

Effect of Student Attitude on Academic Performance of Chemistry Subject: A Case of Bondo Sub-County, Kenya

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Abstract: Attitude is one of the key factors that influence student performance in any subject in secondary school education. Bondo has been among the Sub Counties in Kenya with poor academic performance in Chemistry subject and this could be attributed to poor student attitude towards the subject among other factors. This research paper sought to establish and address the effect of student attitude on performance in Chemistry subject in secondary schools in Bondo Sub County. The main objective of this study was based on the purpose of the study. The study was informed by Jean Piaget's constructivism theory of knowledge and its link to the study was done by a conceptual framework. The study adopted a correlation research design. Questionnaires, interviews and document analysis were used as instruments of data analysis. Quantitative data analysis generated both inferential and descriptive statistics while qualitative data was analyzed continuously using content and thematic issues. The findings revealed that the Pearson correlation co-efficient, $r = 0.078$ which is a positive correlation between attitude and academic performance in the subject in over 80% of the schools.

Keywords: Attitude, Academic Performance, Chemistry, National Examinations, Secondary Education in Bondo Sub County.

INTRODUCTION

Background to the Study

Attitude can alter every aspect of a person's life, including their education. Student attitude determines their interest, ability and willingness to learn. In fact, a student is most unlikely to perform well in a subject or continue his/her education beyond what is required, if the issue of negative attitude is not properly addressed. The point in this study is that a student's attitude is a necessary aspect that determines the learner interest in Chemistry subject and its academic performance. A study by (Nyaga, 2011) points out that negative attitude limits student performance because when motivation to learn is derailed then actual intake of concepts is inhibited. There is actually no guarantee that a learner will be able to understand what is taught in Chemistry through eliminating a negative attitude about the subject. Thus a negative attitude in Chemistry discourages the learner and even limits and even prevents achievement of a positive change and growth.

In developed nations, the aspect of teaching and learning of Chemistry subjects is designed in such a way that it is purely interrogative, inquisitive and investigative with an aim of stimulating the learners' interest, enhancing the academic performance in the subject as well as minimizing wastage grades in the course examinations. A study by Lunetta, Hofstein and Clough (2009) show that the laboratory has been made the center of discovery in teaching and learning in the subject and this has assisted students to discover and make sense of the natural world from experimental analyses.

Tatli and Ayas (2011) in a study indicated that in American states like in Florida, the scientific literacy needs of individuals entering careers in Science oriented fields are becoming even more important. This means that Chemistry which is among the practical Science subjects has been given the importance it deserves in terms of the practical

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approach in teaching. Therefore the entry behavior of such students at secondary schooling level is considered vital and is the basis for which practical concepts are taught.

In Sub Saharan Africa, Bennett, Lubben and Hogarth (2007) cited in a study that there is insufficient practical exposure to students. Therefore, the curriculum and education stakeholders have emphasized most on active learning approaches which should focus much on learner-centered education, participatory teaching, inquiry-based approaches, problem solving and critical thinking. This is in line with international literature on Science education in which student learning is not a passive activity, but an activity in which students actively construct their own knowledge through interaction with their existing knowledge and ideas provided by materials, other students and the teacher (Rogan and Grayson, 2003). Despite this campaign, Chemistry subject in these countries still faces a challenge on how they are being taught and therefore these countries still lag behind in scientific literacy needs and this has posed a threat on achievement of quality grades in national examinations and on the number of students pursuing Science oriented courses.

In most Sub Saharan countries, there's some evidence of lack of practical aspects in teaching the Science subjects and this situation has resulted into a huge gap between the intended curriculum and what is implemented in the classroom. UNESCO reports have indicated that theoretical pedagogy approaches have dominated Science classes and that students therefore are not effectively engaged in Science experiments. Moreover, according to UNESCO (2013), availability of practical resources varies from government schools to community schools and this has resulted into inequalities in teaching and learning. Therefore community schools end up performing poorly in Science subjects yet they are treated equally with private schools by the national examining bodies despite the differences in availability of human resources and practical instructional resources. In a way therefore, students from such schools do not often perform well in order to qualify for good Science courses at post-secondary level (SCPSC, 2010).

The Kenyan Science curriculum has been revised from time to time so as to include more practical aspects of teaching and learning so as to promote teaching by experiments, observations, analysis, generalizations and conclusions (Mudulia, 2012). There is always a positive correlation between availability of resources and students' academic performance in Chemistry and therefore the subject has to be taught with emphasis on practical approach (MOE, 2015).

In Bondo Sub County, Ministry of Education reports of 2015 and 2019 indicate that academic performance in Chemistry subject has been on the decline and as a result, there has been realization of wastage grades in national examinations. This is reflected on the "below quality" scores realized not only in Chemistry but in the three Science subjects as whole in the national exams. That is why this research paper focused on the effect of student attitude on academic performance of Chemistry subject in this Sub County.

Statement of the Problem

Chemistry is a challenging subject for most learners and most of them struggle with the subject because they don't approach it the right way. The issue of poor student attitude towards this subject has continuously been evident and Bondo Sub County has not been an exception in this problem (MOE 2017). This has put at stake the interest and passion of the learners towards the subject, thus lowering the quality of academic performance in the subject, both in national and internal examinations. The Ministry of Education has however put in interventions aimed at addressing this issue by adopting a number of interventions targeting both the learners and teachers so as to try and improve the overall teaching and learning environment that is appealing and fascinating to the learners. But despite those interventions, academic performance in Bondo Sub-county is still below average and this might be an indication that poor learner attitude among other factors still has a negative impact on learning of chemistry subject. Therefore, it is in light of this reason that the study sought to examine the effect of attitude on academic performance in Chemistry subject among secondary school students in Bondo Sub-county.

Purpose of the study

The study sought examine the effect of poor attitude towards academic performance of Chemistry subject among secondary school students in Bondo Sub County, with a view of improving the practices and effectiveness in teaching and learning of Chemistry subject so as to make the subject interesting and appealing to the learners.

Research Objectives

To examine the attitude of learners towards Chemistry subject secondary schools in Bondo Sub County and the role it plays towards shaping the academic performance of the subject.

Research Hypothesis

The study employed the testing of research hypothesis because it was a correlational study which tested the causal effect of learner attitude on academic performance in Chemistry.

Significance of the Study

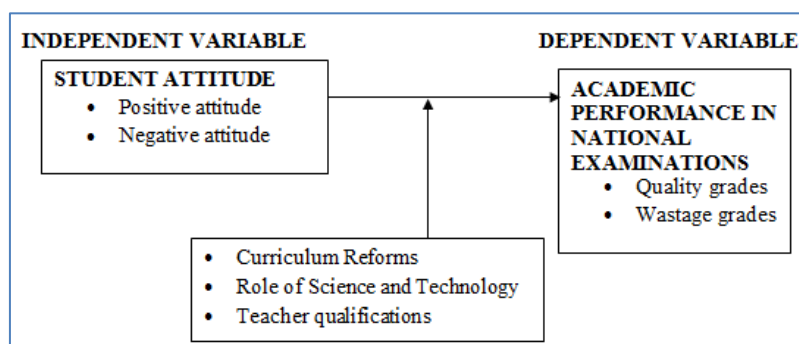
The findings of this research might be a contribution to education stakeholders in curbing the challenges encountered in teaching and learning of Chemistry and the need to expand on instructional resources, it might enrich different studies that have been undertaken in relation to this study as well as influencing the planning and implementation of the educational practices for sustainable development.

Theoretical and Conceptual Framework

This research study based its theoretical argument on constructivism theory of knowledge by Jean Piaget which argues that humans generate knowledge and meaning from an interaction between knowledge, circumstances and ideas. This theory stipulates that Science has moved from telling and mere dispensation of knowledge or what one might term 'absolute truth' to problem solving and rational inquiry into natural phenomena. Therefore, through accommodation and assimilation, individuals are able to construct new knowledge from their background knowledge and experiences.

Learners are expected to be taken through a learning process in which they actively build new ideas and concepts based upon prior knowledge, prevailing circumstances and new information. The teacher is a facilitator whose role is to encourage and guide the learner in discovering new knowledge, performing discovery activities so as to obtain knowledge by himself/herself through the use of materials and the learners' mental process. This theory therefore asserts that learning occurs particularly well when people are engaged in a practical activity or in constructing a given product. This theory also pointed out that learning resources stimulate learner interest; attitude and involvement in Science and that students are able to develop higher order reasoning skills and a deeper understanding of scientific concepts and their relevance to their daily lives.

A conceptual framework was designed in the view of explaining the causal effect of student attitude as an independent variable on the consequential outcome. That is, how does the attitude towards Chemistry subject actually play a role in realization of quality grades or wastage grades in the subject, which actually impacts on the academic performance itself?



Source: Adopted from Myers and Dyers 2006.

LITERATURE REVIEW

This section of the study only reviewed literature relevant to it, based on how student attitude has contributed to performance in Chemistry subject in secondary schools from a global view to the Sub-Saharan analysis and down to the Kenyan situation and particularly in Bondo Sub County.

RESEARCH METHODOLOGY

This study adopted a correlation research design to establish the relationship that exists between the student attitude and academic performance in Chemistry subject in national examinations. The study was carried out in secondary schools in Bondo Sub County.

Study Population

The study considered a group of 41 secondary schools (TSC, Bondo Sub County, 2019) from which the target population was the Chemistry teachers, heads of Science departments (41) of each of the schools, heads of Chemistry departments (whose number is inclusive in the Chemistry teachers), candidate students and the Quality Assurance officer Bondo Sub County.

Sample size

Stratified sampling was used to group the population onto homogeneous sub groups which share homogeneous characteristics (Orodho, 2009), so as to ensure equitable representation of each set in the population. The Morgan table

for choosing a suitable sample size was used since it provided a direct sample size from a population other than the one being calculated. I.e, the sample in each category was selected at 95.0% confidence level with a margin error of 5.0%.

Table-1.0 Sample Frame for Heads of Science Departments, Chemistry teachers and Candidates (Adopted from the Sample Size Table by Krejcie and Morgan (1970))

Stratum (Schools category)	National	Extra County	County	Sub County	Total
No. of schools	1	3	9	28	41
HODs (N)	1	3	9	28	$\sum N = 41$
HODs (n)	1	3	9	28	$\sum n = 41$
HOS (N)	1	3	9	28	$\sum N = 41$
HOS (n)	1	3	9	28	$\sum n = 41$
Chem. teachers (N)	14	24	37	17	$\sum N = 91$
Chem. teachers (n)	14	24	37	17	$\sum n = 91$
Candidates (N)	629	658	2021	965	$\sum N = 4273$
Candidates (n)	248	248	333	278	$\sum n = 1107$

Instruments of Data Collection

The study used questionnaires, interview schedule and document analysis guide as data collection tools instruments.

DATA ANALYSIS

The analyses were done separately for both quantitative and qualitative data. This enabled comparison of the results from the quantitative and qualitative studies so as to determine if the two data bases yielded similar or contrasting results.

Findings, Interpretation and Discussion

Research findings, analysis, interpretation and analysis were discussed based on the study objectives. Analysis aimed at withholding or nullifying the null hypothesis. Quantitative data was analyzed using both descriptive and inferential statistics. Descriptive statistics was used to describe and summarize data inform of graphs, tables, frequencies, percentages, mean deviations and standard deviations. Inferential statistics was used in making inferences on the findings and drawing conclusions on them. A thematic approach was used to analyze qualitative data.

Findings

The study tested the following null hypothesis;

“There is no statistically significant relationship between learners’ attitude and academic performance in Chemistry subject in secondary schools in Bondo Sub County.”

Statistical analysis was done in order to establish if there was a relationship between the performance of Chemistry and the attitude of the students towards the subject. The correlation between the attitude of students towards Chemistry and the performance that they exhibited in the national examinations in the same subject was tested. The correlation analysis was carried out by Pearson correlation co-efficient.

Table-2.0: Gives summary of the descriptive statistics on the analysis results

Pearson Correlation Coefficient			
		Student attitude towards Chemistry	School Performance has increased
Poor student attitude towards Chemistry	Pearson Correlation	1	.078
	Sig. (2-tailed)		.633
	N	40	40
School Performance has increased	Pearson Correlation	.078	1
	Sig. (2-tailed)	.633	
	N	38	38

Table-2.0: Correlation Analysis on Performance and Student Attitude

The findings indicate that the Pearson correlation co-efficient was 0.078. This is a positive correlation co-efficient. This means that as one variable increase, the corresponding response variable increase with the same margin. This implies that when the attitude of students towards Chemistry is positive, there is improved performance in

Chemistry and when the attitude is negative towards the subject, so the academic performance value also drops. The findings are in line with a study by Mwangi (2016) showed that in Machakos and Nairobi counties, attitude of students has been greatly contributed by the academic performance in the subject, and also academic performance in the subject contributed to by student attitude.

A paired sample t-test which is also called the dependent sample t-test was carried out to determine the differences between the mean observations of attitude of students towards Chemistry as viewed by the teachers who teach these subject and the Head of Departments and head of subjects in the schools under study. In some cases the heads of subject or the teachers who head Chemistry in some schools happened to be the same and also tripling as the Chemistry teachers. In some cases, the Head of department happened to be different from the teacher who actually handles subject at class level. Although the HOD might be the teacher, he might be teaching other classes which are not candidate classes. A study by Ochieng (2014) is a related phenomenon to this study at this point in that presents high teacher workload as the main challenge supported by 31% of teachers followed by lack of sufficient facilities in the school which was agreed by 24% of the respondents. The study also cited the negative teachers' attitude towards SMASSE programmes that were meant to enhance literacy and general knowledge development in Science subjects as a whole.

This study went on to further carry out a statistical test to ascertain whether the views of the respondent groups on student attitude in Chemistry in relation to wastage grades in national examinations, were different. The study formulated a research question from the respective hypothesis as follows;

“Is there difference in the average responses to students’ attitude as viewed by Chemistry teachers versus that which is given by the head of subject and Head of department?”

A paired t-test analysis was carried out using SPSS and the results are summarized in the table below.

Group Statistics

Group 1 or 2		N	Mean	Std. Deviation	Std. Error Mean
Poor student attitude towards Chemistry	Group 1-HOD	39	2.82	.970	.155
	Group 2- Teacher	39	2.79	1.056	.169

Table 3.0: Group Statistics on Student Attitude

N.B- group 1 is made of Chemistry teachers in different schools while group 2 is made of heads of departments in different schools. The independent variable which is the category of the respondent was classified as either the head of Chemistry department or the Chemistry teacher. This meant that independent variable was to be classified into two distinct groups. Group 1 was the head of Science departments while group 2 was the Chemistry teachers. Responses for this item were sourced from 39 heads of Science department and 39 teachers of Chemistry.

These findings are in line with a study by Ogembo, Otanga and Yaki (2015) which pointed out that unless something is done to motivate the learners, attitude in Chemistry subject can easily show a decreasing trend. Attitude plays a significant role in shaping the classroom environment which has an impact on a student's self-efficacy which in turn influences a student's academic output in Science subjects in general (Hwang, et al., 2021). Attitude is very important in controlling learning environment, personal factors, and behavioral adaptations of the learner. Just as this study later suggested, it is essential to motivate learners and teachers so that they can uphold positive attitude in Chemistry and work hard to produce good results in examinations. This way, the wastage grades realized in national examinations would be reduced to some extent.

A study by Jassem (2014) shows that most students have a negative attitude towards Chemistry subject despite their interest in careers that require the knowledge of the subject. As such, students’ attitude towards the subject has affected the performance in the subject. The study ascertains that poor performance was associated to the lack of adequate exposure of students to practical before K.C.S.E exams hence inability to tackle practical work well by students: because the teachers preferred demonstration method rather than involving the learners in laboratory experiments and practical activities.

SUMMARY

First, Study findings revealed that the attitude of learners is generally negative in Bondo Sub County and this was attributed to factors such as the role played by teacher professionalism in shaping student attitude in the subject, teaching and learning resources and teaching methodologies. Secondly, the student attitude in the subject fluctuated across secondary schools in the Sub County due to variation in the general learning environment in different schools.

Therefore, There is need to enhance the level of stocking in the laboratory equipment so as to embrace practical learning which is more concrete than theoretical learning, development programs for Science subject teachers in general, such as workshops for training on emerging issues in various areas of instruction so that they are up to date with relevant skills and knowledge that they impart in learners

A comparative study is thus recommended on the status of student attitude and academic performance of Chemistry subject in other sub counties in Kenya as well as a similar studies in other science subjects.

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