A study of students' performance in Kenya Certificate of Secondary Education with special reference to Biology

Lewis Muli Ngesu (University of Nairobi)

Esther Nthoki Kaluku (Kamuthanga secondary school)

Abstract: *Many secondary schools in Kenya have been performing poorly in Kenya Certificate of Secondary Education (KSCE) in Biology examination over years. Often the teacher is blamed for poor performance among other factors. The purpose of this study was to investigate students performance in Biology in KCSE in secondary schools in Central division of Machakos district. The study was conducted in twelve secondary schools in the division in the categories of national, county and district. Data was collected from Form four Biology students, Biology teachers, Heads of Science department and heads of secondary schools in the division through the use of a questionnaire and interviews. The design of the study was descriptive survey and stratified sampling was used to select participants depending on the category of the school. The study revealed that syllabus coverage and effective practical sessions were the major predictors of good performance in Biology. The study concludes that student's performance in Biology at KCSE level seems to be influenced by a combination of factors (Teaching methodologies, teacher's related factors, school related and social-economic factors). The Kenyan government should intensify its efforts to train and retrain Biology teachers through conducting induction courses, seminars and refresher courses on teachers of Biology.*

Introduction and contextual background

In Kenya, the current long-term development policy of the Government (GoK) is to transform the country into a newly industrialized, middle-income economy providing a high quality life to all its citizens by the year 2030 (GoK, 2007). One of the strategies towards this goal is to provide its citizens with globally competitive quality education, training and research for development and enhanced individual well-being as it is acknowledged that human resource is central to the country attaining its goals of industrial development and technological advancement (UNESCO, 2004). The Government of Kenya further intends to have international ranking for her children's achievement in Mathematics and Science and all these are critical for socio-economic development. To achieve this, the government aims to transform the country into a new industrialized, middle income economy providing a high quality of life to all its citizens by the year 2030 (GoK, 2007).

Science is recognized widely as being of great importance internationally both for economic well being of nations and because of the need for scientifically literate citizenry (Fraser & Walberg, 1995). Knowledge of science and technology is therefore a requirement in all countries and all people globally due to the many challenges that are facing them. Educators and the general public have time and again expressed concern over factors that influence student performance in examinations.

In order to improve academic performance in secondary schools different strategies have been laid down. That is, education stakeholders always endeavor to ensure that students perform well in examinations. This is because examination provides major channels of pursuing chances for higher education and promising jobs. Education is critical to this realization and as Ngesu et al

(2014) points out education and development are two inseparable and mutually supportive processes. This explains why Education for all is being increasingly adopted by most countries which now seek to provide free and compulsory education for all citizens up to age 15.

Teaching and learning Biology in Kenya

It is the government of Kenya policy that the country attains the newly industrialized status and this has been emphasised by the recently launched blueprint vision 2030 (Government of Kenya, 2007). Education, especially in the areas of Mathematics and Science (Physics, Chemistry and Biology) is critical to this attainment (Digolo, 2005). Biology plays a key role in industrialization and other sectors of the economy (Mwirigi, 2011, Ngesu et al 2014). It is a practical subject which equips student with concepts and skills that are useful in solving the day to day problems of life. The learning of Biology helps us to know how to use natural resources more efficiently in industry, for example in Bio-technology, food production, building and paper industry. It also helps learners to understand changes in the environment and the factors affecting these changes in order to know how human needs are influenced, ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture; reasonable and functional scientific attitudes (Kenya Institute of Education, 2002). All these objectives whether general or specific are only achieved by the teacher through giving the right types of instructions to the science students. No matter how well-developed and comprehensive a curriculum is, its success is dependent on the quality of the teachers implementing it.

In 2005 when 236,262 candidates were entered for Biology, only 7.7% attained grades B+ to A while 43.61% attained grades D to E (KNEC, 2006). In 2006 only 6.12% of the candidates attained grades B+ to A while 49.64% which was almost half the candidature in that year attained grades D to E and this was below the expected basic mastery of the subject (KNEC,

2007). The performance was relatively the same in 2007 when only 8.79% of the candidates attained grades B+ to A while 40.76% attained grades D to E (KNEC, 2008). For the years under review, more than a third of the candidates in Biology attained grades below the stipulated basic mastery of the subject matter. In Machakos District, achievement in Biology at KCSE has been low and a similar trend of poor performance which was lower than the national average is observed for the years under review. In 2006 the district registered the lowest performance for the years under review with 3.36% and 61.17% of the candidates attaining grades A to B+ and D to E, respectively (KNEC, 2007). This implies that close to two-thirds of the candidates who sat for Biology at KCSE in Machakos District in 2006 did not attain the expected basic mastery of the subject matter. For 2007 the figures were 5.46% and 49.03% for grades A to B+ and D to E, respectively (KNEC, 2008). In 2009 and 2010 the results were pathetic and reflected a downward trend.

It can be summed up that teachers should focus on the desired learning outcome and make decisions about pacing and curriculum emphasis so that students may have every opportunity to learn. Teacher should use teaching methods that suit both the content and the students. A teacher may use a variety of teaching methods including discussion method. Discussion is a process whereby two or more people express, clarify and pool their knowledge, experiences, opinions, and feelings (Ngesu et al 2014).

In Kenya, secondary school teacher training combines teaching methodology and teaching subject content mastery and under this system both academic and methodology suffer from an overburdened programme. This may imply that the teachers are not adequately prepared on teaching approaches which may in turn explain the low achievement in Biology at KCSE. In order to address the low achievement in Biology at KCSE in Kenya, Biology teachers need to be

exposed to appropriate teaching and learning approaches that are learner cent red rather than teacher cent red. The learner centred teaching and learning approach actively engage the learner in the learning process for effective mastery of the subject content matter and promotes a positive attitude towards the subject. To improve academic achievement, the teaching approaches adopted by a teacher should make learning more learner-cent red so as to promote imaginative, critical and creative skills in the learners resulting in better achievement of instructional objectives (Ministry of Education Science and Technology, 2001).

In her research on teaching resources on student performance in Biology in selected secondary schools in Nakuru district Jane (1996) found out that there are a number of factors that contribute to students poor performance in the subject namely; inadequate teaching resources such as textbooks, laboratory and its related facilities.

Ansu (1992) says that the culture of an ethnic group may have some influence of the student because it may be instrumental in transmitting certain ides and attitudes affecting motivation and levels of aspiration, personality traits that may bear an academic ability and linguistics expressions and logical concepts which mediate the learning process.

Mwiringi (2011) says that malnutrition and poor living conditions are bound to have an influence on the health of the child and so directly or indirectly affect his ability to learn. Limited income among low class families have been found to restrict provisions of school books, development funds and other necessary materials to ensure good performance and attendance at school.

Parental interest and aspiration for their child's education are very important. The children who are encouraged in their work by their parents are at an advantage both in the relatively high scores, they make in their test and in the way they improve their scores between eight to eleven

years compared to those that are not encouraged. This interest is related to the parents socio-economic status and to a large extent, educational levels (Kibera and Kimokoti 2007). They further argue that children who are not encouraged by parents in their school work are likely to go to school late, for they may be given duties like fetching water, opening the family shop, cooking and even bathing brothers before going to school. Simmons (1968) emphasizes the fact that educational investment enhances the power or position of those who are not. He further asserts that home background or parental social economic advantages far more than it enhances the power or position of those who have not.

Objective of the study

The study was guided by the following objectives:

1. To examine the influence of teachers related factors on students' performance in Biology in KCSE
2. To establish the influence of social economic factors on students performance in Biology in KCSE.

Research design and Methodology

The study used descriptive survey design. Descriptive Survey design attempts to collect data from members of population in order to determine the current status of that population with respect to one or more variables. The design was appropriate for this study because it can provide a broad exploratory overview of a sample of respondents. It can also be used to collect information about people's attitudes, opinions, habits or any of the variety of social issues from a large sample (Kombo, 2005). The study used qualitative and quantitative approach to collect the

data by the use of a questionnaire and interview schedule. The quantitative data was processed and analysed using descriptive statistics with the aid of the Statistical Package for Social Sciences soft ware programme while the qualitative data was subjected to content analysis.

Discussion of research findings

Table 4.1 shows that 17.8% agreed that Biology teachers do not cover syllabus on time, 61% disagreed while 21.8% were undecided. 29% agreed that Biology teachers were not motivated with 61.7 disagreeing. 39.1% agreed that methodologies used to teach Biology were not adequate with 40.8% disagreeing. Concerning the influence of the teachers' level of education on performance in Biology 65% of the respondents agreed, 30.1% disagreed and 13% were undecided. Finally, on unmanageable workload 65% of the students agreed while 22.0% disagreed and less than 14% were undecided.

Table 4.1: Teachers Related Factors and Performance in Biology

Teachers related factors statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Response Average
	N	%	n	%	n	%	n	%	n	%	
Biology teachers do not cover syllabus on time	9	7.3	13	10.5	27	21.8	33	26.6	42	33.9	3.69
Biology teachers in my school are not motivated	9	7.5	26	21.7	11	9.2	33	27.5	41	34.2	3.59
Methodologies used to teach Biology is not adequate	19	15.8	28	23.3	24	20.0	27	22.5	22	18.3	3.04
Teachers level of education influence performance in Biology	42	34.2	38	30.9	6	4.9	12	9.8	25	20.3	2.51
Inadequate staffing leads to unmanageable workload	41	33.3	39	31.7	16	13.0	15	12.2	12	9.8	2.33
										Total Respondents	124

A chi-square analysis on the relationship between students perception on performance in Biology and teacher related factors showed that there was no significant association between frequency of the statement and the gender of the students. The findings are summarized in Table 4.2. It is observable from the table that teachers related factors are not significant in determining the academic performance in Biology at KCSE level. The finding agrees with head teachers and Biology teachers responses who reported that there was no significant relationship between teacher's related factors and performance in Biology. Mochire (2010) corroborates this as well.

Table 4.2: A chi-square analysis on student perception on performance status of the study on teachers' related factors

Teachers related factors	**Gender**	**Strongly Agree**		**Disagree**		**Neutral**		**p-value**
		N	%	n	%	n	%	
Biology teachers in my school are demotivated	M	19	15.8	43	35.8	6	5.0	0.921
	F	16	13.3	31	25.8	5	4.2	
Biology teachers do not cover syllabus on time	M	13	10.5	42	33.9	14	11.3	0.875
	F	9	7.3	33	26.6	13	10.5	
Teachers level of education influence performance in Biology	M	42	34.1	24	19.5	2	1.6	0.247
	F	38	30.9	13	10.6	4	3.3	
Inadequate staffing leads to unmanageable workload	M	42	34.1	18	14.6	8	6.5	0.397
	F	38	30.9	9	7.7	8	6.5	
Methodologies used to teach Biology is not adequate	M	25	20.8	28	23.3	13	10.8	0.923
	F	22	18.3	21	17.5	11	9.2	

On social economic status, the distance from home to school usually hampers student concentration was agreed by 32.5% while 58.6% disagreed. Only 31.5% confirmed that insecurity at home affects students' attitude towards learning while 56.2% disagreed. Over 45%

disagreed that parent's level of education cannot support education, 26.0% agreed and 26.0% were neutral. The majority of the sample (46.7%) agreed that they are always absent from school due to poor fee payment while 63.4% disagreed and 11.4% were neutral. 63.4% of the respondents disagreed that lack of basic needs hampers good performance in Biology, 25.2% agreed and 11.4% were neutral. The findings are shown in Table 4.3. The findings concur with head teachers and heads of Science department who reported that socio-economic factor were not significant factors in determining students' performance in Biology and other science disciplines.

Table 4.3: Socio-Economic Factors and Performance in Biology

Socio-Economic factors statement	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		**Response Average**
	N	%	N	%	N	%	n	%	n	%	
The distance from home to school hampers my concentration	18	14.6	22	17.9	11	8.9	19	15.5	53	43.1	3.54
Insecurity at home affects my attitude towards learning	17	14.1	21	17.4	15	12.4	29	24.0	39	32.2	3.43
My parents level of income cannot support my education needs	15	12.2	17	13.8	32	26.0	22	17.9	37	30.1	3.4
I am always absent from school due to poor fee payment	23	18.9	21	17.2	21	17.2	26	21.3	31	25.4	3.17
Lack of basic needs cannot provide a stable mind	45	36.6	33	26.8	14	11.4	14	11.4	17	13.8	2.39
										Total Respondents	124

Conclusion and recommendations

Poor equipped laboratories and poor teaching methodologies contribute to problems of teaching and learning of Biology. Therefore for poor performing schools the root cause should be traced

and appropriate strategies aimed at improving the performance be improved. Long distance to school caused lateness and fatigue which was an obstacle to good performance. Creation of boarding schools would solve the problem of long distance and would provide a pleasant environment for learning. The Kenyan government should therefore intensify its efforts to train and retrain Biology teachers through conducting induction courses, seminars and refresher courses on teaching of Biology in order for them to teach efficiently and effectively. These programmes would improve teachers' pedagogical skills for work and provide the needed personal output in performance. Retraining of teachers would give them better orientation of what is expected of them in a changing teaching environment.

References

Ansu, D. (1984). *Education and society: Sociology of African Education*. London: Routeledge & Kegan Ltd.

Digolo, O. P. (2005). Education as a strategy for development in the 21st Century. *The Fountain*: Journal of Education of the University of Nairobi.

Fraser, B. J. & Walberg H.J. (1995). *Improving Science Education.* National society for the Study of Education (NSSE). Illinois.

Government of Kenya (2007). Kenya Vision 2030. Government Printers. Nairobi.

Jane, N. (1996). *The effects of availability and use of teaching resources on student's performance in Biology in selected secondary schools in Nakuru district.* Unpublished PGDE project: Egerton University: Nakuru.

Kenya Institute of Education (2002). Secondary Education Syllabus Volume Two. Kenya Institute of Education, Nairobi.

Kenya National Examination Council (2006). 2005 KCSE Examination Report. KNEC, Nairobi.

Kenya National Examination Council (2007). 2005 KCSE Examination Report. KNEC, Nairobi.

Kenya National Examination Council (2008). 2005 KCSE Examination Report. KNEC, Nairobi.

Kibera, L. and Kimokoti, A. (2007). *Fundamentals of Sociology of Education with reference to Africa*. Nairobi: University of Nairobi press.

Kombo, D.K., (2005). *Sociology of Education*. Ad Print Publishers, Nairobi.

Ngesu, L.; Gunga, S., Wachira, L. & Esther, K. (2014). Some determinants of student's performance in Biology in KCSE: A case study of central division of Machakos district. *International Journal of Innovative Research and Studies*, 3 (1), pp.174-186.

Ministry of Education (2001). National Report on the Development of Education in Kenya presented at the International Conference on Education 46th session, Geneva, 5-7th September. http://www.ibe.unesco.org/International/ICE/natrap/Kenya.pdf

Mwirigi, C. (2011). How teachers influence the performance of Biology in high school. Retrieved from http//EuneaArticles.com/ on 10th August 2011.

Mochire, S. (2010). The relationship between attitude and academic performance in Chemistry among secondary school students: A case of Central Kisii district. Unpublished Med thesis, Moi university-Kenya.

Simmons, H. (1968). *Roots of revolt*. Canada: McGraw-Hill.

UNESCO (2004). Report on Development of Education in Kenya: Ministry of Education Science and Technology. UNESCO-Nairobi Office. http://www.ibe.unesco.org/International/ICE47/English/Natreps/reports/kenya.pdf.