The Impact of Perception on Performance in Mathematics of Female Students in Secondary Schools in Teso District, Kenya.

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Abstract

This study seeks to determine the impact of perception of female students on the performance of the Mathematics within secondary schools in Teso District. The main objectives were: to establish the effect of perception of female students on performance in mathematics in secondary schools and to establish the effect of type of school on the perception of female students on the performance in mathematics. This study was guided by constructivism analytical framework (1992) of gender performance. The study sample involved a selection of 240 females selected by stratified random sampling method from secondary schools within Teso District to complete an inventory of Mathematics perception .The main instruments of data collection were the questionnaire. Data collection was done from May to June 2009 during the regular school sessions. Analysis of the data was done using descriptive statistics. Analysis of data from the questionnaire responses revealed a significant ($P < 0.05$) effect perception towards performance in Mathematics among the students. Female students had negative perception towards Mathematics. Most of the female students with negative perception performed poorly in Mathematics. Female students' in boarding schools were established to have more positive perceptions towards Mathematics and therefore performed better in the subject than students from co-educational schools. This indicates that performance of Mathematics can be improved through enhancing positive perception towards Mathematics. Further, the Ministry of Education should devise methods of improving the perception of female students towards Mathematics, to unlock their ability in performance.

Keywords: Perception, Performance, Impact, School.

1.0. Introduction

Globally, education is fundamental in the development of human persons and has been viewed principally in light of a fundamental human right (Kyalo *et al*., 2006) as well as being the cradle of mankind. Education in Kenya has continued to play a significant role in imparting knowledge to many people, which portends a good future life for many people (Shiundu and Omulando, 1992). Many high performing schools in Kenya often attribute their "excellent students' performance" on students hard work and discipline in the schools (Sifuna, 1990). Transition of the students from secondary schools to the university education Kenya is tied to academic performance (Njuguna, 1999).

Academic performance could be defined as the display of knowledge attained or skills developed in school subjects designated by test and examination scores or marks assigned by the subjects' teachers (Smith, 1997). It could also be said to be any expression used to represent students' scholastic standing. Many researchers, psychologist and educators alike, have identified some of the variables that have effects on students' academic performances. Academic performance is an individual's inherent potentials in terms of intelligence combined with other sociological factors. Ojerinde (2009) in his study identified personality factors such as anxiety, achievement, motivation and level of interest as factors that affect academic performance. The consistence of these claims was asserted by Ford (2010), which claimed that student with high self-efficacy received higher grades than those with low self-efficacy and that students with negative self-concept have poor academic performance. Moreover, academic performance is a facet of many interrelated variables key among them is the inherent students' efforts, teachers' inputs, school environment and students perceptions. Despite various efforts to improve academic performance, some schools continue to perform dismally in national examinations and therefore most students from such schools fail to secure admission to higher learning institutions. There are a number of suggestions that apart from school- related factors, the students' achievements are a facet of perceptions that students have (Saha, 2007).

2.0. Literature Review

2.1. Perception and its influence on performance

Perception may be defined from physical, psychological and physiological perspectives. But for the purpose of this study, it shall be limited to its scope as postulated by Allport (1996), which is the way we judge or evaluate others. That is the way individuals evaluate people with whom they are familiar in everyday life. Eggen and Kauchak (2001) gave cognitive dimension of perception; they see perception as the process by which people attach meaning to experiences. They explained that after people attend to certain stimuli in their sensory memories, processing continues with perception. Perception is critical because it influences the information that enters working memory. Background knowledge in the form of schemas affects perception and subsequent learning. Research findings have corroborated this claim that background knowledge resulting from experience strongly influence perception Chuangane, (1990), it was called "social perception" which is the process through which we attempt to understand other persons. The term "apperception" can also be used for the term under study. Apperception is an extremely useful word in pedagogic, and offers a convenient name for a process to which every teacher must frequently refer. It means the act of taking a thing into the mind. The relatedness of this view of perception to the present study is further explained, that every impression that comes in from without - be it a sentence or vision - no sooner enters our consciousness than it is drafted off in some determinate directions or others, making connection with other materials already there and finally producing what we call our reaction. From this it is clear that perception is the reaction elicited when an impression is perceived from without after making connection with other materials in the consciousness (memory). From this point of view two implications could be deduced.

Firstly, perception cannot be done in vacuum; it depends on some background information that will trigger a reaction. This is consistent with the view of researchers (Allport, 1976; Glover *et al*., 1990) and the overall research problem of this study. Students' perception of teachers' knowledge of subject matter, attitudes to work and teaching skills is absolutely dependent on the fact that they have been taught by the teachers under evaluation and are familiar with them. They therefore, have minds already pre-occupied with memories and reactions that inventory for data collection will measure. Secondly, studies had confirmed possible influences on apperception. Perception may be energized by both the present and past experience, individual attitude at a particular moment, the physical state of the sense organ, the interest of the person, the level of attention, and the interpretation given to the perception.

From evidences available in literatures it is being established why teachers' knowledge of subject matter is highly essential for effective teaching. It's confirmed that a teachers' teaching is influenced by the level of his pedagogical knowledge, as different from his subject matter knowledge. It is to be noted that pedagogical knowledge are not exactly the same thing as knowledge of subject matter, they nevertheless are, intimately linked with it, because teachers' mastery and use of them in the classroom will indicate the depth of their knowledge of subject matter.

3.0 Research Methodology

3.1 Research Design

This study used Descriptive survey design. This is normally used to systematically gather factual quantifiable information necessary for decision-making. According to Kothari (2004), such designs are efficient methods of collecting descriptive data regarding the characteristics of populations, current practices and conditions or needs. They also help gather information from large cases by employing use of samples hence cutting down on costs. Given the above stated attributes, descriptive survey design was adopted in this study in order to capture descriptive data from selected samples and generalize the findings to the populations from which the sample were selected. It was also hoped that this design would unravel the complexities that characterize female students as far as mathematics performance is concerned. The samples would then be used to make decisions to reverse the unsettling trend or current situation. The researcher investigated and established the role of perception on performance in mathematics.

3.2 Population

The target population for this study comprised of female students from secondary school in Teso District. Currently there are 16 schools within the district's four divisions. There are a total of 1143 female students and 1709 male students (District Education Office, Teso District, 2008).

3.3 Sample Design and Sample Size

The research sample consisted of 240 students. The schools within Teso District were selected using proportional stratified random sampling from each of the four divisions as presented in Table 3.1; ensuring that at least 50% of the schools are sampled from every location. Three additional schools, which represent schools with special needs, were added to the initial 10 schools using purposive sampling. From the sampling frame, a total of 240 students were used in the sample. The study comprised of Female boarding schools, co-educational

boarding schools and co-educational day schools.

Students were selected through stratified sampling technique. The lower strata were represented by students who are poor in Mathematics. This was based on the class lists of the students' performance kept by the head teachers in school administrative units. The researcher ensured that equal representation is used for all the school sampled. Form 4 and Form 3 students were selected for the study. The choice of the above was based on the fact that the students have been in the school much longer and are more knowledgeable about the school environment than the Form one and Form two.

Table 3.1: Population of Schools and Samples Selected for this Study

Division	Schools	Sampled schools	% of sampled schools	Students sampled per school	Total number of students
Amagoro,	3	2	67.0	20	40
Angurai,	5	3	60.0	20	60
Chakol,	3	2	67.0	20	40
Amukura	5	3	60.0	20	40
Additional*		3		20	60
	16	13			240

[1]Add – Additionally sampled schools based on special needs

Source: District Education Office, Teso, 2005

During data collection, the researcher visited each study school and two suitable research assistants distributed and collected the questionnaires. The research assistants helped the selected students to ensure that participants completely understood the directions of the questionnaire, and to reduce cultural bias on behalf of the researcher.

4.0. RESULTS
4.1 Background information of the respondents
The background information sought included; type of school, class, and age of the respondents as shown in Table 4.1. Out of the 240 respondents, the majority of the students were sampled from girls boarding schools (55.0%) followed by co-educational boarding (26.2%) while co-educational day had 18.8%. The respondents were sampled from two classes, form three and form four. Higher number of the students were sampled from form four (57.3%) compared to form three (42.7) the majority of the respondents were aged 16-18 years, while 28.2% were aged over 18 years, and 21.3% were between aged 12-15 years.

Table 4.1: Background information of the respondents

Variable		Frequency	% Frequency
Type of school	Co-educational day	38	18.8
	Co-educational boarding	53	26.2
	Female students boarding	111	55.0
Class	Form 4	110	54.5
	Form 3	92	45.5
Age	12-15 years	43	21.3
	16-18 years	102	50.5
	>18 years	57	28.2
	Total	202	100

4.2. Effect of Perception of Female Students on Performance in Mathematics in Teso District
This study also investigated the perception of female students towards Mathematics and how it affected their performance in Mathematics. To realize the aforementioned objective, a hypothesis was formulated that stated 'Perception of females toward Mathematics has no effects on the performance in mathematics in secondary schools in Teso District'.

First the researcher sought to establish the overall perception of the female students towards Mathematics, which would later help in determining the relationships between the perception of the female students and the overall performance in Mathematics. The perception of the female students towards Mathematics is depicted in Figure 4.2.

Figure 4.2: Perception of the Female Students towards Mathematics
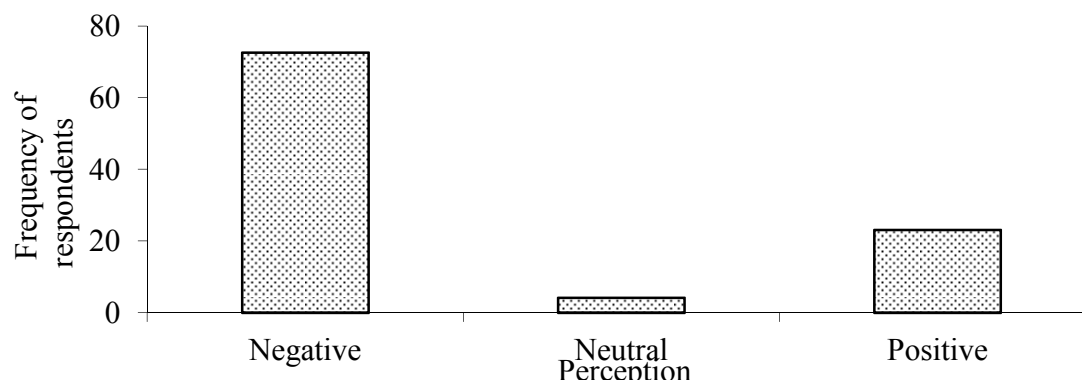
There was a significant difference in the perception of the female students towards Mathematics. Majority of the female students had negative perception (72.6%) towards Mathematics. The proportion of female students with neutral attitudes were the least (4.2%) compared to those with positive perception of Mathematics (23.2%).

In order to establish the relationships between the perceptions of female students towards Mathematics and how this influenced their performance in Mathematics, mean score of female students in Mathematics were computed based on the three perception categories (Figure 4.2). Parametric ANOVA test were performed on the perception of female students as independent variable and performance in Mathematics as the dependant variable (4.4).

Performance of female students with positive perception toward Mathematics was the best at a mean score of 43.1% than the performance of female students with negative and neutral attitudes which had mean scores of 26.8% and 18.9% respectively.

Relative to attitudes, there were significant differences in performance in Mathematics between female students' with negative, neutral and positive perception towards Mathematics (One-Way ANOVA; Table 4.3). This led to the rejection of the null hypothesis stating that perception of females toward Mathematics has no effect on their performance in mathematics in secondary schools in Teso District.

Table 4.3: ANOVA Table Showing Level of Significance in Mathematical Performance among Females with Negative, Neutral and Positive Perception towards Mathematics in Teso District.

ANOVA

SCORES

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.025	2	24.013	86.570	.000
Within Groups	82.381	297	.277		
Total	130.406	299			

The ANOVA table indicates highly significant ($P < 0.05$) differences in the Mathematical performance of female students with negative, neutral and positive attitudes towards Mathematics.

4.5 Influence of Type of School on Female Students Perception on Performance in Mathematics

The fourth objective was to determine the female students' perception toward Mathematics and how this affected their Mathematical performance from the 3 types of schools in Teso District; co-educational day, co-educational boarding and female students' boarding. To realize the aforementioned objective, a hypothesis was formulated that stated 'Perception of females student toward Mathematics have no effects on their Mathematical performance in various types of schools'.

Perception of Female Students towards Mathematics from Various Schools in Teso District is presented in Figure 4.4.

Table 4.4: The Influence of Type of School on Perception of Female Students towards Mathematics.

	Co-educational day	Co-educational boarding	Female boarding
Negative	57.2	49.4	34.5
Neutral	7.2	7.9	7.1
Positive	35.6	42.7	58.4
	100	100	100

The differences in perception of female students toward Mathematics were significantly different (χ^2 = 23.887, df = 4, P = 0.002) among the various types of schools. Negative perception was recorded in 57.2%, 49.4% and 34.5% of the female students in co-educational day schools, co-educational boarding and female students boarding respectively. Neutral attitudes were recorded in 7.2%, 7.9%, and 7.1% in female students from co-educational day schools, co-educational boarding schools and female students boarding respectively. Positive attitudes in female students towards Mathematics were recorded more in female students boarding (58.4%) followed by co-educational boarding (42.7%) then co-educational day schools (35.6%).

The performance of female students in Mathematics was also compared among the various types of schools by computing the mean scores of female students with negative, neutral and positive perception toward Mathematics (Table 4.5).

Table 4.5: Performance of Students with Negative, Neutral and Positive Perception towards Mathematics among the Various Types of Schools

	Co-educational day	**Co-educational boarding**	**Female boarding**
Negative	36.5	39.2	25.2
Neutral	11.5	7.9	9.1
Positive	50.9	52.9	65.7

There were significant interactions between the type of school and the perception of female students in determining the performance in mathematics in the schools sampled. Student with positive perceptions performed better regardless of the school than female students with neutral or negative attitudes. However, in eco-educational boarding and girl schools, performance in Mathematics among the female students with neutral attitudes was better than students with negative attitudes.

5.0. Discussion

5.1. Perception of Female Students toward Mathematics Achievement in Secondary Schools

There were significant differences in the performance and perception of female students towards Mathematics. Students with negative perception towards mathematics were not performing well as their counterparts with positive attitudes. This tends to suggest that students' performance will largely be shaped by their perception to Mathematics. However, good academically the student is, the perception creates an impetus into the student's mind which creates a culture to like or dislike the subject. When these students' perceptions are not strengthened towards an undertaking, they often don't do quite well academically, even though they have the ability to do well under conducive environment.

5.2. Effect of Perception of Female Students toward Performance in Mathematics from Various Types of Schools

The literature with respect to the effects of single-sex and co-educational schools on attitudes and performance in mathematics is also equivocal. Recent Australian studies, have indicated that single-sex school environments have tended to be more closely associated with positive attitudes towards mathematics, particularly by female students. Further it has been observed that female students tend to prefer lower levels of social competition and a warmer teaching style and that they are more likely to be found in female students only classes. Not all studies find support for single-sex classrooms. It has been argued that coeducation has more potential for counter-sexist practices to be effective. The creation and maintenance of gender takes place through two processes that are intertwined to the extent that one cannot precisely draw a line of demarcation between them. It suffices to indicate that these processes are complementary. The first process is concerned with the actual construction of gender and the second process is concerned with the spreading of gender, reinforcing and maintaining it. Both these processes are carried out in a subtle, manner through the use of gendered agents, Stipek, (2006).

Gender is constructed by different roles for different sexes. In every society that practices gender division or discrimination, there is a demarcation between the roles, clothes, toys, games, attitudes, behaviors, language and

skills that are meant for females and males respectively. On top of that society uses different sets of names, one set for females and the other for males (Bonvillian, 1995). Each person born into this society has his/her gender blanket that has all gender aspects waiting for him/her. There is enough evidence to suggest that gender is a social construct. It is defined as the socio-cultural differences between males and females respectively (Kessler and McKenna, 1978; Mackie, 1983; Lips, 1988; Butler, 1990; Richmond-Abbot, 1992; Bovillian, 1995).

People in every society maintain and transmit ideas about roles that women and men must perform, the rights they have in relation to each other and the values associated with their activities. Socialization is concerned with the actual teaching and learning of gender. This involves gendered institutions and gendered agents that facilitate this process.

The findings of a study by Will, Self and Datan (1976), as cited in Lips, (1988) clearly indicate the issue of different treatment of boys and female students. In that study mothers were given the same student to play with. To five of them, the student was made to appear male in terms of clothes and the name, "Adam". To the other six mothers the student was made to appear female in terms of clothes and the name, "Beth". It is reported that the mothers gave a doll to "Beth" and a toy train to "Adam" and they smiled at and held the baby more closely when they thought they were dealing with "Beth" than when they thought they had "Adam".

Similarly in education, according to Taylor and Mardle (1986) there is enough evidence that there is gender discrimination in the education system with female learners being discriminated against and thus being discouraged from doing such subjects or developing a negative perception towards them. This finally leads to female learners believing that they cannot make it. It follows therefore that the major source of gender differences in attitudes comes from education.

Finally, it would seem that gender differences in attitudes begin in the middle grades with boys being positive while female students are negative (Catsambis, 1995). The home seems to attach more importance and the value on the male student than the female student. The school reinforces this practice. Teaching therefore seems to fulfill the gender beliefs and expectations of the society *holding* the learner.   Sadker and Sadker (1985) have found out that teachers treat boys and female students differently, with the latter regarded as the *weaker sex*.

Even though the provision of equal opportunities for men and women has been a priority in many countries, large gender differences prevail in competitive high-ranking positions. Suggested explanations include discrimination and differences in preferences and human capital.

Schools where students' perceptions toward Mathematics were positive exhibited significantly higher academic performance than those where students had negative or neutral perception. This was the case in the female student's schools in relation to the co-educational schools. Number of students with neutral perceptions reduced moderately as students' performance improved whereas the number of students with positive attitudes increased with improved student performance. The possible explanation offered to account for this increase in the number of students with positive perception as Mathematical performance improved is the fact that when students trust their academic environment then they expect to succeed in it (Gross, 1992).

In female students' boarding school, performance was also a strong function of the students' perceptions. The number of the students with negative perceptions was fewer as did lower performers, however, the number of students increased markedly with improvement of performance among students with positive perceptions. This was in line with Bolarin, (2007) diction that students with positive perceptions find school meaningful, enjoy school environment and believe that what they are doing in school will produce beneficial outcomes for them. Finally, they implement self–regulating strategies where they set realistic expectations and implement appropriate strategies to accomplish their goals successfully.

6.0. Conclusions

Students' perception was found to be significantly and positively related to achievement in mathematics. There is need to address negative perception among girls because of the far reaching negative consequences that it can have on the performance of mathematics. The research findings also showed that most female students with positive perception performed very well in Mathematics. It was still established that female students' boarding schools performed remarkably well followed by co-educational boarding and co-educational day schools. The poor performance may probably be because of lack of effort, persistence or stereotyped beliefs about mathematics by female students. From this, it was concluded that performance of female students is a function of perception as well as school and learner related reasons.

7.0. Recommendations

Based on the foregoing discussion of the findings and conclusion, the following recommendations are offered to female students, educators and the government regarding the performance in Mathematics in secondary schools.

1. Teachers should be encouraged to identify how to inculcate positive perception in the female students to improve the learners' abilities and performance.

2. Schools in Kenya should come up with group discussion under the guidance of female students with positive perceptions towards Mathematics and include other students who are less academically endowed. Such group will have a mandate of trying to encourage students to develop positive perceptions toward Mathematics.

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