mathematics performance shown in Table 1 indicates a dismal performance in mathematics in Laikipia County, which is evidence of poor performance in the subject. The poor performance in mathematics can be attributed to students' attitudes towards the subject amongst other factors.

The complexity of factors that can be influencing mathematics performance is demonstrated by Singh, Granville and Dika (2002) who showed that high achievement in the subject is a functional of many interrelated variables related to students, school and families. Among students variables, attitudes towards mathematics (ATM) is regarded by several researchers as an important factor to be taken into account when attempting to understand and explain variability in students' performance in mathematics (Mohamed & Waheed, 2011; Nicolaidou & Philipou, 2003).

Ma and Kishor (1997) defined attitudes as an aggregated measure of liking or disliking of mathematics, a tendency to engage or avoid mathematical activities, a belief that one is good or bad at mathematics, and a belief that mathematics is useful or useless. A number of studies has indicated that children begin schooling with positive attitudes towards mathematics, but these attitudes tend to be less positive as children grow up and more often became more negative at the high school (Ma & Kishor, 1997; Middleton & Spanias; 1999).

However, the junior high school years have been identified as a crucial period in the course of development of students' attitudes, meaning that teachers have both the opportunities and responsibility to promote their students' positive attitudes and achievement at the stage (Ma & Kishor, 1997).

Fraser and Kahle (2007) have highlighted that learning environments at home, school and within the peer group accounts for a significant amount of variance in students' attitudes. In addition, Mohamed and Waheed (2011) when reviewing literature aimed at understanding attitudes and the influences on their development in relation to differences between students, identified three groups of factors that play a vital role in influencing students' attitudes. These are: (i) factors associated with the students themselves (e.g., mathematics achievement, anxiety, self-efficacy, self-concept, motivation and experiences at school), (ii) factors associated with the school (e.g., teachers and teaching, teaching materials, classroom management, and guidance), and (iii) factors from the home environment (e.g., parents' educational background and expectations).

In all, students' attitude can be seen as either positive or negative. 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 reflects a negative disposition (Mata, Monteiro & Peixoto, 2012; Zan & Martino, 2008). These emotional dispositions tend to have an impact on an individuals' behavior as a student is a likely to achieve better in a subject that he/she enjoys, has confidence in or finds useful (Eshun, 2004). Therefore, positive attitudes towards mathematics are desirable since they may influence the willingness of a student to learn, and the benefits that can be derived from mathematics instruction in the life after school.

The relationship between students' attitudes and achievement in mathematics has been of concern in literature. Students' attitudes towards mathematics has been correlated with mathematics achievements and performance, and found to be an important predictive factor of achievement in mathematics (Chagwiza et al., 2013). In a similar study, Ajisukmo and Saputri (2017) found a significant correlation between students' attitudes towards mathematics and students' mathematics achievement, as well as between attitudes towards mathematics and use of met cognitive skills. Furthermore, Sirmaci (2010) investigated the correlation between attitudes and learning styles among ninth grade high school students' in Turkey, and found a significant positive relationship between students' attitudes and their learning styles in mathematics.

In Laikipia County, despite the poor performance in mathematics there is lack of information on the influence of students' attitudes in the learning of mathematics. Specifically, the influence of teachers' use of resources on students' attitudes towards mathematics has not received any attention. The Kenya Institute Education, (KIE, 2010) defined

teaching and learning resources as materials used by the teachers and learners to enhance teaching and learning. Furthermore KIE (2020) states that the use of instructional materials make teaching effective as it enable learners to participate actively in classroom instruction.

Busljeta (2013) posits that the purpose of using teaching and learning resources in the classroom is to assist the teacher with the presentation and transmission of educational content and the achievement of educational objectives, while aiding the students in acquiring knowledge and profiling different abilities and values. There are various types of instructional materials. They include: (i) visual materials (e.g., written materials, models, textbooks, printed materials, board still pictures, graphics and so on), (ii) audio materials (e.g., radio, record players, tape recorders), (iii) audio-visual materials (e.g., motion pictures, television) and (iv) community resources (Nacico-Brown et al., 1994). According to Lyons (2012), learning is a complex activity that involves interplay between physical facilities, skills of teaching and the curriculum, students' motivation to learn and teaching/learning resources. Therefore, availability of resources enhances the effectiveness of learning as they are basic tools that partly help to bring about good academic performance among students.

There are studies which indicate the effect of educational resources on students' achievement. In a study by Adeogun (2001) and Adeogun and Osifila (2008) it was found that there is a positive significant relationship between academic achievement of students and physical, financial and material resources. In a similar study, Savasci & Tomul (2013) pointed that there is a relationship between educational resources and academic achievements but the relationship is fairly limited. Furthermore, Demir (2009) found a significant effect of student-teacher ratio on academic achievement but posited that physical facilities and financial potential of schools had no significant effect on achievement which contradicts other studies. Literature on the relationship between teachers' use of resources and students' attitudes in learning is limited. However, Adegbola (2019) investigated the effects of teachers' pedagogical competence (i.e., use of instructional materials, knowledge of subject matter, teachers' communication skills, and teachers' teaching styles) as determinates of students' attitudes towards basic science in South West Nigeria. It was found that of all the teachers' pedagogical competence variables, teachers' use of instructional materials had the highest influence on students' attitudes towards the basic science.

In the current study, it is hypothesized that use of teaching and learning resources has no significant influence on students' attitudes towards mathematics. The effect of use of resources mathematics classrooms can only be more clear if the relationship between students' attitudes and use of teaching and learning resources in learning of mathematics is established. In Laikipia County such empirical evidence is lacking, hence the need for this study.

II. OBJECTIVE(S) OF THE STUDY

The objective of this study is to investigate the influence of teachers' use of resources on students' attitudes towards mathematics in Laikipia County Kenya.

III. NULL HYPOTHESIS

(The null hypothesis is tested at .05 level of significance)

HO₁: There is no statistically significant influence of teachers' use of resources on students' attitudes towards mathematics among secondary school students.

IV. METHODOLOGY

Descriptive research design was employed in this study. The target population was all 8357 Form Four secondary school students in Laikipia County. This category of students was selected because they have covered most of the content in secondary school mathematics curriculum. The respondents were drawn from twenty (20) randomly selected public secondary schools in Laikipia County. Simple random sampling was used in selection of schools and respondents. The sample consisted of 412 respondents (i.e., 392 students and 20 mathematics teachers) randomly selected from the sample

classes. The sample size was determined using the Krejcie and Morgan's (1970) table of sample sizes.

V. INSTRUMENTATION

In this study, the attitude towards mathematics (ATM) scale was utilized and teachers' use of resources (TUR) scale were used. The ATM scale had 40 items presented in the form of positive and negative statements (Tapia, & Marsh, 2004). The responses were scored on a five-point scale from strongly disagree (1) to strongly agree (5). The scoring for negative items was reversed. The alpha reliability for the scale was 0.97 (Tapia & Marsh, 2004). The TUR scale was developed by the researcher, and had 10 items presented in the form of positive statements. The responses were scored on a five-point scale from 0 (the lowest) to 4 (the highest). The alpha reliability for the scale was 0.71 which was determined by the researcher.

VI. DATA ANALYSIS

The Pearson's correlation coefficient (r), and simple regression analysis were used in data analysis.

VII. RESULTS

The results of data analysis are presented in Tables 1 and 2.

Table 1: Pearson's correlation coefficient between students' attitude towards mathematics (ATM) and teachers' use of resources (TUR)

Variables	r	r-	Adjusted r-squared	Std. error of estimate	Sig.
ATM and TUR	.189	.036	.033	23.1213	.000

The results in Table 1 show a statistically significant correlation between attitude towards mathematics (ATM) and teachers' use of resources (TUR) ($r=.189$, $p=.000$). That means ATM and TUR are not independent. Teachers' use of

resources explains 3.6% of the variance in students' attitudes towards mathematics. Table 2 gives the results of simple regression analysis.

Table 2: simple regression of teachers use of resources on students' attitudes towards mathematics.

source	Sum of squares	Df	Mean square	F	Sig
Regression	7715.219	1	7715.219	14.431	.000
Residual	208503.311	390	534.624		
Total	216218.531	391			

- Dependent variable: Attitudes towards mathematics
- Predictors: Teachers use of resources

The results in Table 2 show that the F-value is statistically significant ($F(1,390)= 14.431, p=.000$). The interpretation is that teachers' use of resources makes a significant contribution in the prediction of students' attitudes towards mathematics among secondary school students in Laikipia county, Kenya. Therefore HO₁ is rejected.

VIII. DISCUSSION

From the analysis of data, it was found that students' attitudes towards mathematics was moderate (i.e., mean score = 163.439 out of a possible maximum of 200), and teachers' use of resources was also moderate (mean score = 27.724 out of a maximum possible score of 40) and their correlation was

significant. Further, it was found that teachers' use of resources makes a significant contribution toward students' attitudes towards mathematics. This finding is in agreement with studies by Adegbola (2019), Adeogun (2001) and Adeogun and Osifila (2013) which found that there is a significant relationship between teachers' use of resources and academic achievement of students. Further, students' attitudes have been found to be an important predictor of students' achievement (Ajisukmo & Saputri, 2017; Chagwiza et al., 2013; Sirmaci, 2010). As Bulsjeta (2013) has indicated, the purpose of using teaching and learning resources is to assist the teacher in the presentation and transmission of content, while aiding the student in acquiring knowledge, values, and

attitudes. Therefore, it appears that the use of resources facilitates active participation of students in classroom activities, which in turn promotes students' attitudes and achievement in a particular subject. In sum, KIE (2010) has put it clear that for effective teaching and learning, the teacher should make available a variety of relevant resources. The resources used should depend on; the specific objectives of a topic; availability of resources and their cost; learners' level of ability; the number of learners in a class; ability of the teacher to use the resources; the learning settings (KIE, 2010).

IX. CONCLUSION

This study has found that teachers' use of resources makes a significant contribution to the prediction of students' attitudes towards mathematics. Therefore, teachers' use of resources plays an important role in the development of students' attitudes towards mathematics and teachers should make available a variety of resources among secondary school students.

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