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The Relationship between Students Attitude towards Biology and Performance in Kenya Certificate of Secondary Education Biology in Selected Secondary Schools in Nyakach, Kenya

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ABSTRACT

This paper focuses on student's attitude towards Biology and how it influences their performance in Kenya Certificate of Secondary Education (KCSE) examinations in selected secondary schools in Nyakach. The study was significant as performance in Biology in KCSE examination has been poor over the years; hence need to find out the causes. The study was guided by the systems theory advocated by Gagne and Briggs. The research was conducted through descriptive survey design by quantitative and qualitative approach. The target population was seven hundred and thirty Form four students, eighteen Biology teachers, and fourteen Principals. Stratified random sampling was used to select schools, purposive sampling for selecting teachers and Principals, form four students were first stratified then selected through simple random sampling. Data was collected using questionnaires for students, teachers and interview schedule for principals. Descriptive Statistics such as frequencies, percentages, correlation analysis, regression coefficient and coefficient of determination were used to analyze data using Statistical Package for the Social Sciences Programme (SPSS). The finding showed that there is positive relationship between student's attitude towards Biology and their performance in KCSE Biology. The study recommended that Biology teachers should use teaching methodologies that will promote positive attitude towards Biology among students.

Key words: Relationship, attitude, performance, teaching and methodology, student perception and teacher perception.

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INTRODUCTION

Attitude is a very complex and unique concept, it is defined as the tendency to think, feelings or preferences that a person has about an object, based on their belief about the object, which can be positive or negative. Coll et al. (2002) and Kind et al. (2007) viewed attitude as having different components which include cognitive (knowledge, beliefs and ideas), affective (feeling, like and dislike) and behavioral (tendency towards an action). The attitude that one has towards an object makes one to make judgment as to whether the object is good or bad, harmful or beneficial, pleasant or unpleasant, important or unimportant (Crano and Prislin, 2006), Oluwatelure and Oloruntegbe (2010), Salta and Tzougraki (2004) and Sax (1997). Attitude consists of three basic components, namely thinking, feeling and reacting. The thinking component involves self belief. The feeling component

Table 1. The national performance of candidates in KCSE Biology examination for 2006-2010.

Year	No. of candidates	Percentage mean score%
2006	217,657	54.89
2007	246,662	41.95
2008	270,000	30.38
2009	299,302	27.20
2010	315,063	29.23

Source: KNEC reports (2006 to 2010).

Table 2. National percentage passes in Biology (KNEC).

YEAR	High quality % passes B+ - A	Low quality % passes D to E
2004	12.03	36.67
2005	7.7	43.61
2006	6.13	49.64
2007	8.79	40.76
2008	5.08	34.08
2009	4.39	32.11
2010	5.88	29.4

Source: KNEC reports (2004 to 2010).

involves issues relating to value and the reacting component involves the tendency to behave in a certain way.

This paper examines how student's attitude (positive or negative) influences their performance in Kenya Certificate of Secondary Education (KSCE) Biology. Njuguna (1998) argues that emotional attitude can have profound effect on our learning efficiency. The kind of attitude one holds in a leaning situation therefore is of great significance. Munn et al. (1972) argue that "attitudes are learnt predispositions towards aspects of our environment". They involve the tendency to evaluate something in a positive or negative way. The problem of poor performance in science subjects is global as indicated by studies done by Valverde and Schmidt (1997) in USA, Landry (1998) in Canada, Fonseca and Conboy (2006) in Portugal. The Kenyan society has laid a lot of emphasis on performance tests because the immediate goal of learning is to pass tests those open doors to higher education pursuit. Success in school is determined by high passing scores in examinations. Siringi (2010) also reported that performance in key curriculum subjects like mathematics and sciences at KCSE examinations has not been satisfactory for quite a long time. From the data in Table 1, it is evident that the national performance of students in KCSE Biology is relatively low in the whole country as shown in Table 2.

In the year 2004 only 12.03% attained the high quality grades B+ to A. This declined to 7.7% in 2005, 6.13% in 2006, 8.79% in 2007, 5.08% in 2008, 4.39% in 2009, and 5.88% in 2010, showing that high quality grade passes are very low. On the other hand in 2004, 36.67% of the candidates obtained low quality passes D to E. In the years 2005 it was 43.61%, 2006 it was 49.64%, 2007 it was 40.76%, 2008 it was 34.08%, 2009 it was 32.11% and 2010 it was 29.4%. The majority of the candidates had low quality passes indicating that they obtained grades below stipulated mastery of the subject matter. Learning achievement was adopted as a key indicator of education during world conference of education for all (EFA) in Jomtien, Thailand (UNESCO, 2000).Since achievement in Biology at KCSE in Kenya has been consistently low over the years, this is an indication of low quality Biology teaching/learning. The performance in Biology at KCSE for the years under review, clearly indicates that a large proportion of students who leave secondary school education cycle at form four in Kenya do not attain the basic mastery level of the secondary Biology course. Unless this trend is reversed, the prospects of attaining the goal of Kenya vision 2030 may not be achieved.

The overall candidates performance in Table 3 shows clearly that very few candidates obtained high quality passes, B+ to A was 5.08% in 2008, 4.39% in 2009 and 5.88% in 2010, while low quality passes D to E in 2008 was 38.08%, in 2009 it was 32.11% and in 2010 it was 29.4%, this reveals that a third of the candidates get low quality grades, which cannot allow them to pursue Biology courses in further education. In general performance in sciences has been poor. Knowledge of Biology contributes towards the socio -economic development of the country. The knowledge of genetics which is a branch of Biology has revolutionized determination of paternity disputes and identity of culprits of serious crime with precision and certainty through Deoxyribo-Nucleic Acid (DNA) sequencing and profiling,

Table 3. Biology percentage passes 2008 to 2010 (KNEC).

Grade	2008 %		2009 %		2010 %	
A	0.27		0.27		0.44	
A-	1.71	5.08	1.32	4.39	1.85	5.88
B+	3.1		2.80		3.59	
B	4.43		4.48		5.12	
B-	6.11		6.54		6.97	
C+	8.46		8.86		9.41	
C	11.32	60.79	11.91	63.49	12.35	64.65
C-	14.23		14.90		14.79	
D+	16.24		16.80		16.01	
D	17.78		17.68		16.04	
D-	13.96	38.08	12.66	32.11	11.62	29.4
E	2.34		1.77		1.74	
Total	99.95	99.95	99.99	99.99	99.93	99.93

Source: KNEC report 2010.

Table 4. Sub-County percentage passes in Biology.

Year	High quality passes % B+-A	Low quality passes % D to E
2010	6.2432	37.2851
2009	5.04854	35.9224
2008	8.09232	33.4286
2007	7.4382	36.2459
2006	8.1243	37.1876

Source: Nyakach Sub County Education Days (2006 to 2011).

Table 5. Association between practical and performance in KCSE Biology.

Regulation of administering practical	No. of teachers	Mean in KCSE Biology
Frequently	1	8.145
Occasionally	10	7.151
Rarely	6	5.145
Never	1	4.953

(Institute of Biology, 2007). Table 4 illustrates that through the years the percentage high quality passes has been below 9% while low quality passes has formed the bulk of the candidates with over a third of them. This implies that more than a third of the candidates who sat for KCSE Biology in Nyakach Sub-County, failed to meet the expected mastery of the subject matter and this locked them out of careers where Biology is a prerequisite subject as shown in Table 5. From Table, 1 teacher frequently administered practical to his students, the mean grade was 8.145, 10 Biology teachers occasionally administered practical the mean grade was 7.151, 6 teachers rarely administered practical had a mean of 5.145 and 1 never administered practical had a mean of 4.953 in KCSE Biology. Despite the efforts of the BOM, PAs, CDF, Government and communities, the performance in sciences and Biology in particular have not been impressive. Nyakach Sub-county has been producing very few high quality grade passes, less than 9% of students attain high quality grades B+ to A, and over 30% attain poor quality grades of D to E. Unless this trend is changed Nyakach as a sub-county may not be able to produce students who may be admitted into high education level courses such as in Medicine, Agriculture and Environment. The researcher feels that there are factors which may be contributing to this state of affairs of poor performance in KCSE Biology in Nyakach.

STATEMENT OF THE PROBLEM

In the background section, it has been illustrated that there has been poor performance in KCSE Biology in Nyakach Sub-County as reflected by more low quality passes of D to E above 30% between the years 2006 to 2010 and very few high quality passes, less than 9% within the same period. Biology has contributed to the development of new and better drugs and vaccines

against many human and animal diseases such as measles, malaria, polio and rinder pest, and it has contributed towards conservation of environment and endangered species. Biology lays the foundation for careers in Agriculture, which is the engine for economic growth. Agriculture in Kenya earns 60% of foreign exchange and provides employment to over 70% of the population, (Government of Kenya, 2003). Biology researchers have been able to develop high yielding, disease resistant and fast maturing food crops and animals to meet the food requirements of an ever increasing world population through continuous research. Despite the knowledge of the importance of Biology for socio-economic development of the country, the government and other stakeholders' efforts in provision of facilities and teachers, the performance in science and Biology in particular has not been impressive in Nyakach Sub-County. In view of students poor performance in KCSE Biology, there is need to establish the factors that promote good performance in KCSE Biology. Therefore the researcher specifically set out to investigate factors that influence poor performance in KCSE Biology in selected secondary schools in Nyakach Sub-County, Kisumu County.

LIMITATIONS OF THE STUDY

The study confined itself to investigating students' attitude towards Biology and performance in KCSE Biology. The results were, therefore, interpreted only in this context of the study. The study was limited to a small sample schools that were selected and Form four Biology students, Biology teachers and principals participated. The study was further limited to the performance in KCSE Biology and to analyzing data given by the sources. The study had no control over the exact information students and Biology teachers chose to give or withhold. The study was also limited by inadequacy of time since the KCSE examinations were ongoing, which made the researcher to re-schedule the research process on the days where there were no examinations going on.

MATERIALS AND METHODOLOGY

The study was carried out in 14 selected secondary schools in Nyakach. It sought to capture useful data that was representative of the factors that influence performance of students in KCSE Biology in Nyakach. The study design was descriptive survey research since it was a fact finding with an intention of establishing the truth. There were 41 secondary schools at the time of study, of which 14 were selected for the study based on whether they were boys', girls' or mixed schools. Form four Biology students, Biology teachers and principals were involved. 730 Biology students, 18 Biology teachers and 14 principals were used in the study. Owing to the varied nature of the schools, stratified sampling was used. Three categories were used for equal representation for boys', girls' and mixed schools. During sampling, 40% of the girls', 100% of the boys' and 85% of the mixed schools were used.

Data was then collected from the sample selected using questionnaires and interview schedules. Students were presented with a set of Likert Scale to report on attitude of students towards Biology. The students were to respond as Never = 1, rarely = 2, occasionally = 3, frequently = 4 and Always = 5. For each question, the scores of the response of all the students were summed up to represent a mean. A mean of less than 2.5 meant they had negative attitude, 2.5 to 3.5 meant they had neutral attitude, mean greater than 3.5 meant that they had positive attitude. This was done by using Attitude towards Science Test (ATST) Measure. Both qualitative and quantitative data analyses were employed. Qualitative analysis involved derivation of explanations and making interpretations of findings and trying to establish relationships from information gathered. Quantitative analysis involved derivation of statistical descriptions and interpretations of data by use of descriptive statistics.

RESULTS AND DISCUSSION

The study sought to examine the factors that influence performance in KCSE Biology. This was based on the premise that some factors are influential to performance in KCSE Biology. Therefore, these factors need to be understood and properly addressed in order to improve students' performance. The factors were measured by looking at relationship between students' attitude towards Biology and students performance.

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A mean of less than 2.5 meant that they had negative attitude, 2.5 to 3.5 neutral and a mean greater than 3.5 meant that they had positive attitude. On students opinion on how often they consulted Biology teachers had a mean of 2.786 meant they had a neutral attitude. On frequency to which they had discussion in their groups had a mean of 3.089 this implied that they had neutral attitude, on the extent to which the students set questions for themselves and getting answers without checking test books for answers the mean was 2.667 which meant they occasionally set questions and answered them, so had neutral attitude. From teachers opinion on whether students enjoyed learning Biology had a mean of 3.444

which meant they had neutral attitude, on whether students enjoyed having discussion groups had a mean of 3.278 meant they had neutral attitude. On whether the students enjoyed learning Biology when they were in excursions than in class had a mean of 3.389 implied they had neutral attitude, on the attitude of students towards use of practical to learn Biology had a mean of 3.556 which meant they had positive attitude, on students enjoying Laboratory work when engaged in hands on activities compared to teacher demonstrations had a mean of 3.556 which meant they had positive attitude, on consultation 83.33% Biology teachers confirmed that their student went to them for consultation.

The results from students' perception show that students had neutral attitudes towards enjoying learning Biology, frequency of consulting Biology teachers, having discussion groups, setting questions for themselves and getting answers without checking text books. From teachers' perception, students had a neutral attitude towards enjoying learning Biology, having discussion groups but had positive attitude when engaged in practical and enjoying laboratory work when engaged in hands on activities compared to teacher's demonstrations. This led to poor performance in KCSE Biology. There was a significant positive correlation between students' attitude and performance in KCSE Biology. The analysis of correlation coefficient showed 5% level of significance. The kind of attitude one holds in a learning situation therefore is of great significance. P-value 0.0198, the probability of the null hypothesis being true is 1.98% and the alternative hypothesis is 98.02%, that there is a relationship between students' attitude and performance in KCSE Biology, therefore we reject the null hypothesis and accept the alternative hypothesis.

Attitude is the inner feelings of an individual towards something or somebody. Positive attitudes in students help to improve performance. Attitude influences ones thought which in the end affects understanding of the individual. Positive attitude activates the thinking, feeling and reacting components of an individual, hence influences the performance. On the other hand, negative attitude contributes to lack of motivation in learners hence hindering them from performing well. Positive attitude cultivates students' ambitions and morale of what they want to be in future hence, working hard under minimum supervision. An attitude consists of three basic components, namely thinking, feeling and reacting. The thinking component involves self-belief. The feeling component involves issues related to value, and the reacting component involves the tendency to behave in a certain way. According to Driver and Bell (1986), ''the learners have the final responsibility for their learning…in that they decide what attention they give to a learning task, construct their own interpretations of meaning for the task and evaluate those meanings, Norwich and Jaegar (1989) aver that ''there is at best an explicit or implicit assumption that the attitude to school subjects should be related to achievement, if only on the grounds that positive attitude leads to greater achievement''. It can be said therefore that interest and attitude of a learner towards a particular subject matters a lot. This is because these two constructs are high motivating factors which can lead to better achievement on the part of the learner. Students' interest influence performance in KCSE Biology, this is so because having interest in Biology cultivates students' positive attitude towards the subject, hence enabling the students to work hard.

In the study, it was found out that the students had a neutral attitude towards enjoying learning Biology, having class discussion groups, like learning Biology when they are in excursion than in class, but had positive attitude only when engaged in practical in Laboratory work and when engaged in hand on activities. This led to poor performance in KCSE Biology (Owino et al., 2014). Owiti (2001) believes that attitude affect achievement and achievement affects attitude. Positive attitude activate the thinking, feeling and reacting components of an individual hence influences the performance. Negative attitude contributes to lack of motivation in learners hence hindering them from performing well. Positive attitude cultivates students' ambitions and morale of what they want to be in future hence, working hard under minimum supervision. Attitude also affects performance in K.C.S.E Biology. The problem lies in the attitude type, positive or negative that the learner possesses, if positive it influences good performance and if negative it influences poor performance. Wabuke (2013) established that an interest in Biology influences performance because it provides the drive within students to participate in the learning process.

Logic dictates that hands-on labs should be more exciting for students than watching of demonstration by a teacher, and research consistently indicates that student's attitude improves with hands-on labs compared to teacher demonstrations. (Ajewole, 1991; Freedmon, 1997; Killerman, 1998). Biology practical forms paper three of KCSE Biology. Backe (2005) notes that having a personal experience in the learning process accounts for 80% of knowledge retention. Practical helps students to put what they have learnt in theory into reality thus, making the subject livelier. Practical entail application of theoretical concept by performing experiments. Having interest in something drives an individual towards working hard to achieve it. Student's willingness to participate in practical activities, especially in groups improves performance in Biology. SMASSE INSET (2004). This finding, just like those of SMASSE (2004), show that when a teacher increases the number of time he administers practical to his students, the performance in Biology improves. Moreover, practical supplement good marks to those students who are weak in theory (KNEC, 2007) hence influencing performance in KCSE Biology.

Ability to do practical influence performance in Biology, Biology practical are far much better than the theory papers and therefore, students who are able to perform practical efficiently are well placed in terms of subject performance. The then KNEC Secretary, Juma Mwachihi lamented candidates scripts showed they do not perform adequate practical in Sciences as required by the syllabus.

The candidates failed in questions dependent on experiments (KNEC, 2010). This observation concurs with the findings of the study that students should be capable of doing practical because they contribute positively to performance in practical exams, at the same time improving their response to theoretical questions dependent on experiment. Discussion groups help slow learners to sharpen their minds and be able to integrate complicated Biology terms that they did not understand in class. In addition, group discussion plants the virtue of commitment to members because everybody has to contribute to the discussion, hence widening their scope of knowledge. It is through discussion groups that students are able to express themselves in areas of difficulty and are able to learn new ideas from each other hence, building their capacity in the subject which affects performance. Dr. William Glasser, who specializes in educational counseling, has estimated that we remember 10% of what we read, 20% of what we hear, 30% of what we see, 50% of what we see and hear, and 70% of what we discuss with others (Backe, 2005).

Discussion as a medium for knowledge acquisition is vital. Discussion groups should be embraced more to promote good performance especially among weak students. Proper management of time greatly improves students' performance since time wasted cannot be recovered. Kurgat (2008) notes that poor planning of personal study time may cause students to lose concentration. He advocates for proper planning as a useful study skill as it eliminates distractions and indecision in their study. Respondents mentioned during self study on the subject asking assistance from teachers in areas of difficulty, forming discussion groups, dedicating more time for the subject, having personal timetable which guides students' private studies, are some of the attributes that trigger improved performance in Biology.

The study established that an interest in Biology influences performance because it provides the drive within students to participate in learning process. When pupils express lack of interest in the subject, it affects the way they react or listen to the teacher. It can be said therefore that interest and attitude of learner towards a particular subject matter a lot. This is because the two constructs are high motivating factors which can lead to betters achievement on the part of the learner. Good attitude and better interest learners display particularly in Biology serve as an encouragement even to the teacher. This can help the teacher a lot to disseminate his teaching to the best of his ability and knowledge making use of all available resources, rather than resorting to the use of chalk and talk when learners show no interest or negative attitude. Moreover, when students display good attitude and better interest in Biology, the teacher is motivated and this may cause him to forget whatever hindrances to the teaching of the subject from his own part. In the study, the researcher found out that the students had a neutral attitude towards enjoying learning Biology, having class discussion groups, like learning Biology when they are in excursions than in class, when they are engaged in practicals, laboratory work, when engaged in hands on activities; this led to poor performance in KCSE Biology.

RECOMMENDATIONS AND CONCLUSIONS

This study makes the following recommendations Biology teachers use teaching methodologies that will promote positive attitude towards Biology by encouraging discussion groups, excursions and hands on activities, and making the subject interesting. From the findings and discussions, it was concluded that: Students' neutral attitude towards Biology made them not enjoy learning Biology, not having discussion groups, not liking learning Biology when in excursions than in class, not enjoying Biology when engaged in practicals, hate laboratory work in hands-on activities, not asking assistance from teachers, not dedicating more time for the subject, this led to poor performance in KCSE Biology in Nyakach Sub-County. Attitude if positive influences good performance while if neutral or negative influences poor performance.

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