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RESEARCH ARTICLE

INFLUENCE OF SCHOOL FACTORS ON STUDENTS' PERFORMANCE IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN KENYA: A CASE STUDY OF NDHIWA SUB-COUNTY

[1]Erick O. Ochungo, [2,*]Enose M.W. Simatwa and [3]Maurice A. Ndolo

[1]Department of Education Policy and Management, Tom Mboya University College, Kenya (A constituent College of Maseno University)
[2]Department of Education Policy and Management, Tom Mboya University College, Kenya (A constituent College of Maseno University)
[3]Department of Education Policy and Management, Tom Mboya University College, Kenya (A constituent College of Maseno University)

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[*]Corresponding author:
Enose M.W. Simatwa

ABSTRACT

Biology as a discipline is a pre-requisite field of study at O-level for very many professional careers in the realm of Medicine, Agriculture, Forestry, Teaching, Sociology among others. This means that is a critical subject that requires proper teaching and learning at secondary school or O-level it is a concern to note that in Kenya from 2016 to date the in biology is wanting. The following data attest to this. The performance in Biology at Kenya Certificate of Secondary Education (KCSE) level is very low nationally and even at Sub County level despite provision of educational resources or inputs by the government. Thus, in the whole country candidates who sat KCSE examinations in the year 2016 only 71,348(13.99%) out of 509,822 scored C+ and above, in 2017, only 11,503(2.1%) candidates out of 546,014 scored C+ and above and in 2018, only 33,126(5.66%) candidates out of 584,924 scored C+ and above. In Ndhiwa Sub County, the performance of Biology was been far much below the average for the last four years registering mean scores of: 4.83 in 2015, 2.90 in 2016, 2.27 in 2017 and 2.90 in 2018. The objective of this study was therefore to determine influence of school factors on students' performance in Biology in Ndhiwa Sub-County. The study established that school factors accounted for 7% of the variation in students' performance in Biology but the influence was not statistically significant at the p-value of 0.05. This means that there is serious wastage in utilization of educational resources such as finance, library, Biology laboratory, revision materials in Biology and use of ICT in teaching and learning provided by the government and parents. This is signified by the negative relationship between most school factors and students performance as revealed by multiple regression analysis. The study recommended that Quality Assurance and Standards Officers and principals of secondary schools should ensure optimal use of educational resources to remedy the situation. The findings of this study will inform policy formulation and decision making with a view to enhancing student performance in Biology.

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INTRODUCTION

The significance of education in national development as well as individual development is indisputable. For any country, a highly educated human resource contributes maximally to national development in various spheres. Individuals use education as a ladder to climb to desired social economic levels. Education is also viewed as a tool for social economic changes (Njuguna, 2011).

There is worldwide recognition of importance of science education in national development and this has found a central place in the curricula of schools at all levels (Ogbonna, 2007). According to Olasehinde and Olatoye (2014), Science education is designed to guide the world toward a scientifically literate society and this is important for an understanding of science as it offers personal fulfillment and excitement in addition, Biology is usually regarded as the most simple to understand among all the science subjects and thus it is the one that usually attract the widest enrolment.

The findings of a study carried out by Naugah (2011), on factors affecting the choice of science subjects among girls at secondary level in Mauritius showed that teaching approaches were mainly traditional and that both girls and boys prefer hands-on activities and contextual examples reflecting real-life situations. The majority of the girls' experiences of science were negative and this deterred them from taking science beyond the compulsory level although they were aware of its importance. Teachers had positive opinions about girls' ability to do science but stated that lack of infrastructure facilities did not allow them to involve the pupils in practical work as much as they would wish. However, the study farther revealed that brighter girls' decisions to study sciences were not outweighed by these factors. Parents felt that they did not influence their daughters in the choice of subjects or eventual careers though they held science in high esteem.

Jing-Wen, Miao-Hsuan, Jiachi, Mei-Hung, Choring-Jee (2016) examined the factors that influence students' science learning processes and their learning outcomes and the results showed that learning outcomes chiefly examined students' conceptual change and their science achievement. The most studied factors influencing conceptual change were associated with instruction and personal reasoning ability. As for instruction, multiple instructional methods were usually integrated in the research, and "conceptual conflict" and "cooperative learning" were found to be gaining the most attention. In addition, certain instructional methods were more frequently linked to specific science subjects.

Samikwo (2012) asserted that Biology as a subject endeavors to enable one understand himself/herself, understand major biological processes that take place within himself/herself for example digestion, respiration, circulation, excretion and gaseous exchange. Through Biology organisms tend appreciate the effect of these biological processes and the larger environment as a whole. Biology like other science subjects is a practical oriented discipline which seeks to develop in a learner, scientific inquiry and problem solving skills. He farther revealed that the general goals of Biology Education is to equip the learner with the basic knowledge, skills and attitude that will enable one to lead an independent and useful life both to himself/herself and the larger community in which she/he lives. The Biology subject caters for the needs of a learner who may pursue his /her studies in the subject and its related disciplines. Ofoegbu (2003) asserted that Biology has a large student enrolment than any other science subject especially at the upper basic level of the Nigerian education. According to Akubuilo (2004), in spite of the popularity of Biology among students, the failure rate has remained very high. Despite the fact that Biology is the simplest to comprehend among the science subjects, the level of academic achievement is nonetheless not much different from other science subjects among the students. In addressing the question of poor performance in Biology, educational experts have considered several explanations for the poor performance in Biology examinations. Samikwo (2013) concluded that, availability of text books, laboratory apparatus and other learning resources contribute significantly to the performance of students in Biology examination. The researcher revealed that, students with positive attitude towards the subject register better performance than those who had a negative attitude. Those with positive attitude are motivated to work hard and this is reflected in the good marks scored in the examination.

Samikwo (2012) in a study on factors which influence academic performance in Biology in Kenya: A perspective for global competitiveness established that students with positive attitude towards the Biology subject, register better performance in examinations and also availability of teaching/learning resources in schools impacted positively on student's achievement in Biology examination. The researcher recommends schools to motivate students so as to build positive attitude towards Biology. This study tells us a great deal about the factors which influence academic performance in biology in Kenya. Moreover, it dwelt on extrusive motivation like school motivation and did little to explore intrusive motivations like discipline, class participation, punctuality, personal time, attendance, class participation and consulting teachers which was the gap identified in the current study.

Wanyama, Simatwa, Okwach (2018) on the contribution of school administrators to teaching-learning resources in enhancement of students' academic performance in secondary schools in Kenya: an empirical study across secondary schools of Emuhaya and Vihiga Sub Counties established that administrators' contribution to teaching learning resources was significant and enhanced students' academic performance. Angwech, Gidudu and Simatwa, (2017) established that discrimination accounted for 94.9% of the variation in academic performance of children with disabilities. Onyara (2013) in a school based factors influencing students' academic performance at Kenya Certificate of secondary Education in Teso South District, showed that human resources were not well handled since from the finding most of the head teachers and directors of studies did not employ well trained school workers and their numbers were not enough to handle all the students. Finance resource was not well established since the study indicated that most of the head teachers found their school having financial problems. The conclusion was that physical resources were not well developed in most of the secondary schools since the study revealed that overwhelming number of head teachers and class prefects disagreed that their schools had well developed physical resources. The researcher had recommended that the head teacher should attend the seminars and workshops that teach the importance of a well-managed human resource, physical resource, financial resource and learning technique. This study however, did not find out the influence of those school factors in students performance in Biology which this study looked at. A study by Owino, Osman and Yungungu (2014) on investigation of factors that influence performance of Kenya Certificate of Secondary Education Biology in selected secondary schools in Nyakach District, Kisumu County Kenya, established that, there was positive relationship between teacher characteristic and performance, teacher and learning resource and performance, motivation on performance, students attitude towards Biology and performance in Kenya Certificate of Secondary Education Biology. This is an indicator that student factors and school factors play a vital role in the performance of students in Biology which this study expounded on. The study also did not include all the schools in that District like the current study which included 96% of the secondary schools in Ndhiwa Sub County. Another study on students' factors influencing Academic performance of students in Kenya Certificate of Secondary Education: A case study of Kakamega County by Waseka and Simatwa (2016) that revealed students' factors influenced student academic performance by 7.56%, and the

other 24.4% were due to other factors. The study further revealed that performance in Kenya Certificate of Primary Education, age, participation in co-curricular activities and exclusion from school were student factors that were statistically significant predictors of students' academic performance in (Kenya Certificate of Secondary Education). The study only concentrated on the students' factors yet it revealed that students' factors influenced students' academic factors by7.56%, and the other 24.4% were due to other factors. This implied that the other remaining 68.04% factors could be parental socio-economic and school factors which are the gaps this study was to fill. The study further looked at the influence of those three factors to since these three; the students' factors, parental socio-economic factors and the school factors are conventionally known to be the three pillars for effective and efficient performance. It also looked at Kenya Certificate of Secondary Education as it is the standardized test that can be effectively used to predict students' performance. The study was also prompted by the continuous poor performance of Biology in KCSE which brought mass uproar from all stake holders including teachers, policy makers, parents and the student themselves who are supposed to be at the forefront to improve performance at Kenya Certificate of Secondary Education.

Status report of the University education in Kenya showed a mass failure in Biology: In the 2016 KCSE, a total of 509,822 candidates sat for Biology, but only 71,348 scored C+ and above. In 2017, 546,014 candidates sat for Biology but only 11,503 scored C+ and above indicating a shocking 98% of students who scored below C+ (pass mark).In 2018, Biology had 584,924 candidates, but only 33,126 got C+ and above with 95% scoring below C+. The report further revealed that 280 degree programs in Kenyan University require at least C+ in Biology as a requirement for admission in addition, Biology subject possesses strategic importance as they support two of the Big Four Agenda (food security and universal health care) because the programs fall in clusters such as medicine, nursing and health, Agriculture, food science, Agribusiness and environment among others and concluded that Agriculture and science based courses did not attract students because of the mass failure in Kenya Certificate of Secondary Education Biology (Daily Nation, 8th Wednesday May, 2019). In Ndhiwa Sub County, performance of biology in public secondary schools has been very low over 4 years with a general decline in the performance of students. Table 1 shows the performance of Biology in Ndhiwa Sub-County from 2015 to 2019.

Table 1. Ndhiwa Sub County Kenya Certificate of Secondary Education Sciences Mean Scores

Year	Biology Mean	Chemistry Mean	Physics Mean
2015	4.8293	4.3208	4.8718
2016	2.9023	2.4454	4.7497
2017	2.2670	2.5886	4.3150
2018	2.9007	2.9072	4.258

Sources: Ndhiwa Sub County Education Office, 2019

From Table 1, it can be observed that performance of Biology and Chemistry were lower than that of Physics from 2015 – 2018. It can also be seen that, even though there was an acute drop in Chemistry in 2016, it has had a steady improvement from 2.4454 (2016) to 2.5886 (2017), and 2.9072 (2018). However, performance in Biology remained low over the years after 2015. It is therefore evident that the performance of Biology has been a challenge amongst the students.

To compare the state of all the three sciences across all the eight Sub-County, Table 2 was compared.

Table 2. Homa Bay County Kenya Certificate of Secondary Education Biology, Chemistry and Physics Mean Scores across the Sub Counties 2018

Sub County	Biology	Chemistry	Physics
Rangwe	4.0418	4.4155	6.6552
Suba	3.5694	3.5662	4.416
Rachuonyo South	3.5177	3.8868	5.9339
Rachuonyo North	3.4633	3.1219	4.9350
Homa Bay	3.4118	3.4424	6.5903
Rachuonyo East	3.4041	3.6616	5.2494
Mbita	3.3058	5.5260	5.1972
Ndhiwa	2.9007	2.9027	4.2583

Source: Homa Bay County Office, 2019

From Table 2, it's evident that Ndhiwa Sub County had the lowest Biology KCSE mean score in all the three sciences and a cross all the eight Sub-Counties. This paints a grim picture of the state of sciences especially Biology and Chemistry whose performance in public secondary schools in Ndhiwa Sub-County is less than 3.00 against 12.00. To compare the distribution of quality grade in Chemistry and Biology across all the eight Sub County was computed. Table 3 shows that although a cross the eight Sub-Counties of Homa bay county there was deficit of quality grades, Ndhiwa was hard hit by the deficit of quality grades in Chemistry Kenya Certificate of Secondary Education 2018. This also leaves more questions unanswered about performance in Chemistry public secondary schools in Ndhiwa Sub County. Table 4 shows that although in all the eight Sub-Counties of Homa Bay County there was deficit of quality grades, Ndhiwa was hard hit by the deficit of quality grades in Biology Kenya Certificate of Secondary Education 2018. From the comparison of Tables 3 and 4, it can be noticed that Biology was hit by the deficit of quality grades than Chemistry in all the eight Sub counties. Chemistry had 7.7% quality grades while Biology had only 2.6% of quality grades. This is the reason why Biology performance was selected in this research. Although researchers have revealed that there were some relationship between student factors, parental socio – economic factors and school factors, with students' academic performance, it was not clear whether student factors, parental socio – economic factors and school factors had influence in students' performance in biology in public secondary schools in Ndhiwa Sub County. Arising from the background of poor performance and low number of quality grades in Biology, the current research focused on the influence of selected factors like students', parental socio-economic and school factors on the performance of Biology in public secondary schools in Ndhiwa Sub County since the three factors are the key factors for effective and quality performance in academic achievements of students in an education system.

SYNTHESIS OF LITERATURE ON INFLUENCE OF SCHOOL FACTORS ON STUDENTS' PERFORMANCE IN BIOLOGY

Damien (2010) defined school institutional as the space interpretation and physical expression of the school examination performance of students and students' academic performance, teacher's qualification and adequate facilities may be determinants of assessing academic performance of students.

Table 3. Distribution of Quality Grades in Chemistry across the Sub Counties in Homa Bay County (2018 Kenya Certificate of Secondary Education)

Sub County	Entry	A	A-	B+	B	B-	C+	Total	Percentage
Rangwe	2395	113	79	88	14	140	97	659	27.5%.
Rachuonyo South	2343	62	54	72	85	95	107	499	21.3%
Rachuonyo East	3348	24	35	64	11	139	126	506	15.1%
Mbita	1934	24	34	31	61	76	174	400	20.7%
Homabay Town	2179	24	29	42	66	79	63	303	13.9%
Suba	1446	7	12	19	33	50	54	175	12.1%
Rachuonyo North	3260	23	29	42	65	94	89	342	10.5%
Ndhiwa	2401	5	13	22	37	58	51	186	7.7%

Source: Homa-Bay County, 2019

Table 4. Distribution of Quality Grades in Biology across the Sub Counties in Homa Bay County (2018 Kenya Certificate of Secondary Education)

Sub County	Entry	A	A-	B+	B	B-	C+	Total	Percentage
Rangwe	2372	1	18	70	98	117	132	436	18%
Suba	1368	0	0	1	2	21	72	96	7%
Rachuonyo South	2268	0	1	10	26	68	129	232	10%
Rachuonyo North	3260	0	1	7	23	90	138	257	7.9%
Homa Bay	2142	0	1	8	25	43	123	200	9.3%
Rachuonyo East	3264	0	0	5	17	48	131	201	6.2%
Mbita	1862	0	2	3	9	40	68	122	6.6%
Ndhiwa	2315	0	0	0	7	16	41	64	2.6 %

Source: Homa-Bay County, 2019

A number of studies have been carried out on the influence of school factors on students' academic performance and other related studies both internationally and locally. Abdulrasheed and Bello (2015) carried out a study on challenges to secondary school principals' leadership in Northern Region of Nigeria and found out that poor funding of schools is a major problem of principals' leadership ineffectiveness and lack of availability of funds directly to the schools account to run the schools. This study also established that secondary school education board did not have a system of organizing seminars for capacity building to re train and improve leadership effectiveness of principals in the region. It is clear from this study that finances had influence on students' academic performance. Similarly, Owoeye and Yara (2011) looked at the provision of facilities as it relates to academic performance of students in agricultural science in Ekiti state of Niger between 1990 and 1997. The study population ware results of the West African School Certificate Examination conducted between 1990 and 1997 in 50 secondary schools in both rural and urban areas of the state. One validated instrument (STQ) was used for data collection. The data was analyzed using T-test.

The results showed that there were no significant differences in the performance of students between rural and urban secondary schools in terms of library facilities. Akomolafe and Adesua (2016) carried out a related study on the impact of school facilities on students' level of motivation and academic performance in senior secondary schools in South West Nigeria. The results of the study revealed that there was a significant relationship between physical facilities and students' level of motivation and academic performance. A related study was also carried out on the Impact of school facilities on students' academic performance in public secondary schools in Giwa and Zaria Education zones by Osuji (2016) and established that there is no significant difference in the view of respondents on the impact of welfare/ health facilities on students' academic performance in secondary schools. Khawla and Abdul (2006) carried out a study on the relationship between school laboratory experiments and academic achievement of Palestinian students in introductory university science courses and established that there is a strong relationship between the total number of secondary school laboratory experiments done in secondary schools and the academic achievement of the Palestinian students in science theory and laboratory courses. Yolanda (2014) also carried out a study on determinants of high academic performance in secondary schools in Kilimanjaro region and established that high performing secondary schools had enough qualified teachers, had good teaching and learning environment and teachers conducted informative evaluation before accepting students in their schools. Further, it was revealed that involvement of parents in students' progress and other school business was high. Descriptive research design of analysis was used in both studies and therefore could not give the actual influence of these aspects on students' academic performance.

Limbe (2017) carried out a study on factors affecting students' performance in certificate of secondary education examinations in Newala District, Mtwara region, Tanzania, and the study found that academic performance was low due to: shortage of teaching and learning materials and physical facilities, lack of readiness of students in learning and poor entry marks in form one and form three, low parental involvement and unclear policy. Nyandwi (2014) in a study of determinants of poor academic performance of secondary school students in Sumbawanga District, Tanzania, analyzed data using descriptive and binary logistic model for inferential analysis and established that low parents' income, shortage of laboratory and long walking distances to schools have significant influence on the academic performance of the students. Other factors which were found to influence academic performance included lack of English language competence, inadequate teaching and learning materials, inadequate number of teachers and unavailability of library facilities. The academic performance of secondary school students was therefore found to drop every year mainly due to school and home based factors. In Kenya, a study was conducted by Kyalo (2016) on school factors influencing students' performance in Chemistry in Kenya Certificate of Secondary Education in Makueni County, it established that

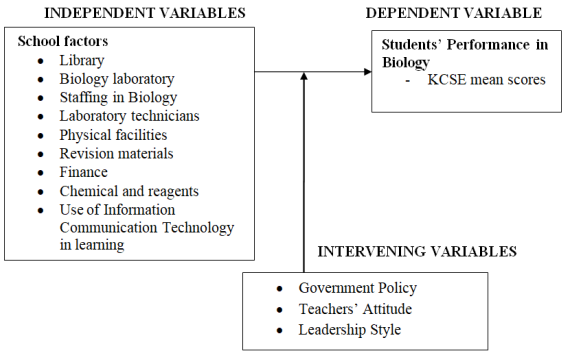
majority of schools did not organize field trips in chemistry and the teachers do not use project work as an assessment method. This means that school factors actually has impact of students' academic performance. Ogutu, Osman and YunguYungu (2014) focused on factors that influence performance in Kenya Certificate of Secondary Education Biology in selected secondary schools in Nyakach District, Kisumu County and the finding were that there was positive significance between teacher characteristics and performance, teaching/ learning resources and performance, motivation and performance, student attitude and performance. The study recommended that teachers should ensure that students performs practical frequently on their own, head teachers should ensure that sufficient instructional materials are availed in schools, teachers should always motivate learners and use teaching methodologies that will promote positive attitudes towards Biology. All the above studies were in agreement that school factors have influence on students' academic performance. However, it was not clear from the studies, the influence the factors had on students' academic performance in Biology, the knowledge gap that the current study sought to address in public secondary schools in Ndhiwa Sub County.

Research Objective

The research objective was to determine the influence of school factors on students' performance in Biology in public secondary schools in Ndhiwa Sub-County, Homa Bay County.

CONCEPTUAL FRAMEWORK

The conceptual framework (Figure 1) postulates that school factors do influence students' performance in Biology.



Source: Adapted from Waseka and Simatwa (2016)

Figure 1. A Conceptual Framework showing the influence of school factors on students performance in Biology in secondary schools.

School factors

- Library
- Biology laboratory
- Staffing in Biology
- Laboratory technicians
- Physical facilities
- Revision materials
- Finance
- Chemical and reagents
- Use of Information Communication Technology in learning
- Government Policy
- Teachers' Attitude
- Leadership Style

Students' Performance in Biology

- KCSE mean scores

The study was based on concept of performance advocated for by Waseka and Simatwa (2016) who state that selected factors interplay to influence students' performance in schools (Waseka & Simatwa, 2016). The conceptual framework was formulated based on Grounded theory (Creswell, 2005) which states that where there is no appropriate theory, data in literature can be used to generate a conceptual framework to guide a study. In this case the literature reviewed studies conducted by Waseka and Simatwa (2016), Samikwo (2013), Ikisanya et al (2014) Mukwana, (2013), Samikwo, (2012) Onyara (2012) Goro, Simatwa and Baraza (2018); Ndege and Simatwa (2019a); Ndege and Simatwa (2019b); Ndolo and Simatwa (2016); Ndolo and Simatwa (2017); Olenja, Simatwa and Ndolo (2020a); Olenja, Simatwa and Ndolo (2020b); Khajeha, Simatwa and Barasa (2019); and Simatwa and Khajeha (2019) were used in formulating this conceptual framework.

This conceptual framework assumed that independent variables which included school factors (library, biology laboratory, staffing in biology, finances, physical facilities revision materials in biology, laboratory technician ,chemical and reagents for biology and use of Information Communication Technology in teaching and learning) influence the dependent variables (students' academic performance in Biology at KCSE). This implies that performance is influenced by many factors but the key are the parental, students' and school factors. However, there are other factors like government policy, teachers' attitude and leadership style which in one way or the other, may intervene positively or negatively thus affecting students' performance in Biology at KCSE.

RESEARCH METHODOLOGY

The study was based on the concept of performance advocated for by Waseka and Simatwa (2016). The conceptual framework was formulated based on Grounded theory (Creswell, 2005). Descriptive survey and correlational research designs were used. Study population was 52 principals, 124 Biology teachers and 2022 (2020 form four students (2020 cohort) totaling to 2198. Sample size of 46 principals, 46 biology teachers and 323 form four student was used for the study. Purposive sampling was used to select 1 biology teacher in schools where there were more than two form four biology teachers and one Sub-County Quality Assurance and Standard Officer. Questionnaire was used on Biology teachers, interview for Sub County Quality Assurance and Standards Officer and Principals while document analysis and focus group discussion for randomly selected form four students. Reliability of the instrument was established by piloting in 6(10%) of schools in Ndhiwa Sub-County. Face and content validity of questionnaire were determined by experts in educational administration. Qualitative data was transcribed, coded and analyzed thematically and reported in themes and sub themes. Quantitative data from questionnaires were analyzed using frequency counts, means, percentages and regression analysis.

RESULTS

Demographic Data of Respondents: The respondents involved in the study were: principals, teachers and the students. The teachers were asked to indicate their gender, age range, administrative post, qualification, and status of employment so as to establish the credibility of the respondents. In addition, teachers were asked to indicate the 2019 KCSE mean score in Biology. The findings were as shown in Tables 5, 6, 7 and 8.

Table 5. Gender of Biology Teachers

Gender	Frequency	Percentage (%)
Male	30	65.2
Female	16	34.8
Totals	46	100

From Table 5 it can be observed that the number of male biology teachers was higher, 30(65.2%), than the number of female biology teachers, 16 (34.8%). There was gender disparity of teachers teaching Biology in the sub county. It was also necessary to establish the gender of teachers because there are conflicting reports on their effectiveness in teaching Biology for example, Paulo and Armstrong (2015) found out that teacher gender may be important in explaining students performance if female and male teachers differs significantly from each other in terms of the ability to teach. The data collected was not biased on the basis of gender and was a good representative of the target population.

Table 6. Distribution of Teachers by Age

Age (years)	Frequency	Percentage %
20-25	2	4.3
26-30	10	21.7
31-35	11	23.9
36-40	13	28.3
41-45	5	10.9
46-50	4	8.7
51 and Above	1	2.2
Total	46	100

From Table 6, it can be noted that most teachers were aged between 36 and 40 years (40.4%), then between 31 and 35 years (23.9%), 26-30 years (21.7%), 41-45 years (10.9%), 46-50 years (8.7%), 20-25 years (4.3%), and finally 51 and above years (2.2%). The fact that most teachers are aged above 30 years indicates that they are had sufficient experience and therefore could respond to questions in relation to influence of student factors, parental socio - economic factors and school factors on students' performance in Biology. There are indications from different research that old teachers perform better than the young, the opposite is also advocated for and that's why it was necessary to deal with this variable for example, Paulo and Armstrong (2015) states that age is inherent differences in the ability of teachers to improve student performance associated with teacher age. If the teacher age is controlled, the older the teacher, the better in improving student's performance due to differences in training received by teachers. From Table 7, it can be noted that most of biology teachers in Ndhiwa Sub County, 31 (67.4%), were not holding any administrative position in the school. This means that they have ample time to prepare adequately for biology lessons. Indeed, given their number, they were able to influence the performance of students in Biology.

Table 7. Distribution of Biology Teachers by Administrative Positions

Administration position	Frequency	%
Principals	0	0
Deputy Principal	3	6.5
Head of Department (HOD)	12	26.1
Teacher	31	67.4
Total	46	100

It may also mean that Biology is tedious science subject compared to chemistry and physic hence most Biology teachers do not prefer administrative responsibility. Biology teachers 12 (26.1%) were also found to be heads of department, meaning that they had gained experience because of the longer period they had taken in service. Administrative positions were considered because in most cases heads of department are appointed on the basis of good performance in the classroom and therefore it was an important variable to focus on as school factors on students' performance.

Table 8. Distribution of Teachers by Professional and Academic Qualifications

Academic qualification	Frequency	%
Diploma	10	21.7
Bachelors degree	35	76.1
Masters degree	1	2.2
Total	46	100

From Table 8, it is clear that most teachers have Bachelors degree, 35 (76.1%). This may mean that most teachers go for Bachelor degree perhaps because of increased number of university offering degree programs or because of the affordable Bachelor degree fee. Only 1 Biology teacher (2.2%) hold a master degree, this low number may be because of the time taken to graduate with masters or because Teachers Service Commission does not pay salaries increment for masters certificates. There were 10 (21.7%) biology teachers who were diploma holders, this may mean that few teachers go for diploma certificate or few diploma teachers qualify for Teachers Service Commission employment. The fact that all respondents were trained and had professional qualification, means they credible respondents because they are highly educated and therefore student based factors', socio- economic factors and school based factors are not foreign to them. This is in agreement with Yolanda (2014) who carried out a study on determinant of high academic performance in secondary schools in Kilimanjaro region established that high performing secondary schools had enough qualified teachers. This means that qualified teachers have the training that enables them to posses the experience and the methodologies to pass the knowledge to the learners effectively. Their qualification also put them at a better position to respond to questions regarding students' performance in biology.

Table 9. Distribution of Teachers by Employment Status

Employment status (Employer)	Frequency (f)	Percentage (%)
Teachers Service Commission	46	100
Total	46	100

From Table 9, it is clear that all the Biology teachers in Ndhiwa Sub County were employed by the Teachers Service Commission (TSC). Lack of Biology teachers employed as Board of Management may mean shortage of this caliber of teachers, the TSC regulation of employing only trained registered teachers as Board of Management may be also

another factor for their absence since the trained one seek better pay in private schools, extra county and national schools. The fact that all Biology teachers were employed by TSC would mean that they were well experienced and trained and were comfortable to teach Biology in public secondary schools effectively. This would mean that they are comfortable and effective respondent concerning the performance of Biology in public secondary schools.

School Data: The performance of Biology in public secondary schools in Ndhiwa Sub County was summarized as shown in Table 10.

Table 10. Kenya Certificate Secondary Education Performance 2019 by Schools in Ndhiwa Sub County

Mean Score	Frequency (f)	Percentage (%)
1.0 - 2.9	19	41.3
3.0 – 4.9	22	47.8
5.0 – 6.9	3	6.5
7.0 - 8.9	1	2.2
Total	46	100

From Table 10, it was observed that most of the schools had biology mean scores ranging from between as low as 1.0 to 2.9 as reflected by 19 (41.3%) scoring between1.0 to 2.9 and 22(47.8%) scoring between 3.0 and 4.9. Three schools (6.5%) posted average performance while only one school had a better performance. This performance indicated that most schools in Ndhiwa Sub County performed below average in biology. This is the reason why it was necessary to establish the influence of students' factors, parental socio-economic factors and school factors on students' performance in Biology in secondary schools in Ndhiwa sub-county. KCSE performance by schools was important because it is the dependent variable of the study.

Research Objective: Research objective was to determine the influence of school factors on students' performance in biology in public secondary schools in Ndhiwa Sub- County. To achieve this objective, biology teachers in public secondary schools were asked to respond to aspects of school factors in relation to students' performance in Biology. The results of were as shown in Table 11. From Table 11, it can be observed that chemicals and reagents for biology (4.07), laboratory technician (4.00), revision materials (3.89), library (3.78) and use of Information Communication Technology in teaching and learning (3.66) had high influence on the performance of students in Biology in public secondary schools in Ndhiwa Sub County. Physical facilities (3.44), biology laboratory (3.11), staffing in Biology (3.10) and finances (2.84) moderately influenced the students' performance in Biology. To estimate the influence of school factors on students' performance in biology, coefficient of determination was computed and results were as shown in Table 12. From Table 12, it was observed that, school factor accounted for 7% of the variations in performance in biology however the influence was not statistically significant because it had P- value of .707 which was greater than 0.05.Thus the null hypothesis was accepted. To confirm whether school factor is a significant predictor of students' performance in biology or not, ANOVA was computed and the results were as shown in Table 13. From Table 13, the ANOVA output revealed that school factors was not a significant predictor of students' performance in Biology, $F(9, 33) = .697$, $p > 0.05$. This means that school factors cannot be relied upon in determining student performance in Biology in public secondary schools in Ndhiwa Sub- county. To confirm the prediction power of school factors, school factors were regressed individually against students' performance in Biology and the result were as shown on Table 14. From Table 14, it was observed that all school factors; staffing in Biology, physical facilities, laboratory technician, chemical and reagents for Biology, finances, revision materials Biology laboratory and use of ICT in teaching and learning did not have significant influence on students academic performance in Biology, despite the fact that they seem to have had different level of influence as indicated by their coefficients. Physical facilities had a coefficient of .317 meaning they increased performance by positive .317 but the p-value was .408 meaning they were not statistically significant.

DISCUSSION

From the findings it can be observed that chemicals and reagents for biology, laboratory technician, revision materials, library and use of Information Communication Technology in teaching and learning had high influence on the performance of students in Biology in public secondary schools in Ndhiwa Sub County. Physical facilities, biology laboratory, staffing in Biology and finances moderately influenced the students' performance in Biology. These findings are in agreement with Khawla and Abdul (2006) who carried out a study on the relationship between school laboratory experiment and academic achievement in introductory science course and established that there is a strong relationship between the total number of laboratory experiments in secondary schools and the academic achievement in science theory and laboratory courses. Nyandwi (2014) also in a study of determinants of poor academic performance established that low parent income, shortage of laboratory, long walking distance to school had significant influence on the poor academic performance of the students, other factors which were found to influence poor academic performance included lack of English language competence, inadequate teaching and learning materials, inadequate number of teachers and unavailability of library facilities.

It is more importantly to note that availability of text books, laboratory apparatus and other learning resources contribute significantly to the performance of students in Biology examination. Mamalanga and Awelani (2014) on exploring factors affecting performance in Biology at selected secondary schools in Lesotho revealed that the performance of biology was affected by factors such as human, physical infrastructure and financial resources. Descriptively, school factors were found to have high influence on the performance of students in Biology in public secondary schools in Ndhiwa Sub County with an Overall Mean Rating of 3.55. This finding concurs with the findings of the studies by Goro, Simatwa and Baraza (2018); Ndege and Simatwa (2019a); Ndege and Simatwa (2019b); Ndolo and Simatwa (2016); Ndolo and Simatwa (2017); Olenja, Simatwa and Ndolo (2020a); Olenja, Simatwa and Ndolo (2020b); Khajeha, Simatwa and Barasa (2019); and Simatwa and Khajeha (2019) which established that institutional factors do influence students' academic performance in certificate of secondary schools and established that school facilities seem to be major institutional factors influencing student performance. The students' focus group discussion also echoed the same sentiment that schools with library, enough staffing, revision materials, use Information

Table 11. Influence of School Factors on Students' Performance in Biology as rated by Biology Teachers (n = 46)

Aspects of School Factors		Ratings					Total	MR
		1	2	3	4	5		
Library;	F	1	2	16	13	13	45	
	Score	1	4	48	52	65	170	3.78
	%	2.2	4.4	35.6	28.9	28.9	100	
Biology Laboratory;	F	9	9	6	5	15	45	
	Score	9	18	18	20	75	140	3.11
	%	20.0	20.0	13.3	11.1	33.3	100	
Staffing in Biology;	F	8	8	6	15	5	41	
	Score	8	16	18	60	25	127	3.10
	%	17.8	17.8	13.3	33.3	11.1	100	
Finances;	F	11	9	7	12	6	45	
	Score	11	18	21	48	30	128	2.84
	%	24.4	20.0	15.6	26.7	13.3	100	
Physical facilities;	F	3	4	15	16	7	45	
	Score	3	8	45	64	35	155	3.44
	%	6.7	8.9	33.3	35.6	15.6	100	
Revision Materials;	F	1	2	11	18	13	45	
	Score	1	4	33	72	65	175	3.89
	%	2.2	4.4	24.4	40.0	28.9	100	
Laboratory Technician;	F	2	5	4	14	20	45	
	Score	2	10	12	56	100	180	4.00
	%	4.4	11.1	8.9	31.1	44.4	100	
Chemicals and Reagents for Biology;	F	4	2	4	12	23	45	
	Score	4	4	12	48	115	183	4.07
	%	8.9	4.4	8.9	26.7	51.1	100	
Use of ICT in Teaching and Learning;	F	4	8	4	11	17	44	
	Score	4	16	12	44	85	161	3.66
	%	9.1	18.2	9.1	25.0	38.6	100	
Overall Mean Rating								3.55

KEY: F – Frequency MR – Mean Rating
Interpretation of Mean Rating
1.00- 1.44 = Very Low,
1.45 – 2.44 = Low,
2.45 – 3.44 = Moderate,
3.45 – 4.44 = High,
4.45 – 5.00 = Very High

Tables 12. Regression analysis of the Influence of School Factors on Students' Performance in Biology

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.400[a]	.160	.070	1.41900	.160	.697	9	33	.707

a. Predictors: (Constant)school factors

Table 13. ANOVA Output on the Influence of School Factors on Students' Performance in Biology

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.622	9	1.402	.697	.707[b]
	Residual	66.447	33	2.014		
	Total	79.070	42			

a. Dependent Variable: Students Performance in Biology
b. Predictors: (Constant): School Factors

Table 14. Multiple Linear Regression analysis between School Factors and Students' Performance in Biology

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.172	1.244		2.551	.016
Library	-.126	.290	-.093	-.434	.667
Biology Laboratory	-.084	.216	-.100	-.387	.701
Staffing in Biology	.048	.247	.052	.194	.847
Finances	-.200	.198	-.206	-1.011	.319
Physical Facilities	.317	.379	.222	.837	.408
Revision Materials in Biology	-.447	.600	-.280	-.745	.461
Laboratory Technician	.642	.394	.525	1.628	.113
Chemicals and Reagents for Biology	.118	.334	.104	.352	.727
Use of ICT in Teaching and Learning	-.313	.266	-.319	-1.175	.248

a. Dependent Variable: Students' Performance in Biology

Communication Technology in teaching, has laboratory and the chemical and reagents for biology and laboratory technician performed better in KCSE. This also concurred with the principal interview who argued "Secondary school equipped with the facility like teaching materials, physical facility, Information Communication Technology, biology laboratory and library, makes schools perform well in the KCSE in biology. This means that school factors are very important for the performance of students in secondary schools." This implies that school factors are very essential in the performance of learners in the KCSE biology exams and schools should ensure that they provide these essential resources for effective teaching and learning of biology at the secondary school level. The study then sought to establish the relationship between mean ratings on school factors and students' performance in biology in terms of KCSE mean scores so as to confirm the influence of school factors on students' performance in biology.

Interview report of the Quality assurance and standards argued that, "Secondary schools are many and sometimes share the facility like teaching materials and physical facility and equal strength of inspectorate, this makes schools with the correct policies to perform at the same range." This means that bright students are likely to perform well if the teaching methods, managements, government policy and staffing are put in place. This may also mean that the provision of teaching materials, staff, revision materials, finance and any other essential services are provided to the schools by the government. This was in agreement with Mamalanga and Awelani (2014) that performance of biology was affected by factors such as human, physical infrastructure and financial resources. Nyandwi (2014) in a study of determinants of poor academic performance of secondary school students in Sumbawanga District, Tanzania, analyzed data using descriptive and binary logistic model for inferential analysis and established that low parents' income, shortage of laboratory and long walking distances to schools have significant influence on the poor academic performance of the students. Other factors which were found to influence poor academic performance included lack of English language competence, inadequate teaching and learning materials, inadequate number of teachers and unavailability of library facilities. The performance of secondary school students were therefore found to drop every year mainly due to school and home based factors. Biology laboratory had coefficient of negative -.084 meaning that they reduced student performance by negative -084 and the P-value of .701 which is greater than 0.05 thus not significant and therefore biology laboratory cannot be relied upon to explain student performance.

The findings concurred with the principal interview that "Lack of school physical facilities like revision materials, library, use of ICT in teaching and learning materials, biology materials, staffing and finance are some of the major challenges likely to influence the academic performance of the learners in both boarding and day secondary schools." This implies that schools in Ndhiwa sub-county lacked some of the essential school factors like laboratory, library, ICT, laboratory technicians and chemical and reagents for biology practical's hence did not perform better in KCSE biology. Finance had coefficient of -.200 meaning they reduced performance by -.200 and the p value was .319 thus not significant. This is also according to Abdulrasheed and Bello (2015) who found out that poor funding of schools is a major problem of principals, leadership ineffectiveness and luck of availability of funds directly to the school accounts influence school performance. Mamalanga and Awelani (2014) agreed that performance of Biology at selected schools in Lesotho was affected by factors such as human, physical infrastructure and financial resources. Similarly Onyara (2013) confirmed that finance resource is not well established since most of the head teachers had their schools having financial problems. The findings of Akomolafe and Adesua,(2016) found out that there was a significant relationship between physical facilities and student level of motivation and academic performance. The result of the interview with the Sub County Quality Assurance and Standards officer also supported the result that; "Physical facilities are significant factors influencing student performance in Biology at secondary school because they provide conducive environment for learning during harsh weather condition like rain and sunshine." The finding concur with the result from students focus group discussion that reported that physical facilities are being provided by the government and has some influence on students performance in Biology in secondary schools. Lumbe, (2017) also carried out a study on factors affecting students performance in certificate of secondary education examination in Newala District, Mtwara region in Tanzania and found out that performance was low due to shortage of teaching and learning materials and physical facilities/lack of readiness of student in learning and poor entry marks in form one and there was low parental involvement and unclear policy while Nyandwi, (2014) established that low parents income, shortage of laboratory and long walking distances have significant influence on the poor academic performance of the students. Other factors which were found to influence poor academic performance include; lack of English language competence, inadequate teaching and learning materials, inadequate number of teachers and unavailability of library facility. In conclusion, school factors had influence on students' academic performance in Biology but the influence was not significant and cannot be relied upon to predict students' performance of Biology in Ndhiwa Sub County.

CONCLUSION

School factors were found to have both negative and positive relationships with students academic performance in Biology. The influence however was not statistically significant. This means that in Ndhiwa Sub county school factors cannot be relied upon to explain students' academic performance in Biology. This means that school factors do not have predictive power on students' performance in Biology.

RECOMMENDATION

Based on the findings of the study the following recommendations were made on the influence of school factors on students' academic performance in Biology:

- School managers to provide prudent financial management
- School principals should ensure that educational resources are utilized in enhancement of students performance. These educational resources include; Library, Biology Laboratory, finance, classrooms, teaching learning materials and textbooks, chemicals and reagents and computers.

- Quality Assurance and Standards Officers should closely monitor optimal utilization of educational resources in schools to the benefit of students.

REFERENCES

Abdulrasheed, O., & Bello, A.S. (2015). Challenges to Secondary School Principals' Leadership in Northern Region of Nigeria. *British Journal of Education. Vol. 3 (3): 1-5.*

Acato, Y. (2006). Quality Assurance vital. *New Vision, University guide*, *2007*, 2002-3.

Adebiyi A.A. (2006). Influence of Attitude and Motivation of Senior Secondary School Students' Achievement in English Comprehension. M.Ed Project, Unpublished. Ibadan: University of Ibadan.

Adekunle, R.F., & Femi – Adoye, K.O. (2016). Students' Attitude and Interest as Correlates of Students' Academic Performance in Biology in Senior Secondary school. *International Journal for Innovation, Education and Research. Vol. 4(3)*

Adhanja, R. A., Nyakan, P. O., & Yambo, J. M. O. (2016). Family based parental socio – economic factors that affect students' academic performance in public secondary schools in Rongo Sub County, Migori County, Kenya. *International Journal of Research and Development Organization. Vol. 2 (3). ISSN: 2455 6661.*

Ahmed, I. (2010). Does service quality affect students performance? Evidence from institutes of higher learning. *African Journal of Business Management*, *4*(12), 2527-2533.

Ajibade, B.O. (2016). Influence of peer group relationship on the academic performance of students in secondary schools: A case study of selected secondary schools in Itiba.

Akinsanya et al. (2014). Relative effects of parents' occupational qualification and academic motivation of wards on students' achievement in Senior Secondary school Mathematics in Ogun State. *Journal of education and Practice. Vol. 5 (22), 99-105*

Akomolafe, C.O., & Adesua, V. O. (2016). The impact of physical facilities on students' level of motivation and academic performance in senior secondary schools in South west Nigeria. *Journal of Education and Practice.*

Akubuilo, D.U. (2014). The effort of problem solving institutional strategies on students' achievement and retention in biology with respect to location in Enugu state. *Journal of the Science Teachers Association of Nigeria.* Vol. 24 (1&2), 94- 100

Alokan, F. B., Osakinle, E. O., & Onijingin, E. O. (2013). The influence of parents' educational background and study facilities on academic performance among secondary school students. *Ozean Journal of Social Sciences*, *6*(2). 27-33.

Albert, O. O., Osman, A., &Yungungu, A. (2014). An Investigation of Factors that Influence Performance in KCSE Biology in selected secondary schools in Nyakach District, Kisumu County, Kenya. *J. Educ. Hum. Dev*, *3*(2), 957-977.

Alordiah, C.O., Akpadaka, G., & Oviogbodu, C.O. (2015). The influence of gender, school location and socio – economic status on students' academic achievement in Mathematics. *Journal of Education and Practice. Vol. 6 (17)*

Amadio, M. (2013). A rapid assessment of curricula for general education focusing on cross- curricular themes and generic competences or skills. *Background paper for EFA Global Monitoring Report*, *14*.

Angwech, G., Gidudu, H. L. & Simatwa, E.M.W. (2017). Mainstreaming discrimination and academic performance of children with disability in Uganda. A Case study of Mbale District. *International Journal of current research Vol.9 (10); 59540-59545*

Arzu, M. (2018). The Effect of Parental socio – Economic Condition on the Students' Learning Achievement at Higher Secondary Level of Education in Jamalpur District. *International Journal of Social Sciences and Humanities Research. Vol. 6 (3), pp. 595 -601.*

Benn, R., Akiva, T., Arel, S., & Roeser, R. W. (2012). Mindfulness training effects for parents and educators of children with special needs. *Developmental psychology*, *48*(5), 1476

Burmeister, M., Rauch, F., & Eilks, I. (2012). Education for Sustainable Development and Chemistry education. *Chemistry Education Research and Practice*, *13*(2), 59-68.

Calvo, R. A., Markauskaite, L., & Trigwell, K. (2010). Factors affecting students' experiences and satisfaction about teaching quality in engineering. *Australasian Journal of Engineering Education*, *16*(2), 139-148.

Cedeno, L. F., Martinez-Arias, R. & Bueno, J. A. (2016). Implications of socio-economic status on academic competence: A perspective for teachers. *International Education Studies,* 9 (4), 257-267.

Creswell, J.W. (2005). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*. Pearson Education, Inc. New Jersey 07458.

Damien, N. (2010). Factors Affecting Private versus Public School Decisions*, Université Internationale de Kampala* - Master 2010

Deepika, K. & Prema, N. (2017). Peer pressure in relation to academic achievement of deviant students. *International Journal of Environmental and Science Education. Vol. 12 (8), 1931-1943.*

Dembélé, M., & Ndoye, M. (2003). A relevant curriculum for quality basic Education for all. The Learning Challenge: Improving the Quality of Education in Sub-Saharan Africa, 149-176.

Elifson, K.W., Runyon, R.P., & Haber, A. (1990). *Fundamental of social statistics*. Mc Graw Hill. New York.

Fakude, X. S. (2012). Some Factors which contribute to poor academic achievement among Undergraduate Students at a Tertiary Institution (Doctoral dissertation, University of Zululand

Femi, O., & Adewale, A.M. (2012). The effects of Parental socio – economic status on academic performance of students in selected schools in Edu LGA of Kwara State, Nigeria. *International Journal of Academic Research in Business and Social Sciences. Vol. 2 (7), 230-239.*

Fraenkel, R.J., & Wallen, E.N. (2009). *How to design and evaluate research*. Illinois: F.E. Peacock Publishers, Inc.

Goro, C. A., Simatwa, E. M.W. & Baraza, O.T. (2019). Influence of Parental level of education on academic achievement of pupils in public primary schools in Kisumu West Sub Counties an analytical study. *International Journal of Research* Vol. 11(08); 6697- 60703

Grinnel, M. R., & Unrau, Y. (2008). *Social work research and evaluation: Foundations of Evidence – Based Practice*. U.S.A: Oxford University Press.

Jing-Wen, Miao-Hsuan, Jiachi, Mei-Hung, Choring-Jee (2016). Examining the factors that influence students' science learning process and their learning outcomes: 30 years of conceptual change research. *Eurasian Journal of Mathematics, Science and Technology Education. Vol. 12 (9), 2617 – 2646.*

Kakumbi, Z., Samuel, E. B. & Mulendema, P. J. (2016). Pupil home background characteristics and academic performance in senior secondary schools: A case study of selected secondary schools in Kitwe District, Zambia. *Journal of Education and Practice*. Vol. 7 n22 p19-25.

Khan, S. A. (2017). *Mathematics proficiency of primary school students in Trinidad and Tobago* (Doctoral dissertation, Teachers College, Columbia University).

Khajeha H., Simatwa E.M.W., & Baraza, O. T. (2019). Influence of Lecturer Characteristics on Academic Achievement of Engineering Students in National Polytechnics in Kenya: An Analytical Study. International Journal of Current Research. (ISSN: 0975-833X) Vol. 11 (06): 5047-5055

Kombo, D.K., & Tromp, D.L.A. (2006). *Proposal and Thesis writing: An introduction.* Nairobi: Paulines Publications Africa.

Korir, W. & Wambugu, B. (2018). Influence of Parental Level of Education and Parental Income on Students' Academic Performance in Public Day Secondary Schools. *Journal of Education and Practice. Vol.9, No.35, ISSN 2222-1735*

Khawla, S. S., & Abdul, H.M.E. (2006). The relationship between school laboratory experiments and academic achievement of Palestinian students in introductory University science courses. Research in post – compulsory Education. Vol. 4 (1), 87-96.

Lebata, M. C., & Mudau, A. V. (2014). Exploring factors affecting performance in biology 5090 at selected high schools in Lesotho. *Mediterranean Journal of Social Sciences*, *5*(8), 271.

Leedy, P. D. & Ormrod, J.E. (2005). *Practical Research Planning and Design*. New Jersey: Pearson Merrill Prentice Hall.

Limbe, B. (2017). Factors affecting students' performance in certificate of secondary education examination in Newala District, Mtwara Region, Tanzania. Unpublished Master of Education Dissertation. The Open University of Tanzania.

Local Government Area of Oyo State. *Global Journal of Human – Social Science. Vol.16 (4).*

Lofland, D., Josephat, F., & Partin, S. (2013). Fecal transplant for recurrent Clostridium difficile infection. *Clinical Laboratory Science*, *26*(3), 131.

Lomax, R. G. (2007). *An introduction to Statistical Concepts*. London. Routledge. Falmer.

Mamalanga, C.L., & Awelani, V.M. (2014). Exploring factors affecting performance in Biology 5090 at selected high schools in Lesotho. *Mediterranean Journal of Social Sciences.*

Matengo, D. (May 9th May, 2019). Kenyan Universities worried over mass failures in Mathematics and Science.CGTN Africa. Retrieved from http:Africa.cgtn.com

Misanya, S.M. (2013). Peer influence on academic performance of form one students in girls boarding secondary schools in Kanduyi constituency, Kenya. Unpublished Master of Arts Research Project. UoN

Michubu, M.J. (2013). Socio- Economic Factors Influencing Students' Academic Performance in Public Secondary Schools in Igembe South District. Unpublished Master of Education in Curriculum Degree Research Project. UoN.

Muchunku, J. (2014). Effects of Socio Economic Factors on Pupils Performance in Kenya Certificate of Primary Education in Chuka Division, Tharaka – Nithi County. Unpublished Master of Educational Administration Research Project. Kenyatta University.

Mudulia, A. M. (2012). The impact of head teachers' administrative factors on performance in secondary school science subjects in Eldoret Municipality, Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies*, *3*(4), 514-52

Mugenda, O.M., & Mugenda, A.G. (2003). *Research Methods: Quantitative and qualitative approaches,* Nairobi: Acts Press

Mukhwana, W.J. (2013). The Role of Student – Related Factors in the Performance of Biology Subject in Secondary Schools in Eldoret Municipality, Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies.*

Naugah, J. (2011). Factors Affecting choice of Science subjects among girls at secondary level in Mauritius. Unpublished PHD Thesis, Brunel University.

Ndege, F.A., & Simatwa, E.M.W. (2019). Influence of Physical Facilities on Quality of Secondary School Education in Kenya. A Case Study of Migori County. *International Journal of Current Research*. (ISSN: 0975-833X) Vol. 11 (12): 8778-8792.

Ndege, F.A., & Simatwa, E.M.W. (2019) Influence of Teaching and Learning Resources on Quality of Secondary School Education in Kenya. A Case Study of Migori County. *International Journal of Current Research*. (ISSN: 0975-833X) Vol. 11 (12): 8793-8807.

Ndiritu, A. W. (2012). Effects of principals' transformational leadership characteristics on students' academic performance in secondary schools in Nairobi County Kenya. *Kenya (PHD thesis,* University of Nairobi, Kenya).

Ndolo, M.A., & Simatwa, E.M.W. (2016). Impact of free Secondary Education Policy on Primary to Secondary Education Transition Rate in Kenya: A case study of Mbita and Suba Sub- Counties. *International Research Journals of Educational Research*, (ISSN: 2141-5161) ICV: 6.05 Vol. 7(2): 024 -040, April 2016.

Ndolo M.A., & Simatwa, E.M.W. (2017). Impact of Free Secondary Education Policy on Secondary School Students Academic Performance in Kenya: A case study of Mbita and Suba Sub- Counties. *International Journal of Current Research*. ISSN: 0975-833X) Vol. 9, Issue, 08, pp. 56060-56072, August, 2017.

Neuman, W.L. (2011). *Basics of Social Research: Qualitative and Quantitative Approaches*. Pearson Education, Canada.

Ngema, M. H. (2016). *Factors that cause po* Ndiritu, A. W. (2012). Effects of principals' transformational Leadership Characteristics on students' Academic Performance in Secondary Schools in Nairobi County, Kenya. PhD Thesis, University of Nairobi, Kenya

Ngesu, L. M., Gunga, S., Wachira, L., & Kaluku, E. N. (2014). Some determinants of students' performance in Biology in KCSE: A case of Central Division of Machakos District. *International Journal of Innovative Research and Studies*, *3*(1), 174-186.

Njuguna, B. W. (2011). The extent, causes, and effects of students' absenteeism on academic performance in public day secondary schools in Nairobi Province. Nairobi. Kenyatta University.

Njuguna, N.R. (2011). Factors Influencing Academic Performance Public Primary Schools in Makuyu Division, Murang'a South District.

Njuguna, M. B. (2005). SMASSE: Students can excel in Mathematics, Science Subjects. *The Principal*, 29-30.

Nnadi, K.E., Dimnuobi, S.K., Nwokoye, E.S., Osigwe, A.C., & Ekisiobi, C.S. (2016). Socio – Economic Determinants of Academic Performances in Aguata Local Government Area, Anambra State. *Journal of Economics and Sustainable Development. Vol. 7 (10).*

Nonis, S. A., & Hudson, G. I. (2006). Academic performance of college students: Influence of time spent studying and working. *Journal of education for business*, *81*(3), 151-159.

Nyandwi, M.D. (2014). Determinants of poor academic performance of secondary school students in Sumbawanga District, Tanzania. Unpublished Master of Arts Dissertation. Sokoine University of Agriculture, Morogoro, Tanzania.

Obidile, J.I., Amobi, S.C., Ozoekwe, H.E., Akuezilo, J.A. (2017). Perceived Factors Influencing Academic Performance of Students in Accounting in Secondary Schools in Anambra State. *IOSR Journal of Humanities and Social Sciences. Vol. 22 (2), pp. 96-99*

Ofoegbu, T.O. (2003). Challenges of Implementing Senior Secondary One curriculum in Nigeria. *Journal of the Science Teachers Association in Nigeria. Vol. 38 (1 & 2), 46 – 50*

Ogbonna, F. N. (2007). Influence of parental involvement and self – concept on science achievement of Junior Secondary School Students in Ogun State, Nigeria. A pre – field research proposal presented at research seminar of the institute of Education. Olabisi Onabanjo University, Ago Iwoye.

Ogutu, O. A., Osman, A., & Yungungu, A. (2014). An investigation of Factors that Influence Performance in KCSE Biology in selected secondary schools in Nyakach District, Kisumu County, Kenya. *Journal of Education and Human Development June 2014, Vol. 3 (2), pp. 957-977*

Okumu, W.M. (2014). Socio – Economic factors influencing students' access to secondary school education in Rongo District, Kenya. Unpublished Master of Education Research Project. University of Nairobi.

Olasehinde, K. J., & Olatoye, R. A. (2014). A comparative study of public and private senior secondary school students' science achievement in Katsina State, Nigeria. *Journal of Educational and Social Research. Vol. 4 (3).*

Olenja, J.M.A. Simatwa E.M.W., & Ndolo, M.A. (2020). Impact of Free Secondary Education Policy on Retention Rates in Public Secondary Schools in Kenya: A Case Study of Emuhaya and Vihiga Sub Counties. *International Journal of Current Research*. (ISSN: 0975-833X) Vol. 12, (07): 12722-12740.

Olenja J.M.A., Simatwa E.M.W**.,** & Ndolo, M.A. (2020). Impact of Free Secondary Education Policy on Completion Rates in Public Secondary Schools in Kenya: A Case Study of Emuhaya and Vihiga sub counties. *International Journal of Current Research*. (ISSN: 0975-833X) Vol. 12, (07): 12741-12758.

Ondieki, P.O., & Orodho, J.A. (2015). School Based Factors Influencing Performance of Pupils on Transition from Lower Primary to Upper Primary in Ekerenyo Division, Nyamira County, Kenya. *Research on Humanities and Social Sciences Journal. Vol. 5 (6), 2015.*

Onyara, B. N. (2013). School based factors influencing student's academic Performance at Kenya certificate of secondary education in Teso South district. Unpublished Thesis, University of Nairobi.

Oredein, A. O. (2000). Leadership characteristics and personnel constraints as factors of school and industrial effectiveness. Unpublished Ph.D. Thesis, University of Ibadan, Nigeria.

Orodho, A.J. (2003). *Essentials of Educational and Social Sciences Research Method.* Nairobi: Masola publishers.

Orodho, A.J., & Kombo, D. K. (2002). *Research Methods*. Nairobi: Kenyatta University, Institute of Open Learning.

Orodho, J. A. (1996). Factors determining achievement in science subjects at secondary school level in Kenya. Unpublished PhD Thesis. Nairobi: Kenyatta University.

Oso, Y. W., & Onen, D. (2005). A general guide to writing Research proposal and report: A handbook for beginning researchers. Jomo Kenyatta Foundations, Nairobi.

Osuji, J.N. (2016). Impact of school facilities on Students' Academic Performances in public secondary school in Giwa and Zaria Education Zones, Kaduna State, Nigeria. Master of Education Dissertation. Ahmadu Bello University, Zaria, Nigeria.

Ovansa, J. U. (2017). Effect of Socio – economic status on the academic performance of Senior secondary school students: A case study of Public Senior Secondary schools in Adavi L.G.A of Kogi State. *International Journal of Education and Evaluation. Vol. 3(8).*

Owoeye J.S., &Yara, P.O. (2011). School Facilities and Academic Achievement of Secondary School Agricultural Science in Ekiti State, Nigeria. *Asian Social Science Journal. Vol 7(7).*

Paulo & Amstrong (2015). *South African journal of childhood Education vol.5(2)*

Salameh, W. (2012).The Impact of Social and Economic Factors on Students' English Language Performance in EFL Classrooms in Dubai Public Secondary Schools. Unpublished Master of Education Dissertation. The British University in Dubai.

Samikwo, D. C. (2012). Factors which influence academic performance in Biology in Kenya a case of selected secondary schools in Uasin-Gishu West District (Doctoral dissertation, Moi University).

Schneider, R. M., Krajcik, J., Marx, R. W., & Soloway, E. (2002). Performance of students in project-based science classrooms on a national measure of science achievement. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, *39*(5), 410-422.

Schwab, K., & Sala-i-Martín, X. (2016, April). The global competitiveness report 2013–2014: Full data edition. World Economic Forum.

Sharma, D., & Srivastava, P. (2013). OFDM Simulator Using MATLAB. *International Journal of Emerging Technology and Advanced Engineering*, *3*(9), 493-49.

Sharma, D., & Srivastava, P. (2013). OFDM Simulator Using MATLAB. *International Journal of Emerging Technology and Advanced Engineering*, *3*(9), 493-496.

Simatwa, E.M.W., & Khajeha, H., (2019). Influence of Institutional Facilities on Students Academic Achievement in Engineering Courses in National Polytechnics in Kenya: Analytical Study across Engineering Courses. International Journal of Current Research. (ISSN: 0975-833X) Vol. 11 (06): 4800-4809.

Suman, B. (2011). Influence of parental Education and parental occupation on academic achievement of students. *International Refereed Journal. Vol. 3 (30), 32-33*

Varaprasad, C., & Manikanta, K. (2018). The Factors Affecting Academic Performance among Students Pursuing Professional Courses. *Journal of Research in Business and Management.*

Wambui, K.E. (2017). Factors Influencing Students' Academic Performance in Kenya Certificate in Secondary Education. A Case Study of Kirinyaga Central Sub County, Kirinyaga County. Unpublished Master of Arts in Project Planning and Management Research Project. UoN.

Wanyama, A. G. E., Simatwa, E. M. W. & Okwach, T. O. (2018). Contribution of school administrators to teaching/learning resources in enhancement of students' academic performance in secondary schools in Kenya. An Empirical study across secondary schools of Emuhaya and Vihiga Sub Counties. *International Journal of Current Research vol. 10 (3); 67290-67301*

Waseka, L.E., & 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 Journal.* Vol. 7 (3): 072 -087.

Waseka, E. L., Simatwa, E., & Goro, T. O. (2016). Influence of teacher factors on students' academic performance in secondary school education. A case study of Kakamega County, Kenya. *Greener Journal of Educational Research*, *6*(4), 151-169.

Yolanda, P. B. (2014). Determinants of High Academic Performance in secondary schools in Kilimanjaro Region.

Zelalem, G., & Kathiresan, A. (2016). The socio – economic factors affecting girls 'academic achievement and gender based violence in higher institutions: A case study in universities in Amharan Regional State. *International Journal of Research – Granthaalayah. Vol. 4 (12), 36 – 46.*

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