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THE INFLUENCE OF TEACHER-STUDENTS' INTERACTION ON MOTIVATION TO LEARN MATHEMATICS AMONG HIGH SCHOOL STUDENTS IN LAIKIPIA COUNTY, KENYA

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ABSTRACT

The purpose of this study was to examine the influence of teacher-students' interaction on motivation to learn mathematics among high school students. The study was guided by Keller ARCS model of motivation. Descriptive research design was employed in the study. The target population was all 8357 Form Four students from 113 public high schools in Laikipia County. Simple random sampling was used to select sample schools, sample classes and respondents. The sample consisted of 392 mathematics students who participated in this study. A self-administered questionnaire was used in data collection. Cronbach's alpha was used in estimating the reliability coefficients of research instruments which were acceptable and above 0.7. Data was analyzed using simple regression analysis.The finding showed that teacher-students' interaction has a significant influence on motivation to learn mathematics. The study concludes that in order to improve effectiveness of teaching and learning, teachers need to use the relevant classroom interaction practices wisely so as to guide and monitor students in the learning process for better motivation so as to enhance acquisition of knowledge.

Keywords: Teacher-students' interaction; Motivation to learn

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Introduction

In Kenya, secondary mathematics aims at producing a person who will be numerate, orderly, logical, accurate and precise in thought. The person should also be competent in appraising and utilizing mathematical skills in playing a positive role in the development of modern society (KICD,2020; KIE,2002). Furthermore, mathematics is a basis for technological and industrial development (KIE, 2020). It is needed in our daily lives and life without mathematics is an impossibility (Cockroft,1982).

Despite the perceived usefulness of mathematics, secondary school students continue to perform poorly in the subject at the end of secondary school education (Kenya National Examinations Council (KNEC), 2020). A report of KNEC (2020) indicates that national mean performance of Secondary school students from 2016 to 2019 were 2.630, 3.161, 3.205 and 3.385 respectively where the maximum mean score is 12 points. Indeed, Middleton and Spanias (1999) argued that many children tend to enjoy mathematics in the primary grades, but this enjoyment tend to fall drastically when children progress into and through secondary schools. In Laikipia County, Kenya the poor performance in mathematics is not an exception. The KCSE mathematics mean performances in the county from 2016 to 2019 were 2.799, 3.236, 3.441 and 3.599 respectively, where maximum mean performance is 12 points (KNEC, 2020). This is below a mean index of 4 points (33%), and this is clear evidence of poor performance of mathematics in the County.

Several factors can be attributed to poor performance in mathematics including motivation to learn among others. Motivation is paramount to students' success in any academic activity (Stipek, 1998). Motivation is a force that activates and sustains behavior toward a goal. For example, children who are motivated tend to be engaged, persist longer, have better learning outcomes, and perform better than other children on achievement tests (Ugyen, 2018). Moreover, Ugyen argued that teachers can support learners' motivation by creating an emotionally supportive and non-threatening learning environment where learners feel valued and safe.

According to Lazarides et al. (2016), students' perceived support for autonomy, competence and relatedness in class is significantly related to intrinsic motivation and self-exploration. Therefore, teacher support is one of the factors affecting motivation and student achievement. Akey (2006) argued that several aspects of the classroom context (e.g., teacher support, students to student's interaction and the academic and behavior expectations of the teacher) were significantly related to students' attitudes and behaviors. Moreover, Zakaria et al. (2007) and Vaughan (2002) posited that students with high perception of the learning environment, and a more positive perception of their teachers have more positive attitudes towards mathematics.

It is well known that positive teacher behaviors such as good lesson preparation and presentation, warmth, patience and confidence generally lead to safe schools (Independent Project Trust, 1999). Furthermore, Clement et al. (1994) indicated that student's involvement, enhances learning activities, self-confidence and moderate's anxiety. As emphasized by Bandura's (1986) social learning theory, through social interaction and maintenance of a role model status, teachers can enhance the learning environment. Moreover, Khamis et al. (2008) indicated that almost all activities of the teacher which are done in the classroom have effects (positive or nega-

tive) on students' motivation to learn mathematics.

Interaction between teacher and students, and students to students are needed in classroom activities since the gap between the teacher and students will disappear (Jia, 2013). Moreover, Jia stated that interaction is the basis of learning, through which learners are engaged in learning both in enhancing their communication abilities and in constructing their identities through collaboration and negotiation.

Jia (2013) stated that in classroom interaction a productive class can be described as follows: (i) the teacher interacts with the whole class, (ii)the teacher interacts with each other in the group, a pair or an individual learner (iii)learners interact with each other in the group, in pairs or as a class, (iv)learners work with material and attempt to task individually, in pairs or in groups. According to Jia, at least five teaching strategies should be taken into account to make the classroom interactive: These are (i) improving questioning strategies, (ii) attending to learners' linguistic level, (iii) implementing cooperative learning, (iv)building positive teacher-learner rapport, (v) reducing classroom anxiety. In all, teachers are leaders in the classroom, and their leadership role, modeling and behaviors should contribute positively to students' performance and the general learning atmosphere.

In the current study, it is hypothesized that teacher-students' interaction has no influence on students' motivation to learn. The four dimensions of motivation to learn that are the focus of this study are; (i) attention (A), (ii) relevance (R), (ii) confidence (C) or expectancy for success, and (iv) satisfactions in the learning process (Brophy, 2004; Driscoll, 2005; Keller,1999,2006). In Laikipia County, Kenya empirical evidence on the relationship between teacher-students' interaction and motivation to learn mathematics is lacking, hence the need for this study.

Objective of the study

The objective of this study is to determine the influence of teacher-students' interaction on motivation to learn mathematics among high school students in Laikipia County, Kenya.

Null hypothesis

(To be tested at .05 level of significance).

HO_1: There is no statistically significant influence of teacher-students' interaction on students' motivation to learn mathematics among high school students in Laikipia County, Kenya.

Methodology

This study employed the descriptive research design. The target population was all 8357 Form Four students from 113 secondary/high schools in Laikipia County, Kenya. The category of Form Four students was selected because they have covered most of the students in secondary school mathematics and also can form an independent opinion in mathematics. The respondents for the study were drawn from twenty (20) randomly selected public selected public secondary schools in Laikipia County. Simple random sampling was used in selection of schools, classes and respondents. The sample comprised of 392 students (i.e., 216 males and 176 females) randomly selected from the sample classes. The sample size was determined using the Krejcie and Morgan's (1970) table of sample sizes.

Instrumentation.

In the study, students' motivation to learn (MTL) scale (Keller, 2006) and teacher-students' interaction (TSE) scale (Fisher, Fraser & Cresswell,1995) were used. The MTL consisted of 34 items. Twenty-five items were positively worded

and nine items were negatively worded. The items were scored from strongly disagree (1) to strongly agree (5), and scoring for negative items was reversed. Keller (2006) reported an alpha reliability of 0.95 for the MTL scale. The TSI scale had 48 items. The items were scored on a five-point scale from strongly disagree (0) to strongly agree (4). The scoring for the (25) negative items was reversed. The TSI scale had eight sub-scales and Fisher, Fraser and Cresswell (1995) reported an alpha reliability above 0.74 for all the sub-scales.

Data analysis

The Pearson's correlation coefficient (r) and simple linear regression were used for data analysis

Results

The results of data analysis are presented in the following tables (i.e., Tables 1 and 2):

Table 1: Pearson's correlation coefficient between motivation to learn (MTL) and teacher-students' interaction (TSI).

variables	r	r-square	Adjusted r-square	Std. error of estimate	r-square change	F-change	df1	df2	Sig.
MTL and TSI	.501	.251	.249	12.068	.251	130.939	1	390	.000

The results in Table 1 show a statistically significant correlation between motivation to learn (MTL) and teacher-students' interaction (TSI) (r = .501, p=.000). Therefore, MTL and TSI are not independent. Teacher-students' interaction accounted for 25.1% of the variability in motivation to learn mathematics.

The results of simple regression analysis are presented in Table 2.

Table 2: Simple regression of teacher-students' interaction on motivation to learn mathematics.

Source	Sum of square	df	mean	F	Sig
Regression	19056.360	1	19056.360	130.939	.000
Residual	56758.923	390	145.536		
Total	75815.283	391			

Dependent variable: motivation to learn, Predictor: Teacher-students' interaction

The results in Table 2 indicate that the F-value is significant (F [1,390]=130.939, p=000). The interpretation is that teacher-students' interaction makes a significant contribution in the prediction of motivation to learn mathematics among secondary/high school students in Laikipia County, Kenya. Therefore, the null hypothesis (**HO1**) is rejected.

Discussion

The finding in this study that teacher-students' interaction contributes to students' motivation to learn agrees with studies by Khamis et al. (2008), Jia (2013) and Ahmad, Shaharim and Abdullah (2017) that interaction is important in the learning process. Overall, in this study students perceived that the teacher-students' interaction practices were good and effective (i.e., mean score=138.684 out of a maximum mean score of 192). According to Jia (2013), the teacher-students' interaction is an important element in the context of teaching, learning and assessment. Moreover, Fraser et al. (2010) argued that

teachers who want to improve students' academic achievement should show strong leadership behavior and understand, and reduce the uncertainty behaviors in the classroom.

According to Khamis et al. (2008), teacher's behavior in a classroom setting is important because it can influence students' motivation and achievements. However, Ahmad, Shaharim and Abdullah (2017) argued that students' activities should be monitored to prevent students from becoming too independent and unmanageable. According to Cruickshank et al. (2009,) when the teacher gives freedom to the students to learn by themselves and leave the classroom without proper control, the students will be less motivated to learn and are more likely to exhibit negative behaviors such as not completing the task. The present study has found that teacher-students' interaction has a significant contribution to motivation to learn mathematics. Therefore, as mathematics teachers attempt to improve the level of motivation of secondary school students, special attention should be given to classroom interaction practices. Meece et al. (2006) posits that when students are motivated, they persist longer in task, conquer more challenges, and achieve more in their academic activities.

In sum, teacher-students' interaction is necessary to establish good relationship between teacher and students for better motivation of students. According to Ahmed et al. (2013), the physical aspects like space, noise levels seating arrangements, and psychosocial aspects (e.g., interaction between students, students and the teacher, and students and environment) of classroom will contribute to teaching and learning satisfaction and have a significant impact on students' learning. Therefore, a conducive learning environment, and a good teacher-students' relationship will lead to higher learners' motivation which will increase comfort in learning and improve students' achievement over time.

9. Conclusions

The findings showed that the level of teacher-students' interaction makes a significant contribution to students' motivation to learn mathematics. Therefore, teachers should employ appropriate interaction techniques and strategies in teaching mathematics in an attractive way in the classroom. Moreover, teachers should apply group activities for classroom interactions to improve communication among students, and also promote active participation during class activities. Furthermore, student-centered learning should be emphasized so that students are more involved and motivated to learn mathematics.

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