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EFFECT OF MOTIVATIONAL STRATEGIES ON THE LEARNERS' PERFORMANCE IN SECONDARY SCHOOL CHEMISTRY IN KENYA: A CRITICAL LITERATURE REVIEW

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Abstract

Purpose: A high achievement in Chemistry can be determined by many factors, some of which can be related to teachers, others to students and also school administration. One factor includes motivation which is that drive which makes an individual set a goal, initiate and maintain behaviors which lead to the attainment of the set goal. The purpose of our study is therefore to assess the effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya

Methodology: The paper used a desk study review methodology where relevant empirical literature was reviewed to identify main themes and to extract knowledge gaps.

Findings: Based on the findings the study concluded that students' perception in chemistry determines its achievement in examinations and that most students do not have positive attitude in chemistry. The research concluded that, levels of motivation changed with significant decreases in self-efficacy and increases in personal relevance and assessment anxiety which consequently influenced the performance in science. The study also found out that, high Relative Autonomous motivation positively affected good strategy and study effort, which in turn positively affected academic performance in form of grade-point averages.

Unique Contribution to Theory and Practice: The study recommends that the Government and school authorities should through the allocation of funds, materials and apparatus for sciences teaching make school laboratories more adequate for effective implementation for Chemistry curriculum so as to enhance students' performance. Students should be exposed to more laboratory applications and activities so that they can recognize laboratory materials and equipment.

***Keywords*:** *motivational strategies, learner's performance, Chemistry*

1.0 Introduction

Chemistry is one of the sciences that are offered in secondary schools. The skills and knowledge gained is very useful in many areas of people's lives, for example, controlling environmental pollution and production of a variety of drugs. For that reason, Chemistry is compulsory in form 1 and form 2 for basic knowledge and as an elective subject for form 3 students. As noted by Twoli (2016), a few areas where chemistry knowledge is important include: Food production and preservation, contribution towards better health, for example, production of a variety of drugs; enhancement of life, for example, production of plastics and synthetic clothes; large scale industries, for example, in production of cosmetics, in detergent industries and petroleum refining plants and career opportunities since it can enable a learner to pursue a science- based career, for example, in pharmacy, engineering or teaching.

In spite of its usefulness in people's lives, students' performance in Chemistry in KCSE is the lowest compared to other sciences as shown in Table 1.1.

Table 1.1: Students' Percentage Mean Scores in Three Science Subjects in the Years 2009-2013 KCSE Examination in Kenya.

Year	**2009**	**2010**	**2011**	**2012**	**2013**
Subject	**Mean Score (%)**	**Mean Score (%)**	**Mean Score (%)**	**Mean Score (%)**	**Mean Score (%)**
Biology	27.20	29.23	32.44	26.21	31.64
Chemistry	19.13	24.91	23.66	27.93	24.23
Physics	31.33	35.13	36.64	37.87	40.11

Source: KNEC (2009-2013)

From Table 1.1, it is clear that Chemistry was the lowest performed science in the years under consideration except in the year 2012.

A high achievement in Chemistry can be determined by many factors, some of which can be related to teachers, others to students and also school administration. Some of the factors that are learner related include; learners' cognitive ability, interest, effort, attitude towards the subject and learner's motivation. The school administration provides physical and financial resources as well as a supportive and conducive working/ learning environment. The teacher facilitates learning and for him/her to do this, he/she has to; have a good mastery of the subject matter, use appropriate instructional techniques as well as consistently motivate learners.

Motivation can be defined as the reasons underlying behavior. According to Cherry (2015) motivation is that drive which makes an individual set a goal, initiate and maintain behaviors which lead to the attainment of the set goal. Motivation is all about putting effort, staying focused to a certain goal and persisting in the face of difficulty, that is, all aspects of activation and intention. The two types of motivation are intrinsic and extrinsic motivation. Deci and Ryan (2010) give the difference between the two types of motivation. Intrinsic motivation refers to doing an activity which individuals find naturally interesting and enjoyable while extrinsic motivation involves performance of an activity so as to get a separable outcome. As Deci, Koestner and Ryan (2010) points out, an activity done by a person who is intrinsically motivated is energized and sustained by the inherent satisfaction that comes from performing the activity. It is clearly seen in behaviors

such as play, exploration and challenge-seeking. On contrary, extrinsic motivation is governed by reinforcement contingencies. Student intrinsic motivation has to do with student desires to participate in the learning process. It also concerns the reasons or goals that underlie their involvement in academic activities. Ryan and Connell (2016) suggest that the learning outcomes of intrinsic motivation are better than those obtained under extrinsic motivation. This is because a student who is intrinsically motivated is going to complete a certain task even when it is challenging such as the difficult topics in chemistry, retain concepts learnt better and confidently handle unfamiliar learning situations.

1.2 Statement of the problem

In spite of all its usefulness in the society, Chemistry continues to be the worst performed school science subject as seen in Table 1.1. This means that there would be shortage of man-power in Chemistry based careers such as doctors and engineers, poor food production and preservation skills and sub-standard products from large scale industries which use the knowledge and skills gained from chemistry. Various efforts that have been put in place to improve this situation include; seminars and workshops for Chemistry teachers to familiarize them with the effective instructional modes, KNEC reports which alert on weaknesses in Chemistry that need to be given attention, embracing of modern technology in instruction to diversify teaching techniques, introduction of micro-kits for practical lessons, SMASSE, establishment of science clubs in schools and science and engineering fairs for learners. Irrespective of the effort put in improving learners' performance in Chemistry, it seems not to improve. Some scholars (Borg and Shapiro, (2016); Ziegert, (2010)) have suggested that one root of the problem and some possible but neglected perspective of learning Chemistry might be related to learners' motivation. Very few studies have been done on Chemistry learners' motivation in Kenya. This research therefore, focused on ways that motivation and particularly intrinsic motivation of learners would be enhanced and sustained so as to improve conceptualization, increase initiation and diligence, sustain interest, active participation and consequently lead to a better achievement in Chemistry.

1.3 Objectives of the Study

The general objective of the study was to assess the effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya.

1.4 Significance of the Study

The findings of this study will assist in bringing to light the importance of motivational strategies which support intrinsic motivation. This is useful to educational quality assurance officers on assessing the quality and quantity of motivational strategies used in schools. Secondly, the research identified some of the problems teachers of Chemistry face when employing motivational strategies and hence policy makers will come up with possible solutions to solve these problems. Thirdly, it will improve the quality of training teachers because the study recommended possible ways of dealing with difficulties associated with use of motivational strategies.

2.0 LITERATURE REVIEW

2.1 Motivational Strategies

Students should be encouraged to set goals which are short- term and realistic and learn ways to work toward their set goals (Schunk and Miller, 2012). Students become increasingly responsible of their own learning when they are allowed to take part in making choices. According to Schunk and Miller (2012), when learners set their own learning goals then they are more willing to put effort, learn that effort and ability contribute to success, improve academic skills and develop self-efficacy. Teachers should teach students how to deal with inevitable disappointments that come when learners do not perform as they had hoped. They can be encouraged to learn from their mistakes and failures and be taught ways of dealing with disappointments and negative emotions that would interfere with learning (Elias, Blum and Schuler, 2017).

When the teacher points out the relevance of chemistry content, it increases the learners' self-determination to learn. Learners are most probably going to value the material they are learning and be motivated to study it if it is of personal interest to them. In a certain study by Covington and Mueller (2012), students enjoyed studying a topic that was of interest to them even when they failed. For intrinsic motivation to flourish, the teacher should make learning activities to be relevant to students' lives. Strategies include using local examples, teaching with events in news, using several teaching aids and relating Chemistry content with the student's immediate environment and daily activities (Brozo, 2015).

When students are given feedback by their teachers pointing out that they performed well as a result of increased effort, learners become highly motivated and experience greater self-determination (Schunk and Miller, 2012). Telling learners to work harder after a poor performance may lower their intrinsic motivation especially when they feel they are doing their best. Students should be provided with precise feedback about the exact skills they have acquired or need to acquire so as to perform well in Chemistry, for example, the teacher should tell students exactly why they failed a certain question and how they would have done it to get it correctly. It is also necessary for students to be praised when they do well and show improvement. The praise should be specific, that is, it should tell learners that their performance was good and for which learning processes or skills they are being praised for. Students use feedback and praise given by teachers and peers to mold how they conceive about their competences as well as making decisions pertaining academic activities.

The performance expectations that are set should ensure that the work does not exceed learners' cognitive ability and that the learner has a chance of been successful in it. Chemistry content should be arranged from simple to complex, known to unknown to ensure a level of success for learners at initial stages. When a student fails in a given task and does not meet the set performance standards, he/she should be allowed to repeat it and be guided on how to do it well. This can be achieved by assisting the learner divide a task into small sections which he/she can purpose to complete one at a time. When the learners find that a task can be completed a feeling of success is imbued in them.

2.2 Motivation and Academic Performance

Several studies have been conducted on effect of motivation on academic performance. In all of these studies it is claimed that motivation is important in learning but the concepts used to explain how and why differ from one study to another.

Obrentz (2012) conducted a study entitled "Predictors of science success: the impact of motivation and learning strategies on college chemistry performance." The predictors of science success in this study were self-efficacy, effort-regulation, assessment anxiety and previous achievement. The research found out that, levels of motivation changed with significant decreases in self-efficacy and increases in personal relevance and assessment anxiety which consequently influenced the performance in science.

Kursurkar et. al (2012) carried out a research on "How motivation affects academic performance: a structural equation modelling analysis." The aim was to determine whether Relative Autonomous motivation (RAM, a measure of balance between autonomous motivation and controlled motivation) affects academic performance through a good study strategy and higher study effort. Students were selected via two different systems namely qualitative and weighted lottery selection. The study found out that, high RAM positively affected good strategy and study effort, which in turn positively affected academic performance in form of grade-point averages.

Afolekemi and Adebisi (2008) did a research entitled "Impact of teachers' motivational indices on science students' academic performance in Nigerian Secondary Schools." The impact of science teacher's motivation on science students' academic performance in Senior Secondary schools in Ondo and Ekiti states of Nigeria was studied. The study revealed that; there was significant relationship between regular payment of science teachers' allowances and academic performance of sciences.

2.3 Empirical review

Several studies have been conducted on effect of motivation on academic performance. In all of these studies it is claimed that motivation is important in learning but the concepts used to explain how and why differ from one study to another.

Musyoki and Mwanza, (2015) carried out a study to investigate determinants of students' achievement in chemistry and the proposed strategies used to improve its achievement. The researcher used Descriptive survey design and also ex-post factor design. A total of 300 respondents were used to derive the findings and conclusion of the study. The researcher adopted stratified sampling to select public schools and students per school were randomly selected while one chemistry teacher and the principal in the sampled school automatically became respondents in the study. Questionnaires for principals, chemistry teachers and students were used to collect data and the results obtained were presented using both descriptive statistics for quantitative data by SPSS program while qualitative data was presented thematically in line with the study objectives. The findings of the study indicate that the perception of students towards chemistry was negative as observed by 64% of the chemistry teachers and 64% of the principals. Teaching experience was found to be significant in determining students' achievement in chemistry in secondary schools as agreed by 60% of teachers and 72% of the principals but academic qualification was insignificant. ICT materials and facilities were found to be available but were not used during teaching and learning of chemistry. Failure to use ICT facilities was due to majority of teachers not being trained to use them in addition to many having not attended ICT

seminars and workshops. Based on the findings the study concluded that students' perception in chemistry determines its achievement in examinations and that most students do not have positive attitude in chemistry. ICT materials and facilities are available but not used during teaching and learning of chemistry. Also, various teaching and learning resources are not adequate in many schools. The study recommends that the Government and school authorities should through the allocation of funds, materials and apparatus for sciences teaching make school laboratories more adequate for effective implementation for Chemistry curriculum so as to enhance students' performance. Students should be exposed to more laboratory applications and activities so that they can recognize laboratory materials and equipment.

Nangabo & Raphael (2014) conducted a research study to investigate abilities of Chemistry teachers to source and integrate instructional materials in their regular teaching as influenced by SMASSE project training. The researcher applied a descriptive survey design to a sample size of; 18 secondary schools, 25 Chemistry lessons, 42 Chemistry teachers and all heads of science department within sampled schools. The raw data was analyzed using a computer software, SPSS. Results were presented in form of descriptive statistics using percentages, frequency tables, and histograms. Findings showed that; (a) Chemistry teachers declined to acknowledge having been influenced by SMASSE training in their regular teaching, (b) most schools had laboratories which are inadequately stocked with necessary facilities and equipment, (c) schools were predominantly acquiring instructional materials through purchasing, (d) expository teaching strategies were still prevalent in Chemistry lessons and (e) learner participation in classrooms was limited to students' responses to their teacher's questions. Additionally, newly established schools were found to be severely disadvantaged in terms of having qualified teachers and requisite facilities for teaching Chemistry.

Miheso and Machina (2013) carried out a study to establish the preparedness of Kenyatta University prospective teachers to facilitate Chemistry instruction at secondary school level. The target population were all the Kenyatta University Chemistry prospective teachers and the secondary school Chemistry learners. The study adapted a descriptive cross-sectional survey research design. A sample of forty-six Chemistry prospective teachers and two hundred and fifty-nine form two learners were selected using purposive, stratified and random sampling techniques. Data was collected using a mixed methods approach, where both qualitative and quantitative approaches were used. The research instruments used included a teacher's and learners' questionnaires and a lesson observation protocol. Descriptive statistics were used to present the data in form of frequency tables and charts. The main findings showed that; most of the TP teachers (67.4%) felt that the Chemistry course content taught at the university does not reflect the expectations of the secondary school Chemistry syllabus and that some of the topics/concepts required at secondary school level were not well addressed at the University. The findings further indicated that most of prospective teachers (64.5. %) felt that the three months TP period was not sufficient for the course and were of the opinion that two terms or a six months duration would be sufficient. It is hoped that the findings and recommendations from this study will be used to inform education stakeholders and policy makers in reforming teacher training programs in line with the dictates of Kenya's vision 2030. The findings will also help enhance learner's achievement and classroom performance outcomes as well as improve on teacher proficiency for quality Chemistry instruction at the Kenya Certificate of Secondary Education (KCSE) level of education.

2.4 Research Gaps

A knowledge gap occurs when desired research findings provide a different perspective on the issue discussed. For instance, Miheso and Machina (2013) carried out a study to establish the preparedness of Kenyatta University prospective teachers to facilitate Chemistry instruction at secondary school level. A sample of forty-six Chemistry prospective teachers and two hundred and fifty-nine form two learners were selected using purposive, stratified and random sampling techniques. The research instruments used included a teacher's and learners' questionnaires and a lesson observation protocol. The main findings showed that; most of the TP teachers (67.4%) felt that the Chemistry course content taught at the university does not reflect the expectations of the secondary school Chemistry syllabus and that some of the topics/concepts required at secondary school level were not well addressed at the University. The findings further indicated that most of prospective teachers (64.5. %) felt that the three months TP period was not sufficient for the course and were of the opinion that two terms or a six months duration would be sufficient. However, our study focused on effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya.

Secondly, a methodological gap can be identified from the research, for example, Miheso and Machina (2013) carried out a study to establish the preparedness of Kenyatta University prospective teachers to facilitate Chemistry instruction at secondary school level. The target population were all the Kenyatta University Chemistry prospective teachers and the secondary school Chemistry learners. The study adapted a descriptive cross-sectional survey research design. A sample of forty-six Chemistry prospective teachers and two hundred and fifty-nine form two learners were selected using purposive, stratified and random sampling techniques. Data was collected using a mixed methods approach, where both qualitative and quantitative approaches were used. The research instruments used included a teacher's and learners' questionnaires and a lesson observation protocol. Descriptive statistics were used to present the data in form of frequency tables and charts. The main findings showed that; most of the TP teachers (67.4%) felt that the Chemistry course content taught at the university does not reflect the expectations of the secondary school Chemistry syllabus and that some of the topics/concepts required at secondary school level were not well addressed at the University. On the other hand, our study applied desk study review methodology.

3.0 METHODOLOGY

The study adopted a desktop literature review method (desk study). This involved an in-depth review of studies related to cancer prevention practices among women in the reproductive age in Kenya. Three sorting stages were implemented on the subject under study in order to determine the viability of the subject for research. This is the first stage that comprised the initial identification of all articles that were based on effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya. The search was done generally by searching the articles in the article title, abstract, keywords. A second search involved fully available publications on the subject on effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya. The third step involved the selection of fully accessible publications. Reduction of the literature to only fully accessible publications yielded specificity and allowed the researcher to focus on the articles that related to the effect of motivational strategies on the learner's performance in secondary school Chemistry in Kenya which was split

into top key words. After an in- depth search into the top key words (motivational strategies, learner's performance, Chemistry), the researcher arrived at 3 articles that were suitable for analysis.

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Nangabo & Raphael (2014) conducted a research study to investigate abilities of Chemistry teachers to source and integrate instructional materials in their regular teaching as influenced by SMASSE project training. The researcher applied a descriptive survey design to a sample size of; 18 secondary schools, 25 Chemistry lessons, 42 Chemistry teachers and all heads of science department within sampled schools. Findings showed that; (a) Chemistry teachers declined to acknowledge having been influenced by SMASSE training in their regular teaching, (b) most schools had laboratories which are inadequately stocked with necessary facilities and equipment, (c) schools were predominantly acquiring instructional materials through purchasing, (d) expository teaching strategies were still prevalent in Chemistry lessons and (e) learner participation in classrooms was limited to students' responses to their teacher's questions. Additionally, newly established schools were found to be severely disadvantaged in terms of having qualified teachers and requisite facilities for teaching Chemistry.

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4.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Motivation is that drive which makes an individual set a goal, initiate and maintain behaviors which lead to the attainment of the set goal. Motivation is all about putting effort, staying focused to a certain goal and persisting in the face of difficulty, that is, all aspects of activation and intention. Based on the findings the study concluded that students' perception in chemistry determines its achievement in examinations and that most students do not have positive attitude in chemistry. The research concluded that, levels of motivation changed with significant decreases in self-efficacy and increases in personal relevance and assessment anxiety which consequently influenced the performance in science.

The study also found out that, high Relative Autonomous motivation positively affected good strategy and study effort, which in turn positively affected academic performance in form of grade-point averages. The study revealed that; there was significant relationship between regular payment of science teachers' allowances and academic performance of sciences.

4.2 Recommendations

The study recommends that the Government and school authorities should through the allocation of funds, materials and apparatus for sciences teaching make school laboratories more adequate for effective implementation for Chemistry curriculum so as to enhance students' performance. Students should be exposed to more laboratory applications and activities so that they can recognize laboratory materials and equipment.

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