Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 5, Issue, 12, pp.4296-4300, December, 2013

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

FACTORS WHICH INFLUENCE ACADEMIC PERFOMANCE IN BIOLOGY IN KENYA: A PERSPECTIVE FOR GLOBAL COMPETITIVENESS

***Dinah C. Samikwo**

Department of Education science, Univesity of Eldoret

ARTICLE INFO

Article History:
Received 23rd September, 2013
Received in revised form
24th September, 2013
Accepted 18th October, 2013
Published online 25th December, 2013

Key words:
Academic performance,
Biology.

ABSTRACT

Biology is a very important subject. It enables one to understand himself/herself and the surrounding environment. The knowledge acquired in Biology is applied in many fields such as medicine, pharmacy, nursing, dentistry and agriculture. Students' performance in Biology at the Kenya Certificate of Secondary Education (KCSE) has been unsatisfactory over many years. Various reasons have been put forward by scholars to explain the cause of the poor performance. Students on the other hand have their reasons for the cause of the poor performance; hence the purpose of this research study was to investigate the factors that influence academic performance in Biology. The study aimed at finding out the attitudes of students towards Biology and how the attitudes influences their performance in Biology and also to find out the extent to which availability of teaching/learning resources influences performance in Biology. A descriptive survey design was used. Data was collected by use of questionnaires, observation checklists, interviews and document analysis. The sample for the study comprised 215 students drawn from 15 secondary schools in Uasin Gishu West District. The study respondents comprised form three students. Stratified random sampling was used to categorize schools into provincial, district and private. Simple random sampling was then used to select 15 schools from the 51 secondary schools in the district. At school level, the researcher applied simple random sampling technique to select 215 students who filled the questionnaires. The data was analyzed by use of descriptive statistics with the aid of SPSS computer programme. The data collected was coded, tabulated and represented using frequencies, tables and percentages. The study findings showed that, students with positive attitude towards the Biology subject, register better performance in examinations and also the availability of teaching/learning resources in schools impacted positively on students' achievement in Biology examinations. The author of this paper recommends that: schools should motivate students so as to build on positive attitude towards sciences, so as to able to compete globally in the careers. Schools without teaching/learning resources should not be registered by the ministry of Education and schools should strive to build on good image.

INTRODUCTION

Biology is a branch of science that deals with the study of living organisms. Biology is primarily concerned with the nature of organisms and their relationship to each other and to their environment. 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. 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. In many areas, biological knowledge can be applied in general improvement of man's well-being as evidenced in Medicine, Agriculture and Industry. Despite the efforts made to support science subjects by the government of Kenya, its performance in the KCSE is still relatively poor as shown by KNEC results (2002-2007. Success in life has so much been associated with ones performance in examination. Students who do well in examinations get a chance of proceeding to higher levels of studies and consequently, being a source to manpower in many biologically related careers. Failure in Biology means a general shortage of manpower in these Biology-related professions. This is because Biology forms the basis of important disciplines such as Medicine, Veterinary, Dentistry, Agriculture and Forestry. Besides, Biology has played a very important role in providing knowledge for current biological issues such as Biotechnology, Genetic engineering, waste disposal and food security. Kenya's development blueprint, Vision 2030, notes that, "Kenya will raise incomes in agriculture, livestock, and fisheries to generate an additional

****Corresponding author: Dinah C. Samikwo,***
Department of Education science, Univesity of Eldoret.

80-90 billion increase in GDP through better yields in key crop sector". Kenya also by the year 2012 intends to develop disease-free zones for livestock production, as quoted by Kenya's Vision 2030 development blueprint (page 18). In medicine, there are new discoveries of drugs and these are only practicable with the knowledge on Biotechnology and Genetic engineering. The world's populations are steadily increasing. This increase has had an impact on the environment in terms of the depletion of the available resources such as food, space, water, and shelter. Hence biological knowledge is necessary to ensure such resources are in sufficient replenishment and supply. New techniques of production such as Tissue Culture, Artificial Insemination (A.I) services, Hybrid Vigor and Embryo Transplants have been put in place to ensure not only large scale production but also ensure good quality breeds are produced through biological knowledge. Increased population also results in increased human activity hence causing environmental pollution. The most serious environmental pollution is the depletion of the Ozone layer. Biological knowledge is very vital in the environmental conservation measures. Through understanding the human reproductive system, measures to control population growth rate such as family planning methods have been established. These will ensure the attainment of a manageable population that will not strain the available resources. Some schools have made Biology a compulsory subject for their students, as evidenced by entries in the KNEC results (2002-2007). Despite these efforts, performance in Biology subject in KNEC has continued to register poor mean scores. Unlike other science subjects, Biology is expected to be performed much better because the subject matter touches on life and life processes that are expected to be interesting and motivating to the learners.

The problem

Kenya National Examination Council (K.N.E.C - 2002-2007) results show that majority of the secondary schools in Uasin Gishu West District made Biology a Compulsory Science subject. Despite the apparent interest in Biology, performance in Kenya Secondary Schools at K.C.S.E has remained poor as shown by KNEC report 2002-2007. As will be seen elsewhere in this paper, has less percentage of students scoring between A and B- which are considered quality grades, as compared to Physics and Chemistry. Despite Biology being a popular subject within the students, there could be something amiss at the teaching- learning level since it is performed poorly at the KCSE level compared to Physics and Chemistry. Failure in Biology in Secondary Schools has been blamed on quite a number of factors. Daily Nation (march 1998, page 18) noted that "Poor performance has been attributed to lack of motivation, creativity, interest, practice, confidence and self-drive towards sciences, among students". Ndirangu (2000) decried the lack of practical experience in the teaching and learning of science leading to poor mastery of important scientific skills and concepts. The KNEC (2000-2007) examination reports attributed the poor performance in Biology to limited practical exposure in the course of learning, poor expression of biological statements and incorrect use of biological terms. Kirima (2000) blamed teachers for poor performance in science. According to Kirima teachers lacked qualification, innovative teaching methods or use of learning materials and that they did not motivate their students, and mainly concentrated on theory and rarely engaged the students in carrying out the practical and projects which, though demanding equip students with skills and improve their understanding of biological concepts. It was as a result of the poor performance in Biology in KNEC examinations that this study on factors which influence academic performance in Biology was carried out. Therefore, this paper sets to study the factors that influence academic performance in Biology.

Study sample

While many strategies may be put to improve performance in Biology, the researcher wished to find out what the students' perceptions were regarding the cause of failure as the first step towards improving academic performance in Biology. The population which was under investigation consisted of all form three students in secondary schools of Uasin Gishu West District. The district had a total of 717 Biology students in 51 secondary schools, from which a sample of 215 students from 15 secondary schools was selected, who participated in the study. In addition, the researcher selectively targeted 15 Biology teachers from the selected 15 secondary schools to obtain more information that was not captured in the students' questionnaire.

Characteristic of the study sample

Distribution of students by sex, age, and grade scored in the last end of term Biology examination and type of school. The data in Table 1 indicated that one hundred and twenty seven (59.1%) of the student respondents were male, eighty eight (40.9%) were females. The data analyzed indicated that majority of the form three students respondents lie at the age of 15 – 17 years (65.1%).

Table 1. Characteristics of Study Sample

Characteristics	Frequency	Percentage (%)
Sex: Male	127	59.1
: Female	88	40.9
Total	215	100%
Age:		
: 15 – 17 years	140	65.1
: 18 – 20 years	73	34.0
: 21 – 23 years	2	0.9
Total	215	100%
Grade in the last End of term Biology Examination		
Above B+	47	21.9
Between C+ and B	52	24.2
Between D+ and C	87	40.5
Between D and E	29	13.5
Total	215	100%
Type of school		
Girls boarding	23	10.7
Boys boarding	52	24.2
Mixed Boarding	11	5.1
Mixed Day	108	50.2
Mixed Day and Boarding	21	9.8
Total	215	100%

The students were in their adolescence and thus the stage for career orientation based on subject choices. Most students in the form three classes did not score excellent grades in Biology as a majority scored between D+ to C (40.5%) which was considered poor grades.

Table 2. Students' Attitude towards Biology

	Type of Response		
STATEMENT	AGREE F (%)	UNDECIDED F (%)	DISAGREE F (%)
1. I like Biology very much	107 (49.8%)	10 (4.7%)	98 (45.5%)
2. I like Biology because of positive guidance from my Biology Teacher.	200 (93%)	2 (0.9%)	13 (6.1%)
3. I get scared when I think of doing Biology.	7 (3.3%)	2 (0.9%)	206 (95.8%)
4. Concepts used in Biology are difficult to understand.	123 (57.2%)	24 (11.2%)	68 (31.6%)
5. I enjoy doing Biology	132 (61.4%)	26 (12.1%)	57 (26.5%)
6. Topics in Biology are difficult to understand.	140 (65.1%)	3 (1.4%)	72 (33.5%)
7. I understand what the subject is about.	178 (82.8)	28 (13.0%)	9 (4.2%)
8. Biology is interesting and fun to study.	210 (97.7%)	2 (0.9%)	3 (1.4%)
9. I do Biology to prepare for my future career.	206 (93.0%)	6 (2.8%)	9 (4.2%)
10. I would like to take Biology related career at higher level of Education.	107 (49.8%)	72 (33.5%)	36 (16.7%)

Students' Attitude towards Biology and its influence on Performance

Students were asked to respond to statements that could indicate their attitudes towards Biology. Their responses are represented in the table below:

Figures in brackets represent the percentages rounded off to one decimal point

Table 2 shows that students had a positive perception towards Biology as a subject. Two hundred and eight (96.7%) of the students agreed that they enjoyed studying Biology. One hundred and seventy eight (82.8%) understood what the subject was about. Two hundred and ten (97.7%) accepted that Biology was interesting and fun to study. One hundred and seven (49.8%) wished to take Biology at higher levels of education. This implies that, a majority of students had a positive attitude towards Biology curriculum hence had a positive perception. The researcher further randomly selected 10 students with positive attitude and 10 others with negative attitude and there mean scores were calculated. Students with positive attitude were found to have a mean of 68.42 while those with negative attitude had a mean score of 47.20. These further showed that the majority of students who had positive attitude scored higher marks compared to those who had negative attitude towards it. The positive attitude could be attributed to the positive guidance received from their Biology teacher and also the fact that Biology is interesting and fun to study. Despite the apparent liking of the subject, performance is poor as shown in Table 1. There could be other underlying reasons and factors which influence performance that were not looked into in this study such as teaching, assessments, evaluation and motivation that could still be a problem.

Attitude therefore directly influences perception hence positive attitude implies positive perception. The findings of the study showed that there was a relationship between students' attitude towards Biology and their performance. Students with a positive attitude towards Biology subject registered a good performance than those with negative attitude. Those with a positive attitude towards Biology are motivated to work hard and this is reflected in the marks scored in the end term examination.On the other hand, those who had a negative attitude apparently were not motivated and therefore lacked the self-drive to work hard. As a result, they ended up scoring poor grades hence performing poorly in the subject. These findings indicated that for Biology subject to register good grades in performance, positive attitude plays a key role. Therefore Biology teachers have a task of inculcating positive attitude towards the subject during the early years of secondary education. Though many respondents cited Biology as the easier science, due to the fact that the study is about life and life processes which students tend to think they understand better than physics and chemistry, quality marks in Biology are not easy to come by.Positive attitude is therefore a crucial factor for students to pass in their Biology examinations, so to be a source of manpower in Biology related careers such as dentistry, veterinary, medicine, agriculture and industry, hence being globally competitive. These findings agree with Jepkoech (2002) and Kipkemboi (2006) who found that students' attitude have an effect on their preparation for national examinations at secondary school level. Kerich (2007) also noted that, negative attitude contributed to the poor performance of students in physics. Positive attitude would imply that students like the subject and would work hard to achieve better grades than those students who have negative attitude.

Availability of Resources and Performance in Biology

SMASSE (1998) baseline studies stressed the use of practical's in learning science. Biology as a science subject requires resources such as the Biology laboratory, textbooks and reference materials, specimens, aquariums and botanical gardens. This study sought to find out whether the selected secondary schools in Uasin Gishu West District had the required facilities and resource materials for teaching and learning of Biology. An observation checklist was used to score the items that were available in the laboratory whereas the library and laboratory inventory books were used to check the use of the available resources. An interview with the form three Biology teachers revealed that, although the school principals purchased textbooks, equipment and reagents for Biology. Teachers, laboratory assistants and students collected other specimens from the local environment and some apparatus were improvised using the locally available materials. Complex apparatus, like microscopes and thermometers, could not be improvised. Students were asked to respond to questions in the questionnaire on the availability of

these resources in the teaching and learning of Biology in their schools. Their responses were represented in a table as shown below:

Table 3. Availability of the teaching and learning resources

	Availability		
Recourses/facilities	Adequate	Inadequate	Completely lacking
Biology laboratory	40(18.6%)	132(64.2%)	37(17.2%)
Apparatus	32(14.9%)	174(80.9%)	9(4.2%)
Reagents	40(18.6%)	166(77.2%)	9(4.2%)
Aquarium	0(0.0%)	30(14.0%)	185(86.0%)
Botanical gardens	0(0.0%)	30(14.0%)	85(86.0%)
Textbooks	182(84.7%)	15(7.0%)	18(8.3%)
Reference books	48(22.3%)	150(69.8%)	17(7.9%)
Preserved Specimen	30(14.0%)	164(76.3)	21(9.7%)

The table above shows that one hundred and thirty two students (64.2%) had inadequate Biology laboratories, while thirty seven (17.2%) completely lacked the laboratory facility. One hundred and seventy four (80.9%) reported that they had inadequate apparatus and reagents. One hundred and eighty five (86%) of the respondents indicate that their schools lacked aquariums and botanical gardens. Thirty respondent (14%) indicated that they had preserved specimens and finally one hundred and eighty two (84.7%) accepted that they had adequate textbooks. Document analysis of library inventories further confirmed that class textbooks were adequate in public schools with one book shared among two, whereas text books were completely lacking in private secondary schools. It also confirmed that Biology reference books were not adequate for both students and teachers in private schools. The results obtained showed that most of the schools had most of the items in the observation checklists but were inadequate. There is a need to improve the laboratories in terms of teaching resources. The study found that the selected schools had insufficient resources for example most schools sampled had only one laboratory which was used to conduct practicals for physics, chemistry and Biology. Most schools lacked a separate Biology laboratory hence the single laboratory was strained in terms of use. Further observations revealed that the private schools that were sampled did not have a laboratory. Teachers kept the apparatus and reagents in cupboards and converted one of the classrooms into a laboratory during examination time. Teachers in these schools resorted to teaching Biology theoretically because of lack of a laboratory, apparatus and reagents. This is a drawback in the learning of Biology.

In Kenya secondary schools it was found out that, acquisition of resources for teaching Biology, was through buying or improvisation. The teachers and students, with the assistance of laboratory technicians, improvised some apparatus from locally available materials for example, specimen preservation bottles from plastic transparent detergents (*omo*) containers and Dark chambers from wooden boxes which were painted black inside. The ratio of textbooks was 1:2 in all the public schools. This was achieved through the subsidized secondary education from the Government of Kenya from the year 2007. The ratio of text books was 1:8 in the private schools that were sampled. Textbooks were mainly bought by parents in the private schools. The student-textbook ratio in private schools is quite high and this implied that textbooks were inadequate for use by students and this contributed to poor results. Biology teachers in public schools were either, a diploma, a bachelor degree or a master's degree holder from reputable training institutions. On the other hand, private schools hired a few professional teachers and more non-professional teachers. Shiundu and Omulando (1992) note that no curriculum innovation can be effectively and adequately implemented without adequate teaching and learning materials and facilities. SMASSE in-service project (1998) found out those teachers who had adequate resource materials and facilities were more confident and productive. Wafula (2005) posits that lack of adequate resource materials and facilities was one of the factors that lead to poor implementation of Biology curriculum. Pale (2008) also found out that availability of textbooks and other learning resources contributed significantly to the performance of students in national examinations. Students who access sufficient resources excel in national examinations, hence becoming globally competitive.

Conclusion

From the findings of the study students' attitudes towards Biology affects their performance. Students with positive attitudes towards the subject register better performance than those who had a negative attitude. A majority of students had positive attitude towards Biology. Those with positive attitude were motivated to work hard and this is reflected in the good marks scored in examinations. Such a student gets a chance to pursue Biology related careers hence competes globally. Those with a negative attitude on the other hand, worked less hard hence ended up scoring poor grades in examinations. Biology as a science subject requires a lot of input from both the student and the teacher for good grades to be obtained. Though Biology is a popular science subject among students, quality marks are not easy to be attained. Respondents named terminologies used in the content of Biology, misspelling of biological terms and the strict marking of Biology examinations, as the key challenges faced in the study of Biology. The findings of this study also found out that availability of textbooks, laboratory apparatus and other learning resources contribute significantly to the performance of students in Biology examinations. Best achievers in Biology examinations were mostly students' respondents drawn from the well-equipped schools of Uasin Gishu West District. These are schools endowed with fully equipped laboratories, student textbook ratio of 2:1, and highly motivated students. On the contrary, majority of the district schools that were in the sample depended on one laboratory which was also used for the other three science subjects, Chemistry and Physics. They also had inadequate laboratory resources hence depended largely on improvisation and specialized more on theoretical work. The study also revealed that majority of the private schools sampled lacked a laboratory building, where they converted one of the classrooms into a laboratory during examinations time. This means that students learned more theory and less practical knowledge in Biology. This practice contributes to poor grades since the learner during examination is trying to learn the new apparatus for the first time. Practical work equips learners with the necessary skills to handle real life practicals; hence students will not shy from Biology related careers since they will be able to apply the skills they had acquired.

Recommendations

The findings of this study have far reaching implications to teachers, Ministry of Education officials and curriculum

developers in setting up strategies of teaching/learning Biology. The recommendations of this study are outlined as follows;

1. Career counselors in schools should guide students on correct career choices in line with their strengths, passion and subject selection.
2. Secondary schools which operate without a science laboratory should not be registered by the Ministry of Education until all the necessary laboratory requirements are met by School Management Board.
3. Parents / Guardians should be sensitized through Capacity Building Seminars by resourceful persons on their roles.

REFERENCES

Aiken, L. R. 1976. Attitudes Towards Classrooms, *Review of Educational Research* vol. 46. Kenya.

Alego, O. 1988. A Study of Availability and Use of Instructional Re

sources in Teaching Kiswahili Grammar in Selected Secondary in Bungoma District. Kenya. Moi University. Eldoret.

Bii, P. K. 2006. Parents/Guardians Occupational status and Students Performance. M.Phil Thesis. Moi University.

Borg, R. W. and Gall, M. D. 1989. Educational Research: An introduction. New York and London:Longman.

Cash, C. S. 1993. Building Condition and Students Achievement and Behavior. Unpublished EDD Thesis.

Ehindero, O.J. and Ajibade, Y.A. 2000.What our student say about how we teach. *Ife J. Education Studies.* 7(1), 1-9.

Eshiwani, G.S. 1983. Factors Influencing performance among primary and secondary school students in Kenya. Kenyatta University Press.

Gentry, M., and Springer, S. 2002. Secondary student perceptions of their class activities regarding meaningfulness, challenge, choice and appeal: An initial validation study. *Journal of Secondary Gifted Education*, 13,192-204.

Gitahi, F.K. 2009. Availability and use of school laboratory Facilities and their Influence on students Achievement in Sciences. M. Phil Thesis. Moi University.

Government of Kenya, 2007. Kenya Vision 2030. The Popular Version. Nairobi. Government Printer.

Government of Kenya, 2007. Kenya Vision 2030. The Popular Version. Nairobi. Government Printers.

Government of Kenya, 2007. District Development plan. Nairobi. Government Printer.

Grace, J. 2001. The Influence of parental Care on academic performance. M.Phil Thesis. Moi University.

Jepkoech, S. 2002. A Survey of Factors that Influence the Performance in Economics in K.C.S.E. M. Phil Thesis. Moi University.

Kenya National Examination Council 2005. *Kenya Certificate of Secondary Education Report. Nairobi*: Kenya National Examination Council.

Kenya National Examination Council 2006. Kenya Certificate of Secondary Education. Report. Nairobi: Kenya National Examination Council.

Kenya National Examination Council 2007. Kenya Certificate of Secondary Education Report. Nairobi: Kenya National Examination Council.

Kerich, B.K. 2007. Attitude as a factor that influences performance of students in physics. M.Phil. Thesis. Moi University

Kipkemboi, B. J. 2006. Factors influencing the Performance of Students in K.C.S.E IN Selected secondary schools in Bureti District. M, philThesis.Moi University.

Mugenda, O. and Mugenda, A. 1999. Research Methods: Qualitative and Quantitative Research Approaches. Acts Press: Nairobi.

Ndirangu, M. 2000. A Study on the Perception of the Influence of Teaching Practice Projects on the Teaching of Science in Selected Secondary Schools in Kenya. Egerton University, Njoro. Kenya.

Pale, J. W. 2008. An Investigation of the Factors that Contribute to Students' Poor Performance in K.C.S.E Mathematics Examination in Mt Elgon District. Moi University.

Parkinson, J. 1994. The Effective Teaching of Secondary Science. Longman.

Roth, W. M. 1994. Experimenting in a constructivist High school physics Laboratory. *Journal of research in science Teaching*, Vol. 31, 197 – 223.

Shiundu, J.S. and Omulando, S. J.1992. Curriculum Theory and Practice in Kenya Nairobi: Oxford University Press.

SMASSE, 1998. Baseline Project. Nairobi;MOEST-JICA.

SMASSE, 2000. Resources and Facilities for Teaching and Learning Biology. Nairobi; MOEST-JICA.

Tairab, H. H. 1992. Perception of Biology Teacher, Classroom Teaching Behavior and Students Achievement in Sudanese Secondary Schools. Ph.D Thesis. University of Hull. UK.

Tobin, K.G.1990. Research on science laboratory Activities. Kluwer. Dordrecht.

Unwin, D. and Mcalleese, R. 1978. Encyclopedia of Educational Media Communication and technology. London. Macmillan Press Ltd.

Wafula, M.S. 2005. Factors that affect Implementation of the Biology Curriculum. M.Phil Thesis, Moi University.

Walkin, D. 1992. Instructional Techniques and Practice. England: Stanley Thornes Publishers. Ltd.

****