Influence of Mathematics Teachers' Teaching and Learning Resources on Students' Academic Performance in Mathematics in Kenya: A Case Study of Public Secondary Schools in Suba South Sub County

Millicent Atieno Okeyo[1], Dr. Maurice A. Ndolo[2], Dr. Nuni S. Esokomi[3]

Faculty of Education, Tom Mboya University, Kenya

DOI: https://dx.doi.org/10.47772/IJRISS.2025.91200181

Received: 21 December 2025; Accepted: 28 December 2025; Published: 06 January 2026

ABSTRACT

Mathematics is a core subject in the primary and secondary School curriculum and is essential in many careers. Mathematics sharpens human mind, develops their logical thinking; enhance their reasoning ability and build spatial power. However, the Kenya Certificate of Secondary Education examination (KCSE) mean score for Mathematics in Suba South Sub-County had been below average with 3.034 in 2019, 3.52 in 2020, 4.25 in 2021 and 4.258 in 2022. The objective of the study was to establish the influence of teaching and learning resources on students' performance in mathematics in public secondary schools in Suba South Sub-County. The study was guided by a conceptual framework that showed influence of teaching learning resources and learners' performance in Mathematics as independent variable and dependent variable respectfully. The study was anchored on the theory of performance by Elger (2007). The findings revealed that mathematics teacher teaching and learning resources influenced students' performance in mathematics moderately with Mean Rating of 2.64. The study concluded that teaching and learning resources moderately influenced students' academic performance in mathematics. The study recommended that, the school administration should promote teaching /learning resources and actively involve the community participation in learning activities. The findings of this study will inform policy and practices in the Ministry of Education and in schools.

Key Words: Influence, Mathematics Teachers' Teaching, Learning Resources, Students' Academic Performance, Mathematics, Kenya: Public Secondary Schools, Suba South Sub County

INTRODUCTION

Konyango, Ongeta, Otieno and Orodho (2018), emphasized that adequate qualified teachers and appropriate laboratory equipment were necessary for effective teaching. They added that when teachers largely utilize the teacher-centered instructional strategies, this would not boost student performance because they use what them but not the learners' need leading to lack of learners' participation, mastery of content and hence poor performance. Konyango et al. (2018) concluded that requisite learning resources were critical in enhancing students' academic performance. Njoroge (2019) supports the findings that books in the school libraries are outdated and need to be revised to fit with the changing world of technology. If the instructional materials are mainly teacher centered resources, the learners will not benefit because the materials only suit the teachers' interest. However, Konyango's study found a gap on adequacy and utilization of the teacher centered resources, this study will establish teacher attitude towards the use of these resources and how they would influence students' performance in mathematics.

According to Okoth (2018), good and adequate physical facilities will ensure learning environment is learner friendly and make teaching and learning interesting to both the teacher and the learner. Dilapidated buildings and lack of essential buildings like laboratories, library, computer rooms, classrooms and even offices inhibit learning and this leads to poor performance by students at national examination. In this study on selected factors influencing academic performance in constituency built schools in Rachuonyo South Sub County Okoth (2018), found that physical facilities are significant when looking at performance of learners at KCSE.

His study looked at the significance of physical facilities in performance, however, this study will determine how other resources such as printed media, and models will influence learners' performance.

Synthesis of Literature on Influence of Mathematics Teachers' Teaching and Learning Resources on Students' Academic Performance in Mathematics

According to UNESCO (2008), teaching and learning materials comprise calculators, books, computers and teaching aids. However, listening, seeing and touching are features of teaching materials that are opening human education in this 21st century. These features of good teaching and learning materials that influences student performance in mathematics is also echoed by Strengthening Mathematics and Science in Secondary School Education, which provides assistance to science and mathematics education through in- service training of teachers. The project provides teaching and learning resources, and train teachers on how to improvise learning materials where necessary through Activity, Student, Experiment and Improvisations and Plan, Do, See and Improve.

According to Umuhoza (2021), most schools lacked instructional materials and there is limited use of ICT due to lack of power in schools. This would generally affect students' performance in Mathematics because students would not actively use the materials to enhance active learning of the mathematic content. Although power availability has been a challenge in some areas, some student did not use the learning materials rightly. Ephrem and Celestin (2023) found that the Rwanda government and educational partners should provide more funding so they can buy more textbooks and other learning materials. Financial support is needed for the schools to help buy the majority of the learning and teaching resources required for mathematics performance. This is similar to Mawarire and Chirume (2020) study in Harare, Zimbabwe who found that most schools in the district were operating without human and material resources to teach ordinary mathematics leading to poor performance. They further recommended that the district and parents should avail human resources and material resources for the improvement of the pass grades in mathematics. Ordinary level mathematics teacher should use resources which enable learners to be actively involved in the teaching and learning process. Ephrem, et al (2023) dwelt on printed resources as the major cause of low performance of students in Mathematics yet there are more resources such as physical, human and financial resources that influences performance in mathematics. This study will look at the extent to which these printed resources influence Mathematics performance together with other resources.

Performance in Mathematics may not only be affected by the availability of the resources but also the relevancy and quality of the materials. The use of appropriate educational materials is equally important as the use of effective methods when presenting mathematics lesson. To gain optimal results the use of these materials should not be limited to the teacher's demonstration, but rather students must use them in meaningful ways. Okwu (2022) in a study in Nigeria, found that a way to make mathematics teaching and learning successful, relevant and exciting is to employ instructional materials or teaching aids as well as delightful activities that learners like. Studying mathematics needs active engagement of the learners in the session which make students always recall and retain what they have previously learnt and therefore there is need for simple geometrical shapes such as cubes, cuboids, pyramids, cylinders and cones in the classroom.

Nduga (2019) in a study on teaching, learning resources and students' performance in Mathematics in Uganda, found that students learn more when they are doing, which implied using learning resources, students also learn more when they are seeing and listening. He found that learning resources have a positive input on students' performance in mathematics. Nduga (2019) said that in future schools to be equipped with adequate internet infrastructure, up-to-date computer hardware and software, classroom resources such as text books, instructional charts and teaching equipment. This study would focus on the influence of government provision of text books and introduction of livestream learning in public secondary schools in relation to mathematics performance.

The Secondary Education mathematics teacher handbook, by Kenya Institute of Education (Kenya Institute of Education, 2006), which is now Kenya Institute of Curriculum Development highlighted how the use of learning resources in mathematics enhance the understanding and development of skills and concepts. The use of resources also makes learning more interesting as a result students develop positive attitude towards mathematic, improving their KCSE mean grade. This is supported by the studies of Isaac (2022) in Mt Elgon,

Bungoma found that institutional materials encourage lively class discussion. They also challenge independent thinking when used individually in an assignment or in class activity. These learning and teaching materials generate more interest and create a situation where the learner would fully engage in classroom and outdoor activities. Maximum utilization of these resources provides the learner with practical experience. The same is observed by Edoho (2020) in a study titled the effect of teaching resources on students' academic performance. He asserted that resource materials needed in teaching learning process have significant positive association with students' success and interest in the subject. Edoho (2020) found that designed, developed and validated videos are recommended in teaching the least mastered competencies in mathematics. The current study would find out how mathematics teachers use the Geogebra, models and charts to help learners understand mathematical concepts.

A study carried in Athi River, Kenya by Jackson (2019) on determinants of teachers' instructional use of instructional resources in teaching revealed that lack of ICT resources and other vital resources among pre-school teacher in Athi River is a possible cause of poor performance in science and mathematics activities among pre-school pupils. The importance use of Information Communication Technology is to improve learning and performance. This is supported by Muriki (2016) in his study on the relationship between students' performance in mathematics for those taught using Geogebra and those taught without Geogebra. The researcher found that there was a clear indication that Geogebra improved students' understanding of concepts in mathematics and hence performance. The same is emphasized by Apondi (2015) that the usage of instructional resources in teaching and learning assist the students to explore experimentation, generate and relate with environment. She further concluded that children taught by use of intangible mathematics symbols perform less than those taught mathematics using instructional resources only. This confirms the Chinese saying that: "What I hear I forget, what I see I remember, What I do I understand." The previous study was carried out in Athi River and used pre-school pupils unlike this current study which was carried out in Suba South Sub County and used secondary students. Moreover, the study analyzed only the use of Geogebra as the main ICT resource whereas this study examines the use of geogebra and other resources such as internet and projectors in teaching Mathematics.

According to Sirengo (2015), his findings showed that instructional materials contribute significantly to students' achievement in mathematics. The instructional materials should be effectively and adequately provided in schools to enhance performance of students in mathematics. The adequacy of resource is also pointed out by Changwony, Pamela and Benard (2020). Tthe reviewed studies found a gap on the quality of resources, the current research would look at the quality and quantity of the resources and determine their influence on students' performance in Mathematics.

Luketero (2019) findings revealed that educational resources play a significant role in diminishing the effect of social economic factors on social development. He further said that scarce instructional resources constrain education system from responding more fully to meeting crisis in educational demand. Luketero (2019) related effect of educational resources and social economic factors on social development but not influence of educational resources on students' performance in Mathematics which determine their level of education attainment and in the long run influence social and economic development, a gap that this study would address. Study by Otieno (2021) in Homa Bay County examined the impact of teaching and learning resources on students' performance in physics in public secondary schools. Otieno (2021) found that the strain on educational resources due to increased enrolment from 100% transition policy in Kenyan schools. He further suggested that schools, particularly sub county schools that operate solely on government funding, to employ addition teachers to reduce pressure on existing resources and staff. This is an area of concern to the current study how teachers' workload influence students' performance in mathematics.

According to Okoth (2021), found that teachers who use concrete materials successfully create a rich atmosphere in which young learners may critically evaluate concepts and solve mathematical problems. The use of concrete materials encouraged the start of life-long mathematics learning among young learners. The Concrete-Representation Abstract instructional sequence of teaching allows teachers to assist pupils in making sense of numbers and the mathematical concepts they represent. He further noted that physical experience provided by these concrete materials help learners to have a better conceptualization of mathematical ideas, which serves as the foundation for Conceptual mathematics knowledge in his study in Homa Bay County, Kenya. The study by Okoth (2021) explored the use of concrete materials in teaching and learning of fraction

on primary pupils. This study would look at how educational stakeholders including teachers and administrators would be encouraged to use concrete learning materials to help learners comprehend mathematical ideas.

Conceptual framework

Conceptual framework of the study was grounded on Elger (2007) theory of performance. The theory states that an individual performance is determined by holistic interaction of six key components. The six key components were the independent variables and they were; level of identity (shared identity within a community and elevation of individual uniqueness); level of skills (actions relevant in various contexts); level of knowledge (facts, concepts and principals acquired through education); context of performance (variables in the performance situation like classroom environment); personal factors (individual personal situation such as motivation and social-emotional attributes); and fixed factors (unalterable individual characteristics like height and genetics). Elger (2007) emphasized three axioms for effective performance improvement; growth mind set (positive emotions like dedication and hard work); immersion in an enriching environment (creating quality learning environment); and engaging in reflective practices (actions that help learners pay attention and learn from experience). Elger (2007 theory of performance provided a framework for understanding performance and improvement in any setting where valued results are produced including academics. The theory was important in carrying out this study where the independent variables are the selected factors and dependent variable was students' performance in KCSE. The independent variable was mathematics teacher teaching and learning resources.

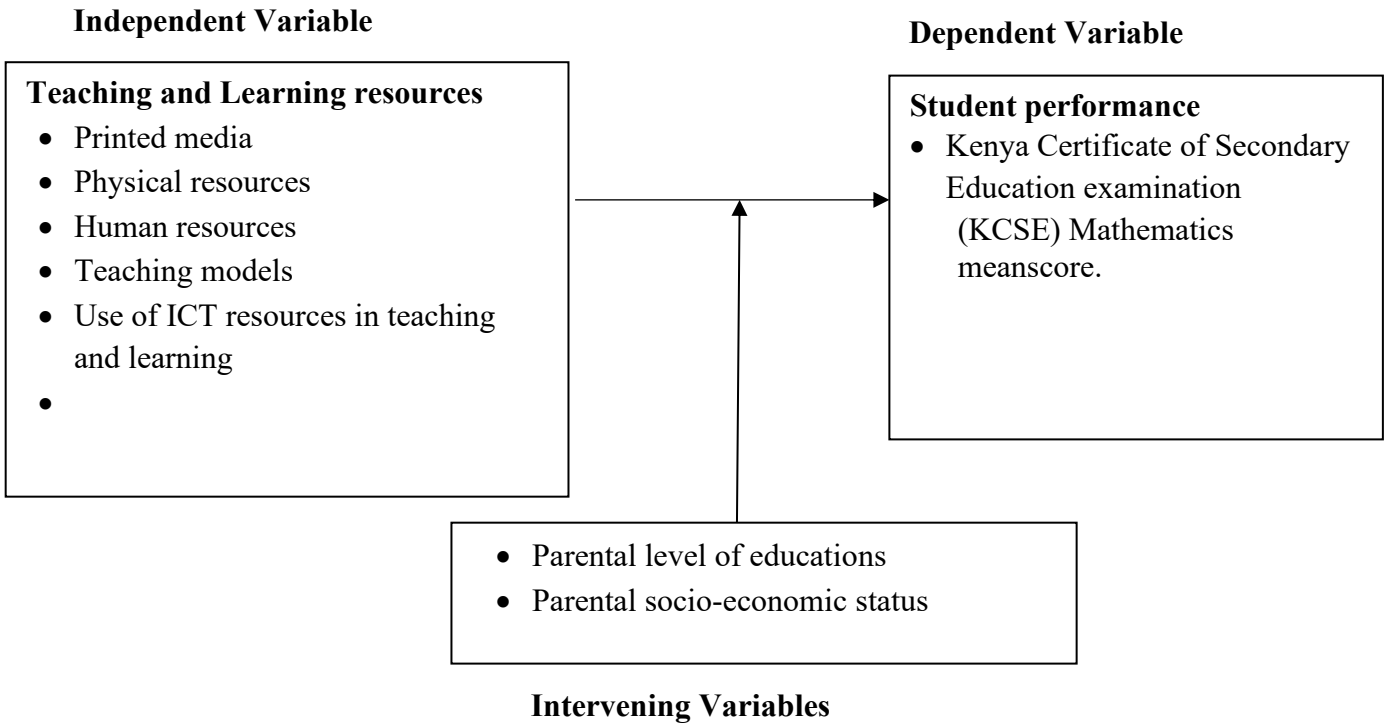

Figure 1: Conceptual Framework showing influence of Mathematics Teachers' teaching and learning resources on Students' Academic Performance in Mathematics

In the conceptual framework independent variables included teaching and Learning resources (printed media, physical resources, human resources teaching models and use of Information Communication Technology in teaching and learning) while the dependent variable would be the student KCSE mean grade. However, students' performance in mathematics might be influenced by several factors but the key factors are the teacher working environment, teaching and learning resources and teacher attitude.

A teacher with adequate teaching and learning resources encourages student's participation and involvement which would improve student memory and mastery of the content. Taylor and Robison (2019) found that availability of instructional resources such as information and communication technology has contributed to quality education and better students' performance.

RESEARCH METHODOLOGY

Descriptive survey and correlation designs were used. The target population was 38 Heads of Department, 100

mathematics teachers, 38 school principals, and 1 Sub County Quality Assurance Standard Officer totaling to 177. Simple random sampling was used to select 35 principals, 35 Heads of Department, and 79 mathematics teachers. Saturated sampling was used to select 1 Sub County Quality Assurance Standard Officer making a sample of 168 respondents. Questionnaires, interview guides and document analysis were used to collect data. Validity of the instruments was determined by experts from the department of Education Administration who examined the instruments and the recommended adjustments were done in the final instruments. Reliability of the instruments was determined by piloting in 3 schools. The reliability coefficient for Heads of Department was 0.718 and for teachers was 0.836. Quantitative data was analyzed using descriptive and inferential statistics and presented in frequency counts, percentages and means while qualitative data was transcribed and analyzed for content and categorized into themes and sub themes.

RESULTS

Respondent by Gender

The demographic characteristics of Heads of Department and mathematics teachers categorized in terms of gender and the results were summarized in Table 1.

Table 1 Respondents by Gender

Respondent category	Male		Female	
	Frequency	Percentage	Frequency	Percentage
Heads of Department	27	70.3	8	24.3
Mathematic Teachers	57	81.4	11	15.7

Source: Field Data 2025

Table 1 showed that more male respondents than female respondents participated in this study. This ensured research equity, identifying biases and preventing perpetuation of stereotypes by providing complete picture of different population in data collection. Leila and Joriah (2019) found that women participate in research after developing friendship with the researcher for a long time while male participants' friendship does not play a significant role

Table 2 Respondent by Age

Age Group	Heads of Department		Mathematics teachers	
	Frequency	Percentage	Frequency	Percentage
25-29	5	13	24	34.3
30-34	19	51.4	27	38.6
35-39	5	16.2	10	14.3
40-49	4	13.5	7	10.0
50-59	1	2.7	1	1.4

Source: Field Data 2025

From Table 2 it can be observed that most of the respondents lie in the age group 30-34 which translate to 51.4% for Heads of Department and 38.6% for mathematics teachers. This provided the detailed profile of the study participants.

Table 3 Respondent by Qualification

Qualification	Heads of Department		Mathematics teachers	
	Frequency	Percentage	Frequency	Percentage
Diploma	0	0	3	4.3
Bachelor's Degree	33	94.6	66	94.3
Master's Degree	2	5.4	0	0

Source: Field Data 2025

Table 3 shows level of qualification of the Heads of Department and Mathematics teachers who were the main respondents in this study. From the table 2(5.4%) Heads of Departments have masters, 35(94.6%) Heads of Department and 66(94.3%) Mathematics teachers are degree holders and only 3(4.3%) are diploma teachers. This showed that the teachers are qualified to teach mathematics in the schools. The high qualification of Heads of Department and Mathematics teachers indicates that the data collected from the respondents are good for this research analysis and reporting.

Table 4 Respondents Level of Experience

Years of Experience	Heads of Department		Mathematics Teachers	
	Frequency	Percentage	Frequency	Percentage
0-4	3	8.1	18	25.7
5-9	14	40.5	35	50.0
10-14	13	35.1	8	11.4
15-19	5	16.2	3	4.3
20-24	0	0	3	4.3
25+	0	0	1	1.4

Source: Field Data 2025

Table 4 shows the level of experience of Heads of Department and Mathematics teachers. Most respondents were in the year bracket of 5-9 which translated to 40.5% for Heads of Department and 50.0% for mathematics teachers. The Table indicates that the percentages decreased as the years of experience increases because the teachers approach retirement age. This is supported by Seebruck (2015) who found that students who were taught by highly effective teachers for 3 years showed a gain of 35 and 50 percent points in mathematics. Therefore, the level of experience influenced data quality and insight.

School Data

Data was collected from public secondary schools in Suba South Sub County. The summary was as shown in Table 5.

Table 5 Summary of School Data

School Population Size	Frequency	Percentage
50-100	3	7.89
101-200	5	13.16
201-300	10	26.32
301-400	8	13.16

401-500	5	13.16
501 and above	7	18.42

Source: Field Data 2025

Table 5 indicates that schools were in the population range of 201-300 implying low population size. This indicated that most schools had few mathematic teachers, employed by Teachers Service Commission leading to inconsistency teaching since most teachers were board of management employees who were temporarily engaged and exceeded any time in better payment in other schools in the country causing teacher burn-out hence low performance.

Students' performance in Mathematics in 2023-2024 in Suba South Sub County

Students' performance in Mathematics in the year 2023-2024 was analyzed and the mean per school was determined in Suba South Sub County. The results are shown in Table 6.

Table 6 School Mean Scores in KCSE Mathematics for 2023 and 2024

Mean Scores	Number of Schools	Percentage
1.00-2.44	16	42.11
2.45-3.44	10	26.32
3.45-4.44	5	13.16
4.45-5.44	3	7.89
5.45-6.44	3	7.89
6.45-7.44	1	2.63

Source: Field Data 2025

From Table 6 the KCSE school mean score in Mathematics in Suba South Sub County in 2023-2024 ranged from 1.472 to 6.820. This indicated a low performance since most schools fall in the mean score below 3.500 which is below average of 5.00. Most schools in the Sub County fall in the mean score of 1.00-2.44 translating to 42.11% and only few were in the mean score range of 6.45-7.44. The percentage of schools decreases as the mean score increases indicating the influence of the selected factors in mathematics performance.

Research Objective

The research objective was to determine the influence of mathematics teachers' teaching and learning resources on students' performance in mathematics in public secondary schools in Suba South Sub County.
To evaluate the objective, Heads of Department and Mathematics teachers were asked to rate the influence of the teaching and learning resources and the result were as per Table 7.

Table 7 Influence of Mathematics Teachers' Teaching and Learning Resources on Students' Academic Performance in Mathematics

Aspect of Teaching and Learning Resources	RESP		RATINGS					Total	MR	OMR
			1	2	3	4	5			
Mathematic text books	HoD	F	0	0	16	19	0	35		
		%	0	0	45.9	51.4	0	100	3.54	
	MT	F	0	0	20	50	0	70		**3.63**
		%	0	0	28.6	71.4	0	100	3.71	

Recommended mathematical set	HoD	F	4	15	5	11	0	35		
		%	10.8	43.2	16.2	29.7	0	100	2.65	
	MT	F	5	43	9	13	0	70		**2.54**
		%	7.1	61.4	12.9	18.6	0	100	2.43	
Computer for GeoGebra	HoD	F	20	2	9	4	0	35		
		%	56.8	5.4	27.0	10.8	0	100	1.92	
	MT	F	45	4	13	7	1	70		**1.83**
		%	64.3	5.7	18.6	10.	1.4	98.6	1.74	
Recommended mathematical Table	HoD	F	0	0	21	14	0	35		
		%	0	0	59.5	40.5	0	100	3.41	
	MT	F	0	1	50	19	0	70		**3.34**
		%	0	1.4	71.4	27.1	0	100	3.26	
Mathematical models Such as cuboid and Cones	HoD	F	0	23	6	3	3	35		
		%	0	64.9	18.9	8.1	8.1	91.9	2.38	
	MT	F	0	48	11	8	3	70		**2.39**
		%	0	68.6	15.7	11.4	4.3	95.7	2.40	
Mathematics Teacher instruments such as blackboard, ruler and protractor	HoD	F	8	13	2	12	0	35		
		%	21.6	37.8	5.4	35.1	0	100	2.54	
	MT	F	6	38	6	20	0	70		**2.56**
		%	8.6	54.3	8.6	28.6	0	100	2.57	
Recommended fx-82MS Calculator	HoD	F	0	19	7	9	0	35		
		%	0	54.1	21.6	24.3	0	100	2.70	
	MT	F	6	38	6	20	0	70		**2.61**
		%	8.6	54.3	8.6	28.6	0	100	2.51	
Graph book and graph board	HoD	F	0	5	18	12	0	35		
		%	0	16.2	48.6	35.1	0	100	3.19	
	MT	F	0	7	47	16	0	70		**3.16**
		%	0	10.0	67.1	22.9	0	100	3.13	
Projectors	HoD	F	3	22	17	3	0	35		
		%	8.1	62.2	21.6	8.1	0	100	2.30	
	MT	F	5	45	15	5	0	70		**2.30**
		%	7.1	64.3	21.4	71.0	0	100	2.29	
Overall Rating	HoD								2.67	
	MT								2.60	**2.64**

Source: Field Data 2025

Key: HoD=Heads of Department, MT= Mathematics Teachers, NR=Nil Response, MR=Mean Rating, OMR= Overall Mean Rating, F= Frequency, %= Percentage

Interpretation of Mean Rating:

1.00-1.44 No Influence
1.45-2.44 Low Influence
2.45-3.44 Moderate Influence
3.45-4.44 High Influence
4.45-5.00 Very High Influence

Table 7 shows that the influence of teaching and learning resources had an overall rating of 2.64 (out of 5.00 possible outcomes). This implies moderate influence on students' performance. The overall mean rating for Heads of Department was 2.67 while Mathematic teachers rated at 2.60. In determining the influence of teaching and learning resources, text books had the highest influence at a rating of 3.63, followed by recommended mathematical tables, 3.34, graph book and graph board, 3.16, recommended calculators, 2.61 and computer for GeoGebra rated low at 1.83. Teaching models such as cylinders and cuboids posted low influence on performance. Resources such as projector with a mean of 2.30 indicated low influence on students' performance.

To determine the influence of Mathematics teachers' teaching and learning resources on students' academic performance in mathematics Regression analysis was computed using data on student academic performance and mathematics teachers teaching and learning resources. The results were as shown in Table 8.

Table 8 Regression Analysis for Mathematics Teachers' Teaching and Learning Resources on Students' Academic Performance in Mathematics

Model	R	R Square	Adjusted R Square	Std Error of the Estimate	Change Statistics				
					R Square Change	F Change	df_1	df_2	Sig. F Change
1	.322	.103	.010	1.99260	.103	1.107	10	96	.365

a. Predictors: Information Communication Technology: (Constant), Projectors, Calculators, Mathematic Books, Math Instruments, Math Tables, Teaching Models

From Table 8, it can be noted that teaching and learning resources had a weak positive influence of 0.322 as signified by coefficient r=0.322. The p-value of 0.365 was greater than 0.05 meaning that the influence was not statistically significant. Therefore, the null hypothesis (H_{02}), "Mathematics teaching and learning resources does not significantly influence students' academic performance in mathematics" was accepted.

To confirm as to whether mathematics teachers' teaching and learning resources was a significant predictor of students' academic performance, ANOVA was computed and the results were as shown in Table 9.

Table 9 ANOVA for Mathematics Teachers' Teaching and Learning Resources on Students' Academic Performance in Mathematics

	Model	Sum of Squares	df1	Mean square	f	Sig.
1	Regression	10.908	10	1.091	1.107	.365[b]
	Residual	94.585	96	.985		
	Total	**105.493**	**106**			

a. Dependent Variable: Mean Score

b. Predictors: (Constant), Projectors, Calculators, Math Books, Computers, Graph Books, Math Set, Math Model, Math Instruments, Math Tables, Teaching Models

From Table 9, it can be noted that teachers of mathematics teaching and learning resources was not a predictor of students' academic performance in mathematics (F (10, 96) =1.107, p = 0.365). This means that teachers of mathematics teaching and learning resources cannot be relied upon in explaining students' academic performance in mathematics in public schools in Suba South Sub County.

To establish as to whether any of the aspects of mathematics teachers' teaching and learning resources influenced students' academic performance in mathematics, multiple regression analysis was computed and the results were as shown in Table 10.

Table 10 Regression Analysis on Aspects of Mathematics Teachers' Teaching and Learning Resources on students' Academic Performance

		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence interval	
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig,**	**Lower Bound**	**Upper Bound**
	(Constant)	1.880	1.581	1.189	.237	.000	-1.258	5.018
	Mathematics books	.739	.548	.354	1.350	.180	-.348	1.826
	Mathematics set	.615	.279	.577	2.202	.030	.061	1.169
	Computers	.850	.319	.939	2.665	.009	.217	1.482
	Mathematic tables	-.400	.671	-.194	-.596	.552	-.1731	.931
	Math models	.156	.343	.103	.456	.650	.524	.837
	Mathematics teacher instruments	-.138	.390	-.147	-.354	.724	-.912	.636
	Calculators	.145	.535	.117	.272	.786	-.916	1.207
	Graph books and board	-.477	.442	-.292	-1.080	.283	-.1354	.400
	Projectors	-.128	.257	-.092	-.498	.620	-0639	.383

a. Dependent Variables: KCSE Mean Scores

From Table 10, it can be noted that the different aspects of mathematics teachers' teaching and learning resources had influence on students' academic performance in mathematics. Some aspects had negative influence while other had positive influence. Aspects of teaching and learning resources, namely, mathematical set ($p = 0.030$) and computers ($p = 0.009$) significantly influenced students' performance in mathematics because their p-values were less than 0.05. This was supported by qualitative data from Sub County Quality Assurance Officer and principals that mathematical sets and computers make mathematics to be practical, improves accuracy, and make geometrical construction easy and understandable as the learners are actively involved in the activities. Descriptive analysis indicated moderate influence of 2.64.

DISCUSSION

Mathematical sets and computers make mathematics to be practical, improves accuracy, and make geometrical construction easy and understandable as the learners are actively involved in the activities. Descriptive analysis indicated moderate influence. These aspects cannot be used to explain the students' academic performance in mathematics in public schools in Suba South Sub County. The findings disagreed with the findings of a study in Rwanda by Umuhoza and Uworwabayeho (2021) and a study by Nyirahabimana (2019), they confirmed that instructional materials like text books, manipulatives, technology tools (E-learning, videos, audio projectors), and physical models (charts, card, manual paper, mathematical sets), would make teaching and learning mathematics simpler, more interesting, more enjoyable and more connected to real-world applications. They further emphasized that the use of mathematical materials in mathematics makes learning simpler, more attractive, tangible, pleasurable and clear in real life circumstances assisting learners in learning efficiently to improve performance. Qualitative data observed that mathematics teachers' teaching and learning resources influenced students' academic performance in mathematics. Interview with principals confirmed that when learning resources are adequate and relevant learning and teaching mathematics is easy and understandable to learners unlike when resources are few and has to be shared among many students. In this respect one principal stated, Teachers who have enough and relevant text books prepare well before the lesson because they relevant concepts from different reference materials, help in timely syllabus coverage, improve the rate at which students do their assignments, and timely revision by teachers and students.

Another principal noted, when learners are taught mathematics using models they tend to understand the subject more than when taught without the models. As they handle the models they make mathematics to be practical than abstract, real and not a theory. Models boost learner's memory as they visualize and manipulate the concept. He further explained that teachers find it easy to explain mathematic concepts using models and as the learners manipulate the model; this prompts more inquiries for deeper understanding and mastery of concepts by students. He emphasized that frequent use of models in the classroom breaks the teacher, monotony of talking though out the lesson and encourage students' involvement in the lesson. Teaching mathematics without models is like giving students a theory to memorize. Another Principal emphasized that students who do not have sets and calculator and do not use them during class hours do not have the ability to use during exams, they cannot carry out geometrical construction by themselves lowering understanding and accuracy in mathematics, practice makes perfect. Another principal said that "The use of computers for GeoGebra and projectors in teaching mathematics make teaching easier with minimal time and all learners benefit at the same time. The use of projectors has made teaching and learning possible even in small schools that lack Teachers Service Commission mathematics teachers through the introduction of live streaming lessons by Teachers Service Commission.

The sentiments from principals were supported by the Sub County Quality Assurance and Standard officer that learners who are frequently taught using mathematical models and are allowed to manipulate the model themselves, actively participate in learning and have deeper understanding of the concepts taught. Although the findings do not concur, the conditions at that time were not significantly influencing performance. When teaching and learning resource are available, adequate and relevant, learners are able to use them at any time improving their mastery and understanding of concepts. Geometrical construction was easy when student do it on their own promoting accuracy in calculation and drawing. The teachers are able to give deeper explanation on the concept when learners have the models prompting more questions from students for better understanding. The availability of adequate and relevant teaching and learning resources give the teacher a variety of reference materials for better lesson preparation, relevant examples, different methods of working out the question and better understanding of the concept before teaching the students. This positively improves students' academic performance in mathematics. However, when these teaching and learning resources are not available, adequate and relevant to the syllabus, the students negatively improve in their academic performance in mathematics.

CONCLUSION

Mathematics teachers' teaching and learning resource had moderate influence on students' academic performance. Use of mathematical sets and computers in teaching mathematics significantly improved students' academic performance.

RECOMMENDATIONS

i) The school stakeholders and the government to ensure the students have adequate and relevant text books, geometrical sets and computers for geogebra to enhance performance in mathematics.
ii) Mathematics teachers should endeavour to use effectively mathematical models, mathematical tables, mathematics teacher instruments, calculators, graph books and projectors in their daily teaching so as to enhance learners performance in mathematics.

REFERENCES

1. Abhilasha, M., Ahmed, S., & Singh, N. V. (2022). Impact of Teachers' Attitude On Students' Mathematics Achievement in Meitei Pangal Community of Manipur. Journal of Positive School Psychology, 6(9), 4713-4725. https://doi.org/10.69739/jelm.v2i2.900
2. Adamu, U., & Rabiu, U. (2020). Relationship between Entry grades in Mathematics and Financial Accounting and Performance of Business Education Students in Colleges of Education in North-East, Nigeria. Unpublished Master's Thesis Ahmadubello University. https://kubanni.abu.edu.ng/handle/123456789/10341

3. Akiri, A. A. (2013). Effects of teachers' effectiveness on students' academic performance in public secondary schools; Delta State-Nigeria. *Journal of Educational and social Research*, 3(3), 105-111. https://doi.org/10.5901/jesr.2013.v3n3p105
4. Akungu, J. A. (2014). Influence of teaching and learning resources on students' performance in Kenya certificate of secondary education in free day secondary education in Embakasi district, Kenya. Doctoral dissertation, University of Nairobi. http://erepository.uonbi.ac.ke/handle/11295/79367
5. Allen, N., Grigsby, B., & Peters, M. L. (2015). Does leadership matter? Examining the relationship among transformational leadership, school climate, and student achievement. *International Journal of Educational Leadership Preparation,* 10(2), 1-22. https://files.eric.ed.gov/fulltext/EJ1083099
6. Appiah, J. B., Korkor, S., Arthur, Y. D., & Obeng, B. A. (2022). Mathematics Achievement in High Schools, the Role of the Teacher-Student Relationship, Students' Self-Efficacy, and Students' Perception of Mathematics. *International Electronic Journal of Mathematics Education,* 17(3). https://doi.org/10.29333/iejme/12056.
7. Back, Y., Jung, J. & Kim, B. (2008). What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. Computer & education, 50,224-234. https://doi.org/10.1016/j.compedu.2006.05.002.
8. Bahtilla, M. (2017). The Impact of School Environment on Teachers job Satisfaction in Secondary Schools *European Journal of Education Studies*, 2021
9. Bandura, A. (1977). Self-efficacy: towards a unifying theory of behavioral change. Psychological review, 84(2), 191.https://www.researchgate.net/profile/mohammed-Bijandi
10. Cheng (2016). Teaching Mathematics with Computer Programming Can Help Narrow Achievement Gap.Edsource.https://edusource.org/2016/teaching-math-with-computer-progamming-can-help-narrow-achievement:gap/563371.
11. Danya M. C., Ekmekci, A., & Parr, R. (2018). The Effects of the School-Work Environment on Mathematics Teachers' Motivation for Teaching: A Self-Determination Theoretical Perspective. Australian Journal of Teacher Education, 43(6). https://doi.org/10.14221/ajte.2018v43n6.4.
12. Elger, D. (2007). Theory of Performance. Faculty Guide Book: https://www.facultyguidebook.com
13. Ephrem, S.M., & Celestin, N. (2023). The influence of school factors on students' Mathematics performance in Gicumbi District, Rwanda. Journal of Research in Innovation and Implication in Education, 7(1), 1-10. https://doi.org/10.34293/education.v7i4.624.
14. Germain, S., & De Dieu, D. J. Effect of Teaching and Learning Resources on Students' Academic Performance at Selected Schools Kagogo Sector, Burera District/Rlyanda. International Journal of Innovative Science and Research Technology, 8(3), ISSN No. 2456-2165. https://doi.org/10.2139/ssm3205040.
15. Gubbins, V., & Otero, G. (2016). Effect of the parental involvement style perceived by elementary school students at home on Language and Mathematics performance in Chilean schools. Educational Studies, 42(2), 121-136. http://dx.doi.org/10.1080/03055698.2016.1148586.
16. Hanushek, E. A., & Woessmann, L. (2017). School resources and student achievement: A review of cross-country economic research. Cognitive abilities and educational outcomes: A festschrift in honour of jan-eric gustafsson, 149-171. https://doi.org/10.1007/978-3-319-43473-5_8.149
17. Hernandez-Martinez, P. & Vos, P. (2018). Why do I have to learn this? A case study on students' experiences of the relevance of the mathematical modelling activities. ZDM, 50, 245-257. https://doi.org/10.1007/s11858-017-0904-2
18. Ikegbusi, N.G., Manafa, F. U. &Iheanacho, R. C. (2021). Influence of school environment on the academic performance of secondary school students in Lagos state. Journal of Educational Research and Development, 5(2). https://doi.org/10.1016/j.acresq
19. Ikenga, N.C. & Ogbaga, E. (2021). Influence of working relationship between principals and teachers on students' activities in secondary schools in Awgu Education zone of Enugu state. DOI: 10.7176/JEP/12-36-08. https://doi.org/10.7176/JEP/12-36-08.
20. Marcus G. O. (2018). Effect of Work Environment on Teacher Commitment to Duty in Selected Secondary Schools of South Eastern Nigeria. Enobun-Nwidi Patience Enyiamaka2
21. Mawarire, C., & Chirume, S. (2020). Teaching and Learning Resources and their Influence on Poor Performance in Ordinary Level Mathematics in Glenview-Mufakose District of Harare,

Zimbabwe. Journal of Humanities and Social Sciences Studies, 2(3), 94-101. https://al-kindipublisher.com/index.php/jhsss/article/view/259

22. Ministry of Education Sessional Paper No. 1 of 2019. A Policy Framework for Reforming Education and Training for Sustainable Development in Kenya: Towards Realizing Quality, Relevant and Inclusive Education and Training for Sustainable Development. Nairobi, Government Printer.
23. Mshelia, H. J., & Emmanuel, O. (2021). Leadership Styles and Their Applications for Effective School Administration. International Journal of Scientific and Management Research, 5(2), 56-63. http://doi.org/10.37502/IJSMR.2022.5204
24. Msofe, G., Koda, G., & Wambiya, P. (2021). Effectiveness of Teaching and Learning Materials in Large Class Size to Enhance Students' Academic Performance in Arumeru District, Tanzania. *International Journal of Innovative Research and Development*, 10(10). https://doi.org/10.24940/ijird/2021/v10/i10/OCT2
25. Mugenda, O.M., & Mugenda, A.G. (2003). Research Methods: Quantitative & Qualitative approaches (Vol. 2, No. 2). Acts Press. https://doi.org/10.2023/jcbs.v5i1.148
26. Ndambo, S.M., Maithya. P., & Mwaura, K. (2021). Effects of teaching work load on teacher performance in public secondary schools in Kitui County, Kenya. International Journal of Innovative Research and Development. https://doi.org/10.24940/ijird/2021/v10/i8/AUG 21013.
27. Ndolo, M. A. (2016). Influence of free secondary education policy access, transition and student academic performance in Mbita and Suba sub-counties, Kenya. Doctoral dissertation, Maseno University.
28. Ndolo, M. A., Simatwa, E. M., & Ayodo, T. M. (2016). Impact of Free Secondary Education Policy on Primary to Secondary School Education in Kenya. A Case Study of Mbita and Suba Sub-Counties. Doctoral dissertation, Maseno University. http://doi.org/10.15580/GJER.2016.2.032816070.
29. Nduga, W. (2019). Teaching, learning resources and students' performance in mathematics: a case study of selected secondary schools in Pallisa District. Doctoral dissertation, Kampala International University. Ir.kiu.ac.ug/bitstream/20.500.12306/2339/nduga%20Wilson.
30. Nuwaha, W., Atukunda, G., & Kyayemagye, F. (2023). The Relationship between Workload and Teachers Effectiveness in Secondary Schools: A Case of Uganda. East African Journal of Education Studies, 6(1), 1-10. https://doi.org/10.37284/eajes.6.1.1035.
31. Ochungo. O.E., Ndolo M.A, & Simatwa E.M.W. (2021) Influence of Students Factors on Performance in Biology in Public Secondary Schools in Kenya: An Empirical Study across Secondary Schools in Ndhiwa Sub-County. International Journal of Current Research. (ISSN: 0975-833X) Vol. 13, Issue, (10):19148-19158.
32. Ochungo. O.E., Simatwa E.M.W & Ndolo M.A, (2021) Influence of School Factors on Students' Performance in Biology in Public Secondary Schools in Kenya: A case Study of Ndhiwa Sub-County. International Journal of Current Research. (ISSN: 0975-833X) Vol. 13, Issue (10): 19159-19171.
33. Odumbe A.G., Simatwa E.M.W., Ayodo T.M.O. (2015). Factors Influencing Student Academic Performance in Day-Secondary Schools in Kenya. A Case Study of Migori Sub county. Greener Journal of Educational Research (ISSN: 2276-7789 ICV: 6.05) Vol. 5 (3): 078-097.
34. Ogari, J. O. (2021). Welfare practices and teachers' performance in private primary schools in Bomet County, Kenya. Doctoral Dissertation, Kenyatta University. http://ir-library.ku.ac.ke/handle/123456789/22835
35. Siachifuwe, M. (2017). Teacher based factors influencing academic performance among learners in open learning classes at Twin Palm Secondary School, Lusaka, Zambia. International Journal of Humanities Social Sciences and Education 4(12), 96-101. http://dx.doi.org/10.20431/2349-0381.0412012.
36. Simatwa E. M.W. & Odoyo, D.O (2025). Relationship between Teacher Identified Regulation, Teacher Introjected regulation, Teacher External Regulation and Student Academic performance in Kenya: A study across Secondary Schools in Gem Sub County. International Journal of Current Science Research and Review ISSN: 2581-8341 Vol. 08 (07): 3438-3453. DOI: 10.47191/ijcsrr/V8-i7-32, Impact Factor: 8.048.
37. Simatwa, E. M. W., Khajeha, H., & Baraza, O. T. (2019). Influence of students' entry behavior on academic achievement in National polytechnics in Kenya. A case study across engineering courses. DOI: https://doi.org/10.24941/ijcr.35709.06.2019.

38. Sirengo, J. L. (2015). School factors as correlates of secondary students' achievement in mathematics in Bungoma County, Kenya. Internal Journal of Educational Investigation. ISSN: 2410-3446.27. http://ereposity.kibu.ac.ke/handle/123456789/1199. http://kerd.ku.ac.ke/123456789/1042
39. Sosu, E. M., & Pheunpha, P. (2019). Trajectory of university dropout: Investigating the cumulative effect of academic vulnerability and proximity to family support. In Frontiers in Education (Vol. 4, p. 6). Frontiers Media SA. https://doi.org/10.3389/feduc.2019.0006
40. Suleiman, A. H. (2023). Factors That Affect Students' Academic Achievement in the Faculty of Social Science at the University of Bosaso, Garowe, Somalia. Open Journal of Social Sciences, 11(2), 446-461.https://doi.org/10.4236/jss.2023.112029
41. Taylor, N. & Robinson, N. (2019). Secondary schools in Sub Sahara Africa Teacher preparation and Support. Literature Review, JET, Education Services. https://doi.org/10.15868/socialsector.36805
42. Umuhoza, C., & Uworwabayeho, A. (2021). Teacher's Use of Instructional Materials in Teaching and Learning Mathematics in Rwandan Primary Schools. African Journal of Teacher Education, 10(2), 1-16. https://doi.org/10.21083/ajote.v10i2.6659.
43. UNESCO, (2008). Challenges of implementing free day secondary schools in Kenya: Experience from Districts. Nairobi, KE: UNESCO. https://10.26859/sae/2022.08.001
44. Waseka, E. L., & Simatwa, E. M.W. (2016). Student factors influencing academic performance of students in secondary education in Kenya: A case study of Kakamega County. Educational Research, 7(3), 072-087. http://dx.doi.org/10.14303/er.2016.138.
45. Yang, X., Yan, M., Ruan, Y., Ku, S.Y., Lo, J. C. M., Peng, P. & McBride, C. (2021). Relations among phonological processing skills and mathematics in children. A meta-analysis, Journal of Education Psychology, Advance online Publication 10(1037).
46. Zhang, Y. (2018). The associations between parental involvement and science achievement via children's perceived academic competence and academic effort. Dissetatation-ALL.894, Syracuse University. https://surface.syr.edu/etd/894