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# Influence of Instructional Resources Provision and Performance in Mathematics Subject in Public Girls Secondary Schools Baringo Central Sub-County

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**Keywords:**

*School Facilities,  
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Baringo.*

This paper looks at the contribution of instructional resources towards the performance of girls in Kenya Certificate of Secondary Examination mathematics in girls' secondary schools in Baringo Central. Based on Hanushek, education production function theory, the instructional resources were considered critical inputs for ensuring the output (examinations performance in mathematics by girls' students) is attained. The study targeted mathematics Heads of Department, mathematics teachers and girls enrolled in 6 girls' secondary schools in Baringo Central Sub County, Kenya. A sample of 6 HODs, 18 mathematics teachers and 166 girls were selected to participate in the study. The research found out that all respondents said that adequate provision of infrastructural and educational resources did have a significant effect ( $p < 0.05$ ) on girls' performance in mathematics in the six public secondary schools. Schools that had inadequate learning resources performed poorly compared to those that had adequate instructional materials. The paper recommends that there is a need for the government of Kenya to equip all schools with necessary supportive infrastructure (electricity, internet and computers) to facilitate instruction in the current digital age. In addition, teachers need to improve their knowledge and skills in using information technological resources.

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## INTRODUCTION

Mathematics is among the significant subjects in the school syllabus throughout the world and is a subject that is directly associated with many subjects, specifically the Sciences (Sa'ad, Adamu, & Sadiq, 2014). Mathematics is also a subject that is studied both in primary and in high school as a compulsory subject. Actually, Mathematics subject is imperative for the attainment of educational qualification at academic institutions and organizes the scholars for the prospective years as well regardless of the way of life they select to participate in. Unfortunately, at primary, secondary and tertiary levels of education, learners' performance in this essential subject for many years has not been promising in Ghana and especially for girls (Enu, Agyman & Nkum, 2015). In South Africa, Mapaire (2016) reported that learners' performance in mathematics in public schools was poor. In Kenya, the Mathematics subject is used as an elementary entry necessity in most valued courses like medicine, engineering and architecture amongst other degree programs (Apondi, 2015). Apondi further argues that there have been undesirable grades in Mathematics in the National Examination regardless of the vital role that the subject acts in the society. In Tanzania, every learner studying both primary and secondary education take Mathematics as a compulsory subject. Despite being the mandatory unit, girls' performance in the subject in Tanzania has been dismal for a long time in Certificate of Secondary Education Examination (CSEE) (Mlozi, Kaguo & Nyamba, 2013). The poor types of textbooks,

unsuitable methods of teaching, as well as negative attitudes in regard to Mathematics have been perceived as possible causes for poor results in Rift Valley province, Kenya (Githua, 2013).

Researchers have proved that learners who obtain good grades in their examinations at KCSE level, their success is contributed by the obtainability of and quality instructional resources like textbooks, equipped libraries, newspapers cuttings, use of teaching aids such as lesson handouts, and teacher experience and qualification (Githua & Mbugua, 2004). In Baringo County, Mbugua et al. (2012) in their research found out that a few staff, inadequate instructional resources, lack of motivation, negative attitudes of both instructors and students and retrogressive practices contributed to poor performance but for this study, the researchers specifically investigated the factors that influence girls' performance in Mathematics in Baringo central sub-county. This research looks at whether the availability of instructional materials influences girls' performance in mathematics.

### Statement of the Problem

In Baringo Central Sub-County just as in other parts of Kenya, there are large gender gaps in performance in Mathematics. The performance of girls in the KCSE examination has been very poor for the last five years. Most students have scored below average. *Table 1* displays the achievements of girls in mathematics in high schools in Baringo Central for the last five years.

**Table 1: Baringo Central Sub-County KCSE Mathematics Performance by Girls from 2012-2016**

Schools	2012		2013		2014		2015		2016	
	Mean score	Grade	Mean score	Grade	Mean score	Grade	Mean score	Grade	Mean score	Grade
Kapropita	7.6900	B-	6.7960	C+	7.2432	C+	8.7672	B	5.2488	C-
Tabagon	5.7692	C	6.2410	C	4.5618	C-	4.6907	C-	4.0316	D+
Pemwai	4.4296	D+	5.8540	C	4.8031	C-	6.3851	C	2.8977	D
Ngetmoi	3.8333	D+	4.0909	D+	3.4302	D	4.5698	C-	1.6768	
AIC Philemon	3.4479	D	3.5161	D+	3.3800	D	3.0185	D	2.1170	D-
Sangarau	2.5417	D	2.1346	D-	1.9231	D-	2.4630	D	1.9194	D-
<b>Average</b>	<b>4.6186</b>	<b>C-</b>	<b>4.7721</b>	<b>C-</b>	<b>4.2236</b>	<b>D+</b>	<b>4.9824</b>	<b>C-</b>	<b>2.9819</b>	<b>D</b>

Source: (Baringo Central Sub County, 2016)

The performance of girls in mathematics in Baringo central sub-county is very low as shown in the table above. The majority of the girls scored low mean grades such as E, D-, D, D+, C-, and C. This prompted the researcher to investigate the influence of instructional resource provision on girls' performance in Mathematics in Baringo central. The aim of conducting this study was to explore how the provision of instructional learning resources influenced girls' performance in Baringo central girls boarding secondary schools, Kenya.

## LITERATURE REVIEW

The issue of girls' achievement in mathematics in comparison to boys has been a significant debate over time (Samuelsson & Samuelsson, 2016). Research conducted in South Africa by Alex and Mammen (2014) found out that despite boys performing well in the subject, the difference was not significant and this was attributed to the efforts made in that country to balance the gender gap. In Kenya, Githua and Mbugua (2004) observed that the country had not yet reduced the gender gap in mathematics as girls tended to perform poorly than boys as a result of instructional methods used in mathematics classrooms in the country. Adequate materials for the learning of Mathematics and equivalent contact with these materials by all learners are significant (Mutai, 2010). These comprise calculators, books, computers, and teaching aids. Listening, seeing and touching which are features of teaching materials are opening of human education in this 21<sup>st</sup> era (UNESCO, 2008). Aramide and Bolarinwe (2010) opined that instructional materials possess the ability for improving students learning. The use of instructional resources in teaching, particularly

with the innovative skills that fit modern information technology is the style in modern society (Apondi, 2015). Apondi also affirms that developments in technology have conveyed teaching resources – mainly the predictable and electronic resources to the lead as the most important tools of social development and globalisation, which affects the classroom teaching/learning state in a positive way.

The usage of instructional materials in teaching and learning assists the students to explore experimentation, generate and relate with the environment in an intensive way (Apondi, 2015). Abundant usage of teaching resources helps to offer students with a facilitating setting to learn Mathematics (Meremikwu, 2008). Esu, Enukoha and Umoren (2006) indicated that teaching resources are essential requirements in the implementation of a curriculum. They affirmed that the key goal of teaching resources in the instruction of Mathematics is to raise the success of performance in the subject as a way to prepare students for upcoming tasks as grown-ups. Sa'ad et al. (2014) in their research in Nigeria found out that fear of Mathematics, learners' poor attitude towards Mathematics, scarce teaching resources and insufficient competent teachers were a few of the reasons for meagre performance in Mathematics. Children taught Mathematics by use of intangible Mathematics symbols perform less than those who are taught Mathematics using instructional resources only (Apondi, 2015). Mutai (2010) further argued that in case of scarcity, a proper established programme needs to be made to enable all learners to make use of the library, practical rooms for Mathematics and any other skill intended to encourage learning of Mathematics. The findings

by Mutai (2010) from different high schools show various adequately furnished schools, satisfactorily ordered classes and adequate textbooks has better performance. However, in such institutions, there are instances of scholars that achieve poorly.

Lack of teaching/instructional resources affects learners’ performance (Karanja & Gikungu, 2014). They further argue that inadequate visual aids play materials and textbooks lowers learner’s self-esteem. Physical facilities and the state of the classroom are significant aspects that affect the results of students. Classrooms of small dimensions that are dim and insufficiently aired are not comfy, and smaller closed classes interfere with students’ unrestricted motion. They further assert that floors, which are poorly maintained, are health threats to students because of jiggers. The kind of furniture used by learners also affects their performance and too short or too tall chairs and tables are unfavourable for learners. Unrepaired fittings for example broken chairs may hurt learners (Karanja & Gikungu, 2014). From the above arguments, the researcher sought to find out the status of the learning resources in Baringo central sub-county and their influence on girls’ performance in Mathematics.

Otieno (2010) said that though faced with several limitations such as insufficient instructional materials in high schools because of poor planning and corrupt deals, the education system in Kenya is changing steadily. The financial support given by the government to the schools will assist in providing many of the learning /teaching resources that are required for excellent performance in Mathematics. Otieno’s research observed the consequence of learning /teaching materials on high school Mathematics performance in Bondo district but this investigation is to specifically examine the effect of instructional resources on the performance of girls in mathematics in KCSE in Baringo Central sub-county.

**Theoretical Framework**

This study was guided by the economic theory of education production function developed by Hanushek (1986). The theory is also known as the cost-quality method or input-output approach. According to Hanushek, education is considered analogous to a production process as can be seen in Figure 1 below.

**Figure 1: Education production function (Hanushek, 1986)**



Educational output = f (educational input)

Figure 1 indicates the flow of how educational inputs are transformed into educational outputs. The transformation involves teaching and learning processes (education process) that usually takes place in secondary schools. The mathematical form of the process is commonly known as an educational production function. It shows the relationship between alternative combinations of educational inputs (instructional resource provision) and educational outputs. From the model, the educational output is typically measured by students’ academic achievement.

**METHODOLOGY**

The study utilised a mixed research approach in which both quantitative and qualitative study methodologies were utilised. The research utilised a descriptive survey research design where information was collected from a random sample drawn from the target population. The research was done in Baringo Central Sub-County. The accessible population for the study consisted of Mathematics teachers, Mathematics HODs and girls in form four in secondary school in Baringo Central Sub-County. The sample size for the study is given in Table 1.

**Table 2: Target population and Sample size**

Schools	HODs	No of Teachers	Form 4 girls Target	Form 4 Sample
Kapropita girls	1	5	205	46
Ngetmoi girls	1	2	100	23
Sangarau girls	1	2	68	15
Tabagon girls	1	3	96	22
Pemwai girls	1	4	180	40
AIC Philemon	1	2	90	20
<b>Total</b>	<b>6</b>	<b>18</b>	<b>739</b>	<b>166</b>

Two questionnaires were used in the study; one was administered to students and the other to Mathematics teachers and an interview schedule for Mathematics HODs. The research instruments were tested for validity and reliability. Data was analysed using qualitative and quantitative methods. Quantitative analysis involved frequencies, percentages, means, standard deviations and correlations. Qualitative was done using the content analysis method.

## RESULTS AND DISCUSSION

The study was conducted in exclusive girls' secondary schools and therefore the respondents were of the same gender. However, teachers were asked to indicate their gender profile the majority 14 (82.4%) of maths teachers were male with only 3 (17.6%) being female. The result, therefore, shows that majority of Mathematics teachers are male and this could be a factor influencing girls'

performance in the subject, as they do not have adequate female role model teachers in the subject. This finding is similar to Mbugua et al. (2012) research in Baringo that showed that 72.2% of Mathematics teachers were male. The trend from 2012 to 2017 is increasing with male teachers teaching the subject increasing significantly. This puts girls' students in disadvantaged positions in having female Mathematics teachers who could be their mentors.

The objective of this study sought to determine how the status of instructional resources in Mathematics teaching influenced KCSE performance in the subject. Teachers and students were asked to state the frequency to which instructional learning materials were utilised in teaching and learning of mathematics in class. Their responses are given in *Table 3*. The following scale was used: Never (1), Rarely (2), Sometimes (3), Often (4) and Always (5).

**Table 3: Teachers and Students Responses on Use of Instructional Materials in Mathematics Teaching and Learning**

Instructional resources use	Mathematics teachers		Girls students	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Use of teaching aids	3.1765	1.13111	1.9819	1.25274
Use of blackboard geometrical instruments on appropriate topics	4.3529	.93148	3.5542	1.23831
Referring to a variety of students' textbooks	3.5882	1.12132	4.2711	1.08656
Incorporation of charts and models in teaching	2.9412	.82694	2.4157	1.34462
Teaching using computers and projectors	1.7647	.75245	1.8855	1.25728
Referring to four-figure mathematical table	3.6471	1.49755	3.8193	1.25186
Use of calculators in solving problems in mathematics	3.4118	1.06412	4.4699	.93209
<b>Composite statistics</b>	<b>3.2689</b>	<b>1.04642</b>	<b>3.1997</b>	<b>1.19478</b>

The results from *Table 3* shows that with regard to the use of teaching aids in mathematics lessons, teachers said that they are sometimes used ( $M = 3.17$ ,  $SD = 1.13$ ) while students said that they were

rarely used ( $M = 1.98$ ,  $SD = 1.25$ ). The result, therefore, shows that teaching aids are not regularly used in mathematics teaching in Baringo Central Sub County Girls schools. Secondly, when asked

on whether the geometrical sets for students and ones for blackboard were used, teachers' ratings were often ( $M = 4.35$ ,  $SD = 0.93$ ) same as students ( $M = 3.55$ ,  $SD = 1.23$ ). This confirms that geometrical sets are regularly used during mathematics lessons. Mbugua et al. (2012) also found out that 28.4% of schools used this resource in teaching and learning of mathematics in Baringo County. Thirdly, teachers ( $M = 3.58$ ,  $SD = 1.12$ ) and students ( $M = 4.27$ ,  $SD = 1.08$ ) agreed that students' textbooks are often used during mathematics lessons. It is seen that this is an instructional material that is commonly used in teaching the subject in schools. One HOD No. 5 said that "revision materials and books lead to good performance." similar to this observation, Mbugua et al. (2012) found out that textbooks were used by 94.1% of schools in Baringo county to teach mathematics. This is because, without textbooks, learners cannot be able to perform well in mathematics examinations.

Further, teachers said that they sometimes incorporate models and charts in teaching while students said that they were rarely used by their mathematics teachers ( $M = 2.41$ ,  $SD = 1.3$ ). This result therefore illustrates that charts and models are not regularly used since they apply to specific units and courses Form Four mathematics. Research findings also showed that both teachers ( $M = 1.76$ ,  $SD = 0.75$ ) and form four girls ( $M = 1.88$ ,  $SD = 1.25$ ) agreed that computers and projectors are rarely used in teaching and learning

of mathematics. This implies that almost all-girls' schools in Baringo Central have no computers and projectors to aid in mathematics subject teaching. Results further reveal that both teachers ( $M = 3.64$ ,  $SD = 1.49$ ) and students ( $M = 3.81$ ,  $SD = 1.25$ ) agreed that they often use four-figure mathematical tables during mathematics lessons.

Lastly, teachers said that they sometimes ( $M = 3.41$ ,  $SD = 1.06$ ) used calculators when solving mathematical computations while students said that always ( $M = 4.46$ ,  $SD = 0.93$ ) use them in mathematics activities. The result shows that calculators are regularly used to aid students make mathematical calculations easier rather manually or through the use of the statistical tables, (four figures). Composite data shows that instructional resources usage is on average level from both students ( $M = 3.19$ ,  $SD = 1.19$ ) and teachers ( $M = 3.26$ ,  $SD = 1.04$ ) perspectives. This implies that the status of using instructional materials in mathematics teaching and learning process was at average in the majority of public girls' schools in Baringo Central Sub County. Buyatsi (2013) who observed this found out that poor performance of students in the subject was influenced by a lack of adequate teaching and learning materials.

The respondents were asked whether utilisation of instructional resources during teaching and learning of mathematics influences girls' performance in KCSE. *Table 4* illustrates the teachers' responses.

**Table 4: Teachers Perceptions on the Influence of Instructional Resources on Girls Performance in Mathematics**

Perceptions	Frequency	Percent
The performance is directly proportional to the instructional materials used	5	29.4
Girls are very practical and tend to remember what they have done using instructional materials	3	17.6
Materials enhance accuracy and also makes calculations neat	2	11.8
Enables students to recall what they have been taught	2	11.8
Non –response	2	11.8
Occasionally	1	5.9
Always	1	5.9
To a great extent because the learners greatly improve	1	5.9
<b>Total</b>	<b>17</b>	<b>100.0</b>

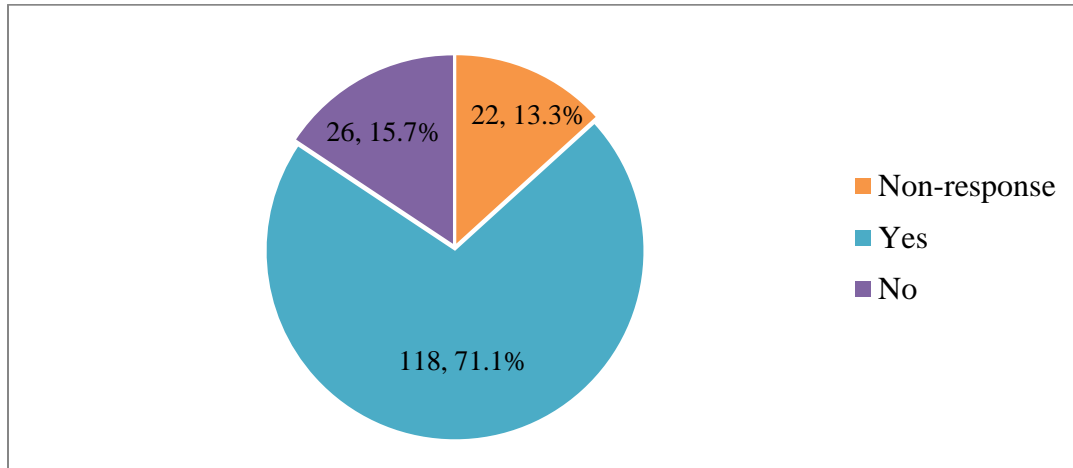
According to *Table 4*, 5 (29.4%) of teachers said that the performance of girls is directly proportional to the instructional materials used and 3 (17.6%)

said that when instructional materials are used, girls are very practical and tend to remember what they have done using instructional materials. Others

mentioned that when resources are used, it enhances accuracy and makes calculations easy. Based on the responses from teachers, instructional to give their views as presented in Figure 2.

materials used is key in determining their KCSE performance. The form four girls were also asked

**Figure 2: Students Perceptions of the Impact of Instructional Resources on Mathematics KCSE performance**



According to the majority of girls students 118 (71.1%), mathematics teachers use of instructional learning materials would influence their performance in KCSE examinations.

Further, the study determined the extent to which instructional materials use determined the performance of schools in KCSE mathematics paper. The research findings are illustrated in *Tables 5 and 6*.

**Table 5: Student’s View on the Correlation between Instructional Resources Use and Mathematics KCSE Performance**

		KCSE	Instructional materials
KCSE	Pearson Correlation	1	.178*
	Sig. (2-tailed)		.022
	N	166	166
Instructional materials	Pearson Correlation	.178*	1
	Sig. (2-tailed)	.022	
	N	166	166

*Note. \*Correlation is significant at the 0.05 level (2-tailed).*

Data in *Table 5* from students shows that there exists a significant positive effect ( $r = 0.178$ ,  $p = 0.022$ ) between instructional materials use and girls’ performance in KCSE mathematics in Baringo Central Sub County. This means that increase in the use of instructional materials during

mathematics learning would improve girls’ performance in the subject significantly. Further, the researcher conducted a correlation analysis on teachers’ responses to the relationship between instructional resources use and girls’ performance in mathematics in KCSE.

**Table 6: Teachers' View on the Correlation between Instructional Resources Use and Mathematics KCSE Performance**

		KCSE mean score	Instructional materials
KCSE mean score	Pearson Correlation	1	.655*
	Sig. (2-tailed)		.004
	N	17	17
Instructional materials	Pearson Correlation	.655*	1
	Sig. (2-tailed)	.004	
	N	17	17

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

Table 5 teachers data shows that there exists a significant strong positive effect ( $r = 0.655$ ,  $p = 0.04$ ) between instructional materials use and girls' performance in KCSE mathematics in Baringo Central Sub County. This finding suggests that increased use of instructional resources by teachers during mathematics lessons would improve girls' performance in the subject in KCSE.

## CONCLUSION

The research found out that digital media like computers and mathematics teachers for classroom instruction rarely or never used projectors. It was found out that the performance of girls' secondary schools was below average in the six schools studied in Baringo Central Sub County. Instructional learning resources were sometimes used in classroom mathematics teaching. Further analysis revealed that the use of blackboard; geometrical sets, textbooks, mathematical tables and scientific calculators were often used by both teachers and girls during the teaching and learning process. However, the use of current media resources like computers and projectors were found to be rare from both mathematics teachers ( $M = 1.76$ ) and students ( $M = 1.88$ ) responses. This meant that the instructional methods used by mathematics teachers were not current (new media resources) and teachers still used the old media resources in the instructional process. Inferential analysis done showed that there existed a significant positive effect ( $p < 0.05$ ) of status and usage of instructional resources on girls' performance in mathematics in KCSE examinations. This meant that increased use of instructional media could result in an improvement in girls' performance in mathematics subjects during KCSE examinations. To address the status

of instructional resources, there is a need for the government of Kenya to equip all schools with necessary supportive infrastructure (electricity, internet and computers) to facilitate instruction in the current digital age. To teachers, school administration needs to sponsor them for ICT training so that they can gain skills and knowledge on how to operate mathematical ICT models and resources during the teaching and learning process.

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## REFERENCES

- Alex, J. K., & Mammen, K. J. (2014). Gender differences amongst South African senior secondary school learners' geometric thinking levels. *Mediterranean Journal of Social Sciences*, 5(20), 1908.
- Apondi, J. A. (2015). *Impact of instructional materials on academic achievement in mathematics in public primary schools in Siaya County, Kenya*. Thesis. Nairobi, Kenya: University of Nairobi.
- Aramide, K. A., & Bolarinwa, O. M. (2010). *Availability and use of audiovisual and electronic resources by Distance Learning Students in Nigerian Universities: A case study of National Open University of Nigeria (NOUN)*. Ibadan: Study Center Nigeria.



- Buyatsi, M. (2013). Factors affecting mathematics academic counselling services: the secondary school counsellors' perspective. *International Journal of Education and Research*, 12 (1), 1-8.
- Enu, J. A. O. K., Agyman, O. K., & Nkum, D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development*, 3(3), 68-74.
- Esu, A. E. O., Enuokoha, O. I., & Umoren, G. U. (2016). *Curriculum development in Nigeria for colleges and universities*. Calabar: BUT- BASS Nig Ent.
- Gikungu, J. M., & Karanja, B. W. (2014). An Investigation of Factors Affecting Performance of Mathematics Activities in ECDE Centre among Children Aged 3-6 Years in Murang'a East District; Kenya. *Mediterranean Journal of Social Sciences*, 5(5), 36-42.
- Githua, B. N. (2013). Secondary school students' perceptions of mathematics formative evaluation and the perceptions' relationship to their motivation to learn the subject by gender in Nairobi and Rift Valley Provinces, Kenya. *Asian journal of social sciences and humanities*, 2(1), 174-183.
- Githua, B. N., & Mbugua, Z. K. (2004). Gender differences in the preferences for instructional methods in secondary school mathematics classrooms in Kenya. *Journal of Education and Human Resources*, 2(2), 63-74.
- Hanushek, E. A. (1986). The economics of schooling: Production and efficiency in public schools. *Journal of economic literature*, 24(3), 1141-1177.
- Mapaire, L. (2016). Learners' Performance in Mathematics: A Case Study of Public High Schools, South Africa. *European Journal of STEM Education*, 1(3), 45.
- Mbugua, Z. K., Kibet, K., Muthaa, G. M., & Nkonke, G. R. (2012). Factors contributing to students' performance in Mathematics at Kenya Certificate of Secondary Education in Kenya: A Case of Baringo County, Kenya. *American International Journal of contemporary research*, 2(6), 87-91
- Meremikwu, A. N. (2008). *Instructional aids, gender and primary school pupils' achievement and retention in mathematics in Cross River State, Nigeria*. PhD thesis. Calabar, Nigeria: University of Calabar.
- Mlozi, M. R. S., Kagu, F. E., & Nyamba, S. Y. (2013). Factors influencing students' academic performance in community and government built secondary schools in Tanzania: A case of Mbeya Municipality. *International Journal of Science and Technology*, 2(2), 174-186.
- Mutai, K. J. (2010). *Attitudes towards learning and performance in mathematics among students in selected secondary schools in Bureti District, Kenya*. Master's Thesis. Nairobi, Kenya: Kenyatta University.
- Otieno, K. O. (2010). Teaching/learning resources and academic performance in mathematics in secondary schools in Bondo District of Kenya. *Asian social science*, 6(12), 126.
- Sa'ad, T. U., Adamu, A., & Sadiq, A. M. (2014). The causes of poor performance in mathematics among public senior secondary school students in Azare metropolis of Bauchi State, Nigeria. *Journal of Research & Method in Education*, 4(6), 32-40.
- Samuelsson, M., & Samuelsson, J. (2016). Gender differences in boys' and girls' perception of teaching and learning mathematics. *Open Review of Educational Research*, 3(1), 18-34.
- UNESCO. (2008). *Challenges of implementing free day secondary schools in Kenya: experiences from Districts*. Nairobi, KE: UNESCO.