Research Article **AJERR 2018,3:36**

American Journal of Educational Research and Reviews
(ISSN:2474-9265)

Perspective of Teachers on the Influence of Textbook Ratio on Quality Academic Achievement among Girls in Secondary Education in Kisumu County

Josephine Adhiambo Agunda, Henry Onderi, Jack Ajowi
Jaramogi Oginga Odinga University Of Science And Technology

ABSTRACT

A number of studies both quantitative and qualitative have attempted to find out causes of challenges of low achievement in mathematics among girls. There was therefore need to conduct a study to establish the influence of textbook ratio as an independent variable on academic achievement in mathematics among girls at form four level in secondary schools in Kisumu County. Kenya Certificate of Secondary Education examination results of girls who sat for the examinations between 2010 and 2014 constituted the dependent variable. The objective of the study was to establish the influence of textbook ratio on girls' academic achievement in mathematics at secondary level. Correlation research design was applied to examine the degree of influence between the independent and dependent variable using statistical data. The study was conducted in Kisumu County Kenya. The target population of the study consisted of 142 public secondary schools which presented female candidates for KCSE between 2010 and 2014, 142 Principals, 142 Heads of mathematics department and 390 mathematics teachers who taught the girls under study. Stratified random sampling was applied whereby schools were categorized as girls' secondary schools and mixed secondary schools. Purposive sampling was done to select all the 18 girls' secondary schools in Kisumu County while random Sampling was used to select 38 out of 124 mixed secondary schools in Kisumu County. The sample constituted 39% of the study population. Data was collected using questionnaires, interviews and document analysis guide. Instruments of data collection were validated by the researcher's supervisors and reliability of the instrument was established through test retest method by carrying out a pilot study in 5 schools which were not part of the study sample. Quantitative data was analyzed using descriptive statistics in form of frequency counts, percentages, means, Pearson's Product Moment Correlation and regression analysis. Qualitative data from interview schedule was analyzed by using thematic analysis. Statistical Package for Social Sciences (SPSS) version 22 was applied to assist in analyzing data. The findings of the study concluded that there was a negative relationship between textbook ratio and academic achievement in mathematics. The study recommended that only mathematics textbooks approved by the Ministry of Education should be availed for use and a textbook ratio of 1:1 should be strictly adhered to.

Keywords:
Textbook ratio, Quality Academic Achievement, Public Secondary Schools, Secondary School Education

***Correspondence to Author:**
Josephine Adhiambo Agunda
Jaramogi Oginga Odinga University Of Science And Technology

How to cite this article:
Josephine Adhiambo Agunda, Henry Onderi, Jack Ajowi. Perspective of Teachers on the Influence of Textbook Ratio on Quality Academic Achievement among Girls in Secondary Education in Kisumu County. American Journal of Educational Research and Reviews, 2018,3:36.

eSciPub LLC, Houston, TX USA.
Website: http://escipub.com/

INTRODUCTION

Sex differences in mathematics performances and ability remain a concern as scientists seek to address the under representation of women at the highest levels of the mathematics, the physical sciences and engineering (Asante, at el 2010). Mathematics, as a tool for understanding and application of science and technology plays an important role of a precursor and harbinger to the much needed technological and of course national development which has become an imperative in the developing nations of the world. Education is considered as a first step for every human activity and the development of any country relies largely on the quality of education. It plays a vital role in the development of human capital and is linked with individual's well-being and opportunity for better living (UNESCO 2014).

As a result, educators, researchers, NGO's, governments have long been interested in investigating variables contributing effectively for quality of performance of girls since gender differences in academic achievement have been among the contemporary issues in the current academic debate all over the world (Rotich et al 2014). Women's education plays a vital role in their economic, socio-cultural and political empowerment. UNESCO (2012) findings stated that girls' secondary education is a tool for poverty alleviation and sustainable development. The finding expressed that women who have undertaken secondary education results in social benefits to the whole society like increase in civic and political participation, lowered levels of sexual harassment and reduced labour trafficking of young women. The gender differences in mathematics and science achievement have implications for girls' future careers and have been a source of concern for educators everywhere. During the past decade, there has been concerted effort to find out why there is a shortage of women in the science, math, engineering and technical, fields (Hanushek et al 2008). A report by the information office of the state council for science in China confirmed that the government was pursuing an active policy to ensure training for women scientists and technicians to improve their living and working conditions and to promote their involvement in research (Kearney, 2006).

China therefore joins all other countries which are striving to encourage pedagogical innovation to ensure that female students are offered the learning options which will equip them to excel in science subjects. The US department of education has found out that girls who have a strong self-concept regarding their abilities in math or science are more likely to choose and perform well in elective math and science courses and to select math and science related college majors and careers.

The study was to find out the influence of textbook ratio on academic achievement among girls in secondary education in Kisumu County. The result from this study may provide in depth understanding as to why girls perform low in mathematics and could be a basis for other studies.

LITERATURE REVIEW

The study reviewed literature from other researchers across the world on textbook ratio and its influence on academic achievement among girls. Studies carried out by Steel (2003) in United States revealed that textbooks ratio provision has a large impact on test scores. Text books increase scores for students with high initial academic achievement and increased the probability that the students who had made it to the selective final year of primary school would go on to secondary school. Textbooks are part of life in the United States classrooms today.

With the move toward creating stronger curriculum standards many teachers and school systems rely on textbooks to ensure that curriculum content is covered. While textbooks have their place, teachers are to ensure that students are well equipped with the learning resource and need to use them wisely to ensure high academic achievement (Richard, 2008).

This was confirmed by Hudson and McMahon (2009) in USA that in the majority of the Nation's approximately 100,000 public and private k-12 schools, textbooks are the primary curriculum material. Eighty to ninety percent of grades 4-12 Math and Science classrooms rely on textbooks for success. (Hudson, & McMahon, 2009).

Research carried out in Australia confirmed that students with learning disabilities, emotional disturbances, or speech, sensory or other health impairments are among the most likely to use text books often. According to Levine (2004), if the achievement of students with disabilities is to be assessed by the same instruments that chart the progress of general education students, these instruments need to be accessible and flexible enough to accurately chart these students' skills, concomitantly, the curriculum resources like text books that these students are provided with to acquire these skills also need to be accessible and appropriate.

In preceding decades, donors have played a major role in funding textbooks at primary and secondary levels of education based on the data for 27 sub-Saharan Africa countries (World Bank 2009). UNESCO (2011) estimates the median share of aid in total government and donor spending on education for the period 2004 – 2010 at about 22 percent. Given donors 'extensive support for textbooks over decades and the poor progress in establishing sustainable and predictable national funding, it is likely that aid of the median country's textbook budget. DfID Department for International Development (2010) addressed the shortage of adequate and predictable financing as a key constraint on the availability of textbooks in sub-Saharan African and stressed that financing must be predictable to enable publishers, government agencies involved in textbook provision and school managers to ensure that the textbooks needed are available in the classroom.

Textbooks provide structure and order in the teaching and learning process and are considered useful and effective tools or instruments whose purpose is to facilitate the work of a teacher on a daily basis (SMMASSE 2011). Textbooks also provide security and confidence to inexperienced teachers and raises academic standards and efficiency of a school system (Triyoga (2010). However, Glennerster et al (2011) observe that an average child does not benefit from text books, a factor echoed by Triyoga (2010) that there is no ideal textbook for every teacher, every group of learners and ideal for every teaching situation hence need to use them carefully alongside other aids or learning materials. Text books may have limitations as inauthenticity, distortion of content lack reflection on students' needs and may deskill teachers (Triyoga 2010).

Study findings by Onderi and Rono (2014) in Kenya explained that small and medium sized secondary schools have unfavorable teaching and learning resources which raised serious concerns regarding their effectiveness in the teaching and learning process, a factor which has been linked to poor syllabus coverage. The authors alleged that lack of textbooks affect the rate and amount of assessment teachers can give to students and that slows down the teaching and learning process which in effect impacts negatively on syllabus coverage leading to poor performance in examination.

Information obtained on availability of teaching/learning materials for mathematics in secondary schools. In research done by Mbugua, Muthaa and Nkoke (2012) in Baringo County in Kenya indicated that textbooks are leading with 94.1% followed by mathematical models taking 6.2%. According to this research study, textbooks are a major input for performance in mathematics at secondary school level. Phylias and Kennedy (2010) in studies carried out on teaching and learning resources and academic achievement in mathematics in secondary schools in Bondo District in Kenya established that textbooks to student's ratio accounted for 41.3% of academic achievement depicting a positive relationship

between textbook ratio and academic achievement in mathematics.

This study focused on the influence of text book ratio on academic achievement among girls at form four levels which has not been emphasized by other researchers.

RESEARCH METHODOLOGY

The researcher adopted a Correlation research design which was applied to explore the extent of variance between two variables. (Creswell 2008). The design represents a general approach to research that focuses on assessing the co-variation among naturally occurring variables. The target population consisted of 142 Public secondary schools which presented female candidates for KCSE examination between 2010 and 2014 in Kisumu County, 142 Principals, 142 Heads of mathematics departments and 390 mathematics teachers. Out of this population 38 mixed schools, 56 Principals, 56 Heads of mathematics departments and 194 teachers of mathematics who taught between 2010 and 2014 were sampled for the study using stratified sampling technique. Systematic sampling was applied within the stratum for mixed public secondary schools to select 38 schools and random sampling technique was applied to select 8 schools from each sub-county in Kisumu County. Purposive sampling technique was used to select 18 girls' schools, KCSE examination results of form four female students who sat for the examinations between 2010 and 2014 and the five years under study.

Questionnaires, interview schedules and document analysis guides were used for data collection in the study. Questionnaires were self-administered to enable respondents seek clarification on issues not clear. Interviews were conducted to obtain information from heads of mathematics department to seek individual interpretation and responses (Mellenberg ,2008). Document analysis guide was meant to obtain records on girls' mean grades between 2010 and 2014 and the records of textbook ratio in the schools studied. Face and Content validity was used to estimate the degree to which the purpose of the test is clear to the respondents and the transparency of the entire test as in Fraenkel & Wallen (2014). Test retest method was applied to test the stability and reliability of the instruments applied in data collection.

Both quantitative and qualitative methods for data analysis were employed. Quantitative data was analyzed by use of descriptive and inferential statistics with aid of Statistical Package for Social Sciences version 22. Descriptive statistics was used to summarize data in tables, frequencies and percentages. Thematic analysis was applied in analyzing qualitative data where data was transcribed while retaining the original verbatim quotes of the participants (Hay, 2009).

FINDINGS, INTERPRETATIONS AND DISCUSSION.

Results from questionnaires and interviews on opinions of Teachers of mathematics, Heads of mathematics department and Principals of schools under study was interpreted as shown in table 1.

Table 1: Number of Mathematics textbooks for reference

Number of Mathematics textbook for reference	Teachers of mathematics		HOD Mathematics	
	Frequency	Percent	Frequency	Percent
1	0	0.0	0	0.0
2	12	6.7	5	11.1
3	44	24.4	8	17.8
4 and above	124	68.9	32	71.1
Total	**180**	**100.0**	**45**	**100.0**

Source: Field data (2017)

The information depicted in table 1 on number of mathematics textbooks for reference was further illustrated in figure 1.

Figure 1 illustrates the information in **table 1.**

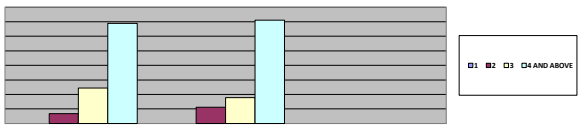

Figure 1: Number of Mathematics Textbooks used for reference by Teachers.

Source: Field Data (2017)

The study findings in Table 1, graphically represented in figure 3 shows that 6.7% of the teachers and 11.1% of the HOD Mathematics pointed that they had two types of Mathematics text books for reference, 24.4% of teachers and 17.8% of HOD Mathematics said they had three types of Mathematics textbook for reference and 68.9% of teachers and 71.1% of the HOD of Mathematics asserted that they had four and above types of Mathematics textbooks for reference in the schools within Kisumu County. The research findings from the interviews administered to heads of mathematics department in the county indicated that the secondary schools in Kisumu County had sufficient Mathematic textbooks for reference, and this should enhance the performance of the students in the subject.

Table 2: Textbook to student ratio

Descriptive Statistics

	N	M	SD
textbook-student ratio in 2010	180	2.89	.364
textbook-student ratio in 2011	180	2.86	.406
textbook-student ratio in 2012	180	2.82	.429
textbook-student ratio in 2013	180	2.81	.433
textbook-student ratio in 2014	180	2.79	.496
Valid N (list wise)	180		

Key: 1.0-1.4 = 1:1; 1.5-2.4=1:2; 2.5-3.0=1:3 and above; M=mean; SD=standard deviation

Source: Field data (2017)

Table 2 shows that the majority of the secondary schools in Kisumu County have the distribution of textbook to students in Mathematics in Form Four class at the ratio of 1:3 and above. In other word, the textbook distribution was not adequate for the teaching of Mathematics in Form Four classes in the sampled schools. Less than half of the sampled population interviewed responded that parents made efforts to supplement for the textbooks to reduce the high ratio. Despite these responses, the performance of mathematics was still below average.

Response from the interviews with the heads of mathematics departments revealed that revision textbooks with shallow content were preferably used by students yet majority were not approved by the Ministry of Education.

"Most mathematics textbooks used are guidebooks which do not possess balanced knowledge hence students prefer them for cramming the solutions." (Head of mathematics department 3).

It means that the emphasis on textbooks ratio to improve performance should be restricted to the

textbooks approved by the Ministry of Education and distributed by the school. The school should not rely on the supplement of textbooks by parents for they may not be the relevant ones as required by the standards. Parents who wish to supplement mathematics textbooks should be restricted to only purchase the textbooks recommended and approved by the Ministry of Education.

The emphasis however should be on the school to meet sufficient textbook ratio of 1:1 to enhance performance in mathematics.

Table 3: Correlation on Textbooks Ratio and Academic performance in Mathematics

Correlations

		Textbook Ratio	Academic Performance
Textbook Ratio	Pearson Correlation	1	-.805**
	Sig. (2-tailed)		.000
	N	180	180
Academic Performance	Pearson Correlation	-.805**	1
	Sig. (2-tailed)	.000	
	N	180	180

**. Correlation is significant at the 0.01 level (2-tailed).

The results of correlation analysis revealed a strong negative (r = -.805; p value < 0.05) relationship between textbook ratio and academic performance, as indicated in the SPSS output in Table 3. Hence from these findings it was reasonable to conclude that there was a negative significant relationship between the textbook ratio and academic performance in mathematics among girls in Kisumu County. From this result it implies that if the textbook ratio is reduced, students are able to have access to the learning materials and they can read and revise on their own effectively, and therefore can result to better academic performance in mathematics.

On the other hand, if the textbook ratio is bigger, the students will lack adequate access to the learning materials and therefore will not realize good academic performance in mathematics. This is in agreement with research findings from Nyambura (2014) in studies done in Embu West District that learning resources and facilities as textbooks affect learning of mathematics. Therefore, the study will advise the management of the schools to ensure that they provide adequate textbooks for the students in order to gain better academic performance in mathematics. The coefficient of determination was calculated as, $r^2 = 0.684$, indicating that the two variables share about 68.4% of their variance.

Regression analysis was done to establish the level of significance between the variables. The finding is shown in the Table 4.

Table 4 Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.805[a]	.648	.647	.35267	1.795

a. Predictors: (Constant), Textbook Ratio b. Dependent Variable: Academic Performance

The model summary shows that r square is .648, this indicates that 64.8% of the academic performance is attributed by the textbook ratio.

Table 5 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.844	1	40.844	328.398	.000[b]
	Residual	22.139	178	.124		
	Total	62.983	179			

a. Dependent Variable: Academic Performance
b. Predictors: (Constant), Textbook Ratio

The ANOVA table 5 shows that the p value of 0.000 is less than .05; therefore, textbook ratio is significant to the academic performance.

Table 6 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.692	.194		24.246	.000
	Textbook Ratio	-1.226	.068	-.805	-18.122	.000

a. Dependent Variable: Academic Performance

Table 6 of coefficient shows that text book ratio is significant to academic performance. Further, the regression model for the relationship between these independent variable and dependent variable is shown in the equation below:

In this model: $Y = 4.692 - 1.226x_1 + e$ equation 3

Where;

Y is the Academic performance

x_1 is Textbook ratio

e is the precision error (0.05)

Despite the fact that the ratio of textbooks to students improved to a smaller figure between 2010 and 2014 as registered in a large percentage (90%) of schools studied, the performance in mathematics didn't measure to the expectation of above mean grade of C+ hence a negative relationship .Some textbooks were indicated to have been not relevant or simplified to the level of the students and others were revision books which lacked detailed concepts to enable students understand when studying on their own.

CONCLUSION

The usefulness of textbooks to girls' achievement in mathematics is important. There was a negative significant relationship between the textbook ratio and academic performance in mathematics implying that if textbook ratio is reduced, students can do assignments or extra work on their own resulting to better performance. There is also need by the Ministry of Education to ensure that only relevant mathematics text books are availed for use and reference in secondary schools in Kenya.

REFERENCES

1. Asante, K. O (2010) Sex differences (1) Mathematics performance among Senior High Students in Ghana *Gender and behavior 8(2). 3279-3289*
2. Creswell, J. (2008) *Educational Research*: *Planning, Conducting and Evaluating Quantitative and Qualitative Research.* New Jersey: Pearson: Merril Prentice Hall
3. Department for International Development (2010) Advanced Mathematics and Science Course taking in the Spring High School Senior Classes NCEC.
4. Washington D.C: National Centre for Education Statistics Institute of Education Sciences, U.S. Department of Education Association.
5. Fraenkel, R. and Wallen, E. (2014*). How to design and evaluate Research in Education* (8th Edition). Mc Graw- Hill. Higher Education.
6. Glennester, R.Kremmer, M. Mbithi, J. and Takarsha,P (2011) Access and quality in the Kenyan Educational System: A review of the progress challenges And potential solutions http//www.poverty action lab. Org/publication.(Accessed on 18/12/2013).
7. Hay, I. (2005*).* *Qualitative Research Methods in Human Geography*. (2nd Edition). Oxford: Oxford University Press.
8. Hudson, S. McMahon, K.C and Overstreet, C. (2009). The 2000 National Survey of Science and Mathematics Education: Campedium of Tables Authors.
9. Kearney, M (1996). *Women and University Curriculum. Towards equality, democracy and peace.* United Kingdom. Jessica Kingley Publishers Ltd.
10. Levine, P. and Wagner, M. (2004*).* *Secondary School experiences in learning from text in special Education classrooms.* National longitudinal transition study, SRI, Menlo Park, C.A.
11. Mbugua, Z. (2012) Factors contributing to students' performance in mathematics at Kenya Certificate f Secondary Education. A case of Baringo County, Kenya. Am. J. Contempt. Res 2(6) 87-91.
12. Mellenberg, J. (2008). *Research Methods in Education*. London: Cromhelm. Onderi,H;Ronoh, K. and Awino, J. (2014).Factors contributing to poor Academic performance in KCSE in Public Secondary Schools in Kericho sub-County, Kericho County, Kenya.
13. Philias, O., & Kennedy, O. (2010) Teaching / Learning Resources and Academic Performance in Mathematics in Secondary school in Bondo of Kenya
14. Richard, T. and Joe, A. (2008*). Content Area Reading*, North Edition U.S published.
15. Rotich, S., Rono, K., & Mutisya, S. (2014). University Education of the Maasai Girls' in
16. Kenya at crossroad: A view point of the Role of Local Leaders and Socio-cultural factors. Int. J.Soc.Sci.Human.Invention 1(1): 51-61
17. Steel, C. and J, Aronson. (2003). Stereotype *Threat and the Test Performance of*
18. *Academically successful African Americans.* Washington, D.C. The booking Institute.
19. SMASSE Project Report (2007). Report on the Survey of Impact of the SMASSE INSET in Kenya. SMASSE, Nairobi.
20. Triyoga, A. (2010). Some hindrances in using ready – made textbooks. Post graduate program. English Education Department. Ahmed Dahlan University, Blogspot. http//arilia.blogspot.co.uk/2010/06. (Accessed on 17/12/2013).
21. UNESCO INSTITUTE FOR STATISTICS (UIS) (2011). School and teaching resources in sub-Saharan Africa. An analysis of the 2011 UIS regional data collection on education UIS information Bulletin No. 9. UNESCO http//www.UIS. UNESCO.org/education/documents//regional education Africa 2012 (Accessed on 18/12/2013)
22. UNESCO (2012) UNESCO Global Partnership for Girls' and women's' Education: Ethiopia.