



# Influence of Test Anxiety on Number of Errors in Mathematics in Schools in Keiyo North Elgeyo Marakwet County, Kenya

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## ABSTRACT

In school, there are many students who struggle with mathematics tests. They seem to understand mathematics concepts but when it comes to tests, they often fail almost in every test. They will make mistakes or seem to forget everything they have been taught. The objective of this study was set to establish effect of test anxiety on students' number of errors in mathematics. The study adopted a descriptive research design. The study aimed at collecting information from students' on their perception and opinion in relation to factors that causes errors in mathematics in Keiyo North, Elgeyo Marakwet County, Kenya. The target population composed of all Form 2 and 3 students' drawn from 21 public secondary schools in Keiyo North, Elgeyo Marakwet County, Kenya. A sample of 237 Form 2 and 3 was selected by simple random sampling. Data was collected by a student's questionnaire. Data collected was analyzed using descriptive statistical techniques which are frequencies, mean, standard deviation. The study recommends that students should seek assistance where they experience difficulty so as to reduce test anxiety during tests which makes them commit errors. It is necessary for students to avoid missing lessons so as to master the concepts in Mathematics and reduce the number of errors. As a result, it is imperative for schools to avail revision text books to students and is utmost necessary for students to do their homework assignments and work the tasks before looking at the solutions.

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## Introduction

During exam, some students become careless, working unconsciously (Baker, Corbett, Roll, & Koedinger, 2008) and making unintended errors (Craig, Graesser, Sullins, & Gholson, 2008). This can happen when an individual is overconfident in carrying out a task (Craig *et al.*, 2008), or carries out a task in an impulsive or in a hurried manner.

Many factors may contribute to student's mathematic errors during exam, such as exam anxiety, not paying attention in class, being over confident and not studying as hard as required, excessive absenteeism, lack of incentives for learning, studying only just before the exam and not from the beginning of the term, some students estimate poorly the range of material that would be tested as well as the time needed to prepare well, and so on (Arce-Medina, 2006).

A study by Horwitz, Horwitz, & Cope (1991) in United Kingdom showed that test anxiety is a kind of anxiety considering apprehension over academic evaluation resulting from a fear of not being successful. Most learners study well and hard before they take an exam; they have confidence in what they have studied and what they have learned but they are afraid they cannot take an exam as well as they expect themselves. The studies have revealed that the source of this test anxiety is due to the failure of not getting good marks. The problem is that why the learners are worried about not getting good marks on the exam, although they have studied well and hard.

Ohata's study (2005) in Japan proved that most of the learners reported that they were afraid of taking tests, because test-taking situations would have them be worried about the

negative result of getting a bad mark. There could be another source of this anxiety which makes the students fear getting a bad grade. Maybe the socio-affective strategies which the teachers apply in their classes are the source of this test anxiety. Research based on error analysis of mathematics examination scripts has not yet been done. In this vein, Luneta (2008) comments that it is surprising that research on error analysis in mathematics (and physics) has not taken centre-stage given its potential to help educators to identify students' skills and knowledge acquisitions that would guide the teaching and learning of these subjects. In Africa, Engelbrecht, Harding, and Potgieter (2005) failed to find enough evidence to support the claim that students had more mathematical procedural understanding than conceptual understanding of, as this was not a study on error analysis. In Kenya, Brodie (2005) used the cognitive and socio-cultural perspectives of learning to explain learner reasoning that causes misconceptions during classroom mathematics discourses. International research involving Africa (Reddy, 2006) focused on mathematics and science tests, and the performance results were mainly used for statistical comparison purposes and not for analyzing errors in learners' scripts. Secondary schools students in Kenya have been performing poorly in the national examination in Mathematics creating worries among the parents, students and teachers. Therefore this study attempted to examine the influence of test anxiety on number of errors made by students in mathematics.

## Statement of the Problem

Studying the causes of errors in mathematics is one of the research areas that have attracted little attention among many

researchers despite it being relevant presently. In mathematics, students struggle with mathematics tasks. There has been persistent increase in the number of errors made in mathematics particularly in the Kenya Certificate of Secondary Education examinations which has led poor academic performance in the subject at national examinations. It has been argued that unless learners and teachers realize causes of errors in mathematics and they would be able to reduce the number of errors. This study attempted to investigate the influence of test anxiety on the number of errors made by students in mathematics Keiyo North, Elgeyo Marakwet County, Kenya.

#### Purpose of the Study

The purpose of the study was to the influence of test anxiety on number of errors done by students in mathematics in Keiyo North, Elgeyo Marakwet County, Kenya.

#### Objectives of the Study

The objective of the study was:

1. To establish the effect of test anxiety on students' number of errors in mathematics

#### Research Hypotheses

The following hypothesis was tested:

H<sub>0</sub>: There is no significant influence of test anxiety on students' number of errors in mathematics

#### Methods

This study adopted a descriptive survey design. The study aimed at collecting information from respondents on their perception and opinion on how test anxiety influenced students' errors in mathematics. The target population comprised of all the students in 21 public secondary schools in Keiyo North, Elgeyo Marakwet County, Kenya. A total of 237 participants' were selected using simple random sampling technique. A students' questionnaire was used to collect data. The questionnaire contains two sections; section A contains students' demographic factors while section B covered students' factors which include test anxiety. A five point Likert scale was used to measure statement such as "worrying too much when exam is near". The researcher analyzed the continuous assessment test and end of term marked exam answer sheets.

#### Results

##### Students' Test Anxiety

Student test anxiety was established by the researcher. The findings are presented in table 1. From the findings, 32.9% (70) of the respondents agreed that they feel un-relaxed and uneasy during mathematics examinations, 18.8% (40) of the respondents strongly agreed on this statement, 18.8% (40) of the respondents disagreed, 23% (49) of the respondents disagreed and 6.6% (14) of the respondents were neutral (mean = 3.06). Similarly, 25.8% (55) of the respondents agreed that they feel uneasy and nervous during mathematics tests, 19.7% (42) of the respondents strongly agreed on this statement, 32.4% (69) of the respondents strongly disagreed, 20.7% (44) of the respondents disagreed and 1.4% (3) of the respondents were neutral (mean = 2.8).

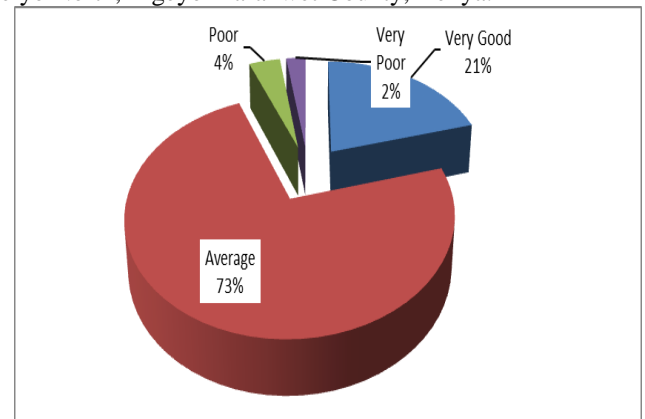
As well, 19.2% (41) of the respondents agreed that they worry too much that other students might understand the problem better than them when the teacher is showing the class how to do a problem, 16.9% (36) of the respondents strongly agreed, 36.2% (77) of the respondents strongly disagreed, 25.8% (55) of the respondents disagreed and 1.9% (4) of the respondents were undecided (mean = 2.55). In a similar vein, 21.6% (46) of the respondents agreed that taking mathematics tests scares them, 10.3% (22) of the respondents strongly agreed, 31.5% (67) of the respondents strongly disagreed and 5.2% (11) of the respondents were undecided (mean = 2.48).

Moreover, 10.8% (23) of the respondents agreed that they dread having to do Mathematics, 16% (34) of the respondents strongly agreed, 36.6% (78) of the respondents strongly disagreed, 27.2% (58) of the respondents disagreed and 9.4% (20) of the respondents were undecided (mean = 2.42). Further, 20.2% (43) of the respondents agreed that they worry too much that they will do poorly whenever the teacher says he/she is going to ask them some questions to find out how much they know about Mathematics, 8.9% (19) of the respondents strongly agreed, 36.6% (78) of the respondents strongly disagreed, 28.2% (60) of the respondents disagreed and 6.1% (13) of the respondents were undecided (mean = 2.37).

Finally, 18.8% (40) of the respondents agreed that they are scared whenever they think they will be doing a Mathematics exam, 9.4% (20) of the respondents strongly agreed, 44.1% (94) of the respondents strongly disagreed, 24.4% (52) of the respondents disagreed and 3.3% (7) of the respondents were undecided (mean = 2.25). In a nutshell, students perceive their performance in mathematics as a measure of their self-worth hence they dread having to do Mathematics, they are scared of taking mathematics exam and they feel very nervous and uneasy while taking mathematics tests. Due to the fact that they have no option other than dealing with mathematics they tend to be distressed hence they are more likely to make errors during Mathematics test. The study findings are similar to Dreger and Aiken (2007) who posit that mathematics anxiety is also exhibited by students that are gifted in Mathematics thereby leading to a lot of errors. As well, Bursal & Paznokas (2006) stated that negative school experiences leads to development of mathematics test anxiety hence a lot of errors in the mathematics tests. Further, failure in mathematics could also lead to mathematics anxiety hence lots of errors in mathematics (Ma & Xu, 2004; Norwood, 2004; Reynolds, 2001; Satake & Amato, 2005; Townsend, Moore, Tuck, & Wilton, 1998).

##### Students Mathematics Performance

The results on students' mathematics performance are presented in figure 1. From figure 1 it is evident that majority (73%) of the respondents has an average performance, 21% of the respondents have very good performance, 4% of the respondents have poor performance and 2% of the respondents have very poor performance. As a result, there is cause for concern since majority of the students have an average performance. If the same trend continues, students may find themselves unable to compete academically with schools from other Counties and they are most likely to miss out on career opportunities. This prompts the researcher to find out the reasons as to why this is the trend among secondary schools in Keiyo North, Elgeyo Marakwet County, Kenya.



**Figure 1. Students Mathematics Performance**  
Source: Researcher (2015)

**Table 1. Students' Anxiety Measures**

		SD	D	UD	A	SA	Mean	Std. Dev.
When the teacher says he/she is going to ask you some questions to find out how much you know about mathematics, I worry too much that i will do poorly	F	78	60	13	43	19	2.37	1.38
	%	36.6	28.2	6.1	20.2	8.9		
When the teacher is showing the class how to do a problem, I worry too much that other students might understand the problem better than me	F	77	55	4	41	36	2.55	1.54
	%	36.2	25.8	1.9	19.2	16.9		
When I am in mathematics examinations class, I usually feel not at all at ease and relaxed.	F	49	40	14	70	40	3.06	1.48
	%	23	18.8	6.6	32.9	18.8		
When I am taking mathematics tests, I usually feel very nervous and uneasy.	F	69	44	3	55	42	2.8	1.59
	%	32.4	20.7	1.4	25.8	19.7		
Taking mathematics tests scares me. I very often feel this way	F	67	67	11	46	22	2.48	1.39
	%	31.5	31.5	5.2	21.6	10.3		
I dread having to do mathematics. I very often feel this way	F	78	58	20	23	34	2.42	1.47
	%	36.6	27.2	9.4	10.8	16		
It scares me to think that I will be taking mathematics exam	F	94	52	7	40	20	2.25	1.42
	%	44.1	24.4	3.3	18.8	9.4		

Source: Reseachr (2015)

**Students' Errors**

Students' errors were established by the study. From table 2, 10.8% (23) of the respondents reported to having had 9 errors, 10.3% (22) of the respondents stated that they have had just one error, 8.5% (18) of the respondents reported that they have had 5 errors, 8% (17) of the respondents stated that they have had 6 errors, 7.5% (16) of the respondents confirmed to having had 11 errors, 7% (15) of the respondents reported that they have had 2 errors and 7% (15) of the respondents confirmed to having had 3 errors. Further, 7% (15) of the respondents reported that they had 13 errors, 7% (15) of the respondents confirmed that they had 14 errors, 6.6% (14) of the respondents stated that they had 12 errors, 6.1% (13) of the respondents stated that they had 10 errors, 4.2% (9) of the respondents affirmed that they had 4 errors and 3.8% (8) of the respondents confirmed that they had 7 errors. From the foregoing results, it is clear that all the students made errors the only difference being the number of errors made. It therefore implies that the errors made are a misunderstanding of the topic which needs to be re-taught rather than assumed.

**Table 2. Number of Errors Reported by the Respondents**

No. of Errors	Frequency	Percent
1	22	10.3
2	15	7
3	15	7
4	9	4.2
5	18	8.5
6	17	8
7	8	3.8
8	13	6.1
9	23	10.8
10	13	6.1
11	16	7.5
12	14	6.6
13	15	7
14	15	7
Total	213	100

Source: Reseachr (2015)

**Correlation Analysis of Student Factors Influencing the Number of Errors in Mathematics**

The existing relationship between the independent factors and the dependent factor (students' number of errors in mathematics). The correlation did not imply a causal-effect relationship. The results were summarized and presented in table 3.

The correlation model illustrated indicates a significant positive relationship between student anxiety( $r=0.465$  and  $p\text{-value}=0.004 < \alpha=0.01$ ) and students' number of errors in mathematics. This implies that student anxiety has 46.5% positive relationship with students' number of errors in mathematics. The findings are consistent with others studies who claim that test anxiety (Dornyei, 2005).

**Table 3. Correlation Results**

		Errors	Students anxiety
Errors	Pearson Correlation	1	
	Sig. (2-tailed)	0	
Students anxiety	Pearson Correlation	0.465**	1
	Sig. (2-tailed)	0.004	

 $p < .05$ 

Source: Reseachr (2015)

**Discussion****Anxiety on Students' Number of Errors in Mathematics**

As evidenced in the findings, anxiety has a positive and significant effect on students' number of errors in Mathematics. This implies that whenever students feel anxious during Math tests, the way in which they manipulate numbers and solve mathematical problems is interfered with hence they are more likely to make errors. In line with the results, Dreyden & Gallagher, (2009) state that most school-based performance measures are administered with a time limit which causes anxiety among the students leading to a lot of errors in the mathematics test. Moreover, Hopko, McNeil, Lejuez, Ashcraft, Eifert, & Riel, (2003) observed that persons with mathematics anxiety make more mistakes in dealing with mathematics

problems. In a similar vein, poor performance in mathematics is associated with an increase in mathematics test anxiety leading to a lot of errors and poor performance (Furner & Duffy, 2002; Hopko *et al.*, 2003). However, Lupkowski and Schumacker (2001) found no correlation between anxiety level and errors in the mathematics portion of the Scholastic Aptitude Test (SAT).

### Conclusion

From the findings it was undefined whether students feel uneasy during mathematic examinations. As well, students were not certain whether they worry too much that other students might understand the problem better than them when the teacher is showing the class how to do a problem. However, students were scared of taking mathematics tests and they dread having to do Mathematics. In most cases, they worry too much that they will do poorly whenever the teacher says he/she is going to ask them some questions to find out if they understand the concepts in Mathematics well.

The study established that anxiety has a significant effect on students' number of errors in mathematics. There is therefore need for both parents and teachers to refrain from giving students negative perceptions of Mathematics so as to reduce uneasiness and nervousness among students during Mathematics examinations. Further, it should be a collective responsibility for students to ensure that they understand well the concepts taught in Mathematics and seek assistance where they experience difficulty so as to reduce anxiety during tests which makes them to make errors.

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