



Students' Sex and Attitudes Toward Mathematics: A Case of Secondary School Students in Eldoret Municipality, Uasin Gishu District, KENYA

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ABSTRACT

Mathematics plays an important role in scientific advancement and development in general. In Kenyan education system, it is a compulsory subject at secondary school level. However students' attitudes toward the subject have been largely blamed for the continued poor performance over the years. A great deal of research reveal differences between the sexes in as far as mathematics is concerned particularly at the secondary school level. Therefore this study using a sample of 205 form three students (126 girls and 79 boys) tried to investigate whether there was any significant gender difference in attitudes toward mathematics. Questionnaires and face to face interviews were used in data collection. Descriptive (%) and inferential (chi-square and z-statistic) statistics were then used to analyse the data. The findings of the study indicated that more boys than girls (93.7% of boys compared to 59.5% of girls) had positive attitudes toward mathematics while more girls than boys (35.7% of girls compared to 6.3% of boys) were negatively oriented toward mathematics. Calculation of z-statistic confirmed that the difference between the two means was significant. Chi-square calculation showed a significant relationship between sex of student and attitude held. Based on the findings, it was concluded that significant gender differences in attitudes toward mathematics existed among students of secondary schools in Eldoret municipality and that closure of the sex differential gap could help see girls perform better in mathematics as well.

INTRODUCTION

Mathematics is a fundamental subject to the attainment of the millennium development goals (MDG) by 2015. However, performance in the subject at secondary school level has not been impressive in most parts of the world (Orton, 1987; Eshiwani, 1993; Owiti, 2001). Research reveal that boys however tend to perform better than girls in mathematics at secondary school level (Childer, et al, 1983; Eshiwani, 1985).

Analysis of the 1995 Kenya Certificate of Secondary Education (KCSE) mathematics results by the Kenya National Examinations Council (KNEC) reveal that Kenya is producing a generation that is mathematically incompetent (Daily Nation, 1996). Over 80% of the candidates, majority of who were girls failed in the subject (Daily Nation, 1996).

Besides, analysis of KCSE mathematics results provided by the District Education officer in Uasin Gishu District for 1993 to 1997 indicated that over 70% of the candidates had been failing in the subject. Mean grade calculation revealed that students in the district had been scoring grades below the minimum pass grade D+ over the years (see table 1).

Table 1: Uasin Gishu District Mean Grade in Mathematics

Year	1993	1994	1995	1996	1997
Mean Score	2.67	2.29	2.73	3.25	2.93
Mean Grade	D	D-	D	D	D

Source: DEO'S office, Uasin Gishu District. Eldoret

In-depth analyses of the same results revealed that of the 49% of the students who failed in mathematics over the years, 39.4% were girls while only 9.6% were boys. Also of those who obtained grade E (Fail), 39.4% were girls while 0.9% were boys. These percentages show that more girls than boys are failing in mathematics. Clearly, this puts the attainment of MDG goals at stake.

Attitude of students toward mathematics have been shown to be clearly related to and influence achievement in mathematics (Eshiwani, 1985; Orton, 1992; Owiti, 2001). Attitude affect achievement

and achievement affect attitude. Neale (1969) refer to this relationship as a dynamic interaction between feelings and behaviour as observed in the performance. Girls are more negatively oriented towards mathematics than boys (Elizabeth, 1980; Gabrielle, 1993; Gipps et al. 1994). However an international survey on mathematics achievement by the International Association for the Evaluation of Educational Achievement (IEA) in 1964 indicated that though boys in other countries showed more interest in mathematics than girls, a sample of girls from England and France showed a higher level of interest in mathematics than boys. This led to greater achievement in mathematics by girls. It was against the aforementioned background that the study was set to investigate whether attitude was related to sex and whether there were any significant sex differences in attitudes toward mathematics among secondary school students of Uasin Gishu District in Eldoret municipality in western Kenya.

Research Question

The study was guided by two main questions:

1. Is sex of the student related to the nature of attitude held toward mathematics?
2. Are there any significant differences in attitudes held by form three girls and boys of Eldoret Municipality toward mathematics?

Data was sought to help answer the research questions.

Research Hypothesis

The study sought to address two hypotheses stated in the null form:

H_{01} : There is no significant difference between attitudes held by boys and girls toward mathematics

H_{02} : There is no significant relationship between students' sex and their attitude towards mathematics

Purpose of the study

The main purpose of the study was to investigate whether student sex was related to their attitude toward mathematics and whether there were any significant differences between the attitude of secondary school boys and girls of Eldoret municipality. The study also aimed at making recommendations on strategies of fostering positive attitudes towards mathematics. This is hoped may go along way in improving scores in mathematics at the end of secondary education cycle.

RESEARCH DESIGN AND METHODOLOGY

The study was carried out in Eldoret Municipality, Uasin Gishu District of Rift Valley province in western Kenya between Sept-Dec 1997. Eldoret Municipality was selected due to its convenience to the researcher who was a graduate student then at Moi University, Eldoret Kenya. The study employed descriptive survey research design. Survey design was recommended due its suitability in gathering data within the three months in which the study was done.

Stratified sampling was used to select 5 out of a total of 15 schools in Eldoret Municipality on the basis of whether they were boys, girls or mixed (2 girls' schools, 2 mixed schools and 1 boy school). Form three students in each school were then classified into three strata according to how they had been performing in mathematics in the past; that is above average, average and below average. This was done based on records of previous end of term mathematics examination results. The help of heads of mathematics department in the schools under study was crucial in this endeavour. Random sampling was then applied to obtain students from each stratum. In one mixed school 6 above average, 7 average and 7 below average boys and girls were selected (40) while in the other 6 above average, 7 average and 7 below average girls (20) and 6 above average, 6 average and 7 below average boys were selected (19). From 2 single sex schools; 13 above average, 13 average and 14 below average boys and girls were random sampled from each (40 boys and 40 girls). In one girl's school, all the 46 girls in form three were involved in the study. A total of 205 students took part in the study.

Data Collection

Data for the study was collected by the researcher who was then a graduate student in a near by university. Questionnaires were administered by the researcher to the students in the sampled schools after explaining to them the objective of the study and assuring them of confidentiality of their responses. Face to face interviews were carried out with 25 randomly selected students to help confirm information in the questionnaires (11 boys and 14 girls).

Data Analysis

Data collected for the study was analysed using descriptive and inferential statistics. Mean scores and percentages of students falling in each category of attitude were calculated. The static z was then used to test for any significant difference between the mean attitude scores for boys and girls at alpha level

of 0.05. Chi-square was then used to test whether there was any significant relationship between students' sex and their attitudes toward mathematics.

RESULTS

Results in table 2 showed that out of 205 students who participated in the study, 72.9% had positive attitudes while 24.4% had negative attitudes toward mathematics. Of the 79 boys who took part in the study, 93.7% had positive attitudes while 6.3% had negative attitudes while out of the 126 girls who participated in the study, 59.5% had positive attitudes and 35.7% had negative attitudes. The percentages showed that more boys than girls (93.7% compared to 59.5% respectively) were positively oriented towards mathematics while more girls than boys (35.7% and 6.3% respectively) were negatively inclined towards mathematics. Similar studies by Herman (1963), Eshiwani (1975) and Gabrielle (1994) shows similar results.

Table 2: Students' attitudes toward Mathematics

Sex	Attitude			
	positive	Neutral	Negative	Total
Boys	74(93.7)	0(0)	5(6.3)	79(100)
Girls	75(59.5)	6(4.8)	45(35.7)	126(100)
Total	149	6	50	205

Figure in parenthesis are percentages

When attitude mean scores were calculated, values 3.94 for boys, 3.09 for girls and 3.44 for the whole group were obtained (see table 3). To test whether the calculated means differed significantly, z-statistic was calculated and a value 4.11 was obtained. The calculated z value was greater than the tabulated value of 1.645 at alpha level of 0.05. Thus the attitude mean scores for boys and girls differed significantly. The null hypothesis; H_{01} : There is no significant difference between attitudes held by boys and girls toward mathematics was rejected.

Table 3: Attitude scores for students

Sex	SA	A	U	D	SD	Total	Mean score
Boys	521	801	187	211	102	7174	3.94
	2084	4005	561	422	102		
Girls	419	712	203	760	429	7794	3.09
	1676	3560	609	1520	429		
Whole group	940	1513	390	971	531	14968	3.44
	3760	7565	1170	1942	531		

Chi-square calculation yielded a value 28.8 which was greater than the critical value of 5.99 at degrees of freedom (df) = 2 and alpha level of 0.05 (see table 4). The null hypothesis; H_{02} : there is no significant relationship between students' sex and their attitude toward mathematics was thus rejected. A significant relationship existed between the student sex and their attitude towards mathematics. A contingency coefficient of 0.35 further pointed to the existence of the said relationship.

Table 4: Chi-square computation for gender attitudes

Sex	Attitude			
	positive	Neutral	Negative	Total
Boys	74(57.4)	0(2.3)	5(19.3)	79
Girls	75(91.6)	6(3.7)	45(30.7)	126
Total	149	6	50	205

Figure in parenthesis are the expected frequencies

$$X^2=28.8, df= 2, c = 0.35 \alpha = 0.05$$

Face to face interview with 25 randomly selected students (11 boys and 14 girls) revealed that 6 boys and 5 girls considered mathematics their favourite subject while 3 boys and 8 girls considered mathematics their most un- favourite subject. Outlining reasons for the foregoing, girls from one of the

SECTION B

Here are sentences about how some people feel about mathematics. Read each sentence carefully making sure you understand it and then tick (✓) the one you think is nearest to your feelings. They are;

1. Strongly Agree (AS)
2. Agree (A)
3. Undecided (U)
4. Disagree (D)
5. Strongly Disagree (SD)

If you think the statement is very near how you feel about mathematics then tick ‘Strongly Agree’ (SA). If you think it is near to what you feel then tick (✓) ‘Agree (A). However, if you are undecided tick (✓) ‘Undecided’ (U). If you don’t agree with the statement tick (✓) ‘Disagree’ (D) and if it is opposite to what you think tick (✓) on ‘Strongly Disagree’ (SD).

Statement	Options				
	SA	A	U	D	SD
1. Mathematics is interesting					
2. I'm not good in mathematics					
3. I like story books more than math					
4. Mathematics wont be very important to me when I leave school					
5. The subject I hate most is mathematics					
6. Mathematics is my best subject					
7. Mathematics is boring					
8. Mathematics should be made an optional subject					
9. Mathematics is useful in life					
10. A lot of mathematics I'm taught is a waste of time					
11. I'm disappointed when I miss mathematics lesson					
12. Girls do not usually choose a job which need any mathematics					
13. Students really enjoy mathematics lesson					
14. Learning mathematics is more important for boys than girls					
15. mathematics is a subject which is more difficult					
16. I would like to do mathematics after form four					
17. The jobs that need mathematics are usually meant for boys					
18. I never expect that I will do well in mathematics					
19. Mathematics is much easier for me than other subjects					
20. I cant understand how some students think mathematics is enjoyable					
21. I like doing mathematics more than doing anything else					
22. I panic in mathematics test					
23. Mathematics is useful to me in my future career					

Appendix B: INTERVIEW SCHEDULE FOR STUDENTS

1. Is mathematics one of your favourite subjects? Why is it so? Could you explain?
2. Are there students in your class who like or dislike mathematics/ why do you think so?
3. Do your parents or teacher think you will pass mathematics?
4. Are you ever shy of asking or answering questions during mathematics lessons? Could you explain?

Appendix C: Uasin Gishu District Mathematics Results Analysis

Year	Grades															
	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	Entry	M/sc	%Fail	%E
1993	24	13	24	37	43	81	84	109	120	349	372	1131	2387	2.667	77.6	47.4
1994	02	04	12	22	33	49	54	84	144	374	740	1102	2620	2.297	84.5	42.1
1995	27	16	26	48	42	92	81	108	147	313	574	1171	2545	2.728	76.9	42.1
1996	53	31	41	69	95	131	124	154	175	443	743	875	2954	3.253	70.4	30.3
1997	37	35	47	43	66	108	103	126	183	414	756	1086	3004	2.926	75.1	365.2

Source: DEO'S office Uasin Gishu District

Appendix D: Eldoret Municipality KCSE mathematics Results Analysis for Boys Schools

Year	Grades														
	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	Entry	M/sc	%Fail
1993	1	0	2	2	2	16	9	12	6	19	27	8	104	4.143	51.9
1994	02	0	4	3	7	6	6	9	17	26	30	2	110	4.127	52.7
1996	8	10	10	11	21	12	9	10	12	6	0	2	111	7.468	07.2
1997	10	8	9	10	14	26	12	11	11	19	11	2	143	8.105	22.4

% failed = 9.6%, % that obtained grade E = 0.9 %

Source: DEO'S office Uasin Gishu District

Appendix C: Uasin Gishu District Mathematics Results Analysis

Year	Grades														
	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	Entry	M/sc	%Fail
1993	12	8	12	15	10	24	21	12	26	36	45	32	253	5.413	44.7
1994	0	1	3	5	14	14	10	24	31	65	68	28	263	4.724	61.2
1996	21	6	17	17	19	31	21	23	13	39	53	64	328	4.817	47.6
1997	17	15	15	10	16	28	19	17	22	37	83	72	351	4.470	54.7

% failed = 9.6%, % that obtained grade E = 0.9 %

Source: DEO'S office Uasin Gishu District