INSTITUTION-BASED FACTORS AFFECTING EFFECTIVE TEACHING IN CHEMISTRY: A SURVEY OF SECONDARY SCHOOL TEACHERS IN NAIVASHA SUB-COUNTY, NAKURU COUNTY

EMILY A. OGUTU

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DECLARATION

I consider this report to be my original work and has not been presented to any other institution for any award.

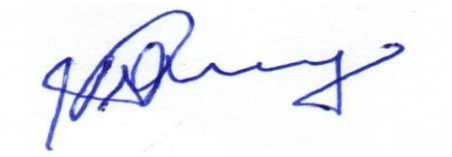
Signature: _____ Date: 31st August 2020

Emily A. Ogutu

L40/10882/2018

Approval by the Supervisor

With my approval as University Supervisor this report has been submitted for examination.

Signature:  Date: 31st August 2020

Mr. Dan Oduor Oluoch

Lecturer,

College of Education and External Studies,

University of Nairobi

DEDICATION

I devote this report to my loving family; hubby Mr. Stephen Ouma, son Baby Byron Ince Ouma and my three months daughter baby Barbra Arianna Ouma who offered both emotional and financial support to ensure success of these academic project throughout my study period.

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I thank God for allowing me first to pursue my education. Secondly, many thanks goes to my supervisor Mr. Dan Oduor Oluoch due to his tireless efforts coupled with meticulous guidance in bringing this work into success. May God bless you abundantly

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ABBREVIATIONS AND ACRONYMS

KNEC-Kenya National Examinations Council

KCSE-Kenya Certificate of Secondary Education

MDGs-Millennium Development Goals

TIMSS-Trends in International Mathematics and Science Study

ABSTRACT

Requirement designed for effective teaching has gained significance in the Global arena. However, in Naivasha Sub-County, students' performance in chemistry in KCSE has remained below average. The research aimed at ascertaining the effect of institution-based factors on effective teaching in chemistry: a survey of secondary school teachers in Naivasha sub-county, Nakuru County. The study objectives include to: scrutinize outcome of availability of teaching materials on effective teaching in chemistry among high school teachers within Naivasha Sub-County, survey consequence of work load on effective teaching in chemistry among secondary school teachers and investigate whether in-service training has an influence on effective teaching in chemistry amongst high school tutors in Naivasha Sub-County. The survey design was employed. Target population were chemistry tutors in Naivasha Sub County. Respondents will be sampled via simple random sampling method. Furthermore, 30% technique was used to get the required sample of 53 participants. Information remained gathered by means of a formal questionnaire. The study revealed that effective teaching in chemistry has be hampered by inadequate provision of instructional materials and other important resources such as physical laboratory, ICT resources, adequate chemicals as well as textbooks. Moreover, it was observed that teachers had a lot in their table in addition to other administrative responsibilities as well as the fact respondents indicated that they seldom attend in-service training to enhance instruction skills and class organization. The report suggests that the ministry of education ought to endeavor in providing adequate instructional materials and other important resources such as physical classrooms and laboratory as well as ICT resources for the improvement of actual instruction. Secondly, adequate science teachers should be availed to learning institutions to allow proper tutoring in schools. This will reduce teacher's workload and promote their efficiency in teaching. Finally, teachers should be provided with technical support to participate in continuous career advancement to abreast their teaching skills.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Chemistry 's position concerning building a country's scientific base cannot be overstated. Chemistry serves as a gateway to many sciences and even other undertakings such as home, agriculture, health and industry. For example, Chemistry products includes the household materials. In Agriculture, Chemistry provides the fundamental basis upon which the technology for the production, processing and preservation of foods is established. Similarly, industrial and analytical Chemistry formed the basis of the various operational processes for production in the manufacturing, engineering and capital goods industries (Olubu, 2015).

There has been a question about low performance of the students in particular chemistry topics. It is acknowledged that chemistry is one of five science branches taught in secondary schools in Zanzibar. Chemistry is taught at secondary and primary level in this country, and is part of general science (Hassan, Ali, Salum, Kassim, Elmoge & Amour, 2015).

Several analytic studies have been conducted into causes and aspects which influence academic performance among students in various subjects but few done in chemistry. Alavi and Hoseini (2009) report a couple of cause as well as aspects that hinder the smooth learning and instruction of chemistry subject.

Science teaching has a vital role in the education sector. It has been argued that qualification of instructors, teaching methodologies and instructional aids are critical aspects for pupils' knowledge. Moreover, it is noteworthy that teachers can also affect students' values and their choice of enrolment (Tobias, & Raphael, 1997).

The success of the chemistry students in Nigeria over the years has been very unsatisfactory. The external review body such as the Board for Exams in West Africa consistently confirmed constant drop regarding Chemistry student success. Chief Examiners Research as well as those images emerging from study papers, shows that students have trouble in answering certain chemistry questions. The concern about chemistry student's success has resulted in many suggestions for change. Sadly, these recommendations revolve around inadequate instruction techniques as well as insufficient hands-on- experience to be key root in the dismal in achievement of chemistry students (Nkemakolam, Chinelo & Jane, 2018).

Nevertheless, despite the rising relevance in science for the emerging world, achievement of learners in Nigeria persists to be a disappointing disaster. Nevertheless, it is alarming to report that given relative importance of subject such as chemistry, the performance of the students in all review is significantly deficient. (Saage 2009). Nbina (2012) recommends that there is a requirement for competent and productive tutors who are well trained to facilitate the teaching of chemistry.

Education results are always quantified via assessments which is acknowledged to be integral part in structure of education. Tests were constantly employed as principal foundation to determine the skill of the applicant, and also as a way of selecting candidates for job market. Nevertheless, most students in many countries around the world do not perform well at national exams counting Kenya. Regarding poor performance, there have been a number of attempts to figure out the reasons behind this. Factors put forward include lack of teachers lack, of school facilities, the lack of discipline among students, the unfavorable home setting, anxiety and the need for students to achieve this were some of the triggers (Maundu, 1980; & Ndirangu, 2007).

According to Korau (2006) today schools list thousands of people compared to hundreds in previous years. Today's schools are overloaded in classrooms, making it difficult to think about the optimal classroom size involved in successful chemistry instruction. Any successful teaching will not happen in challenging scenario tutor is unable to cope efficiently with huge student population. Hence, quality and quantity canoe realized to be working together and that can affect the studying of chemistry by the students making them to poorly perform.

Tutors are seen to be mechanisms for anticipated social changes. Such demands for them to be appropriately educated, have access to reskilling and upgrading their knowledge via in-job instruction and forums (Tahir, 2006). To promote the learning of chemistry in schools, effective tutors with scientific and intellectual qualifications must be established.

In Zambia, the student performance in science with high school students has remained dismal among several years. Notwithstanding the crucial function science play within humanity and in particular in engineering arena, dismal attainment in public examinations is continuously realized (Kafata & Mbetwa, 2016).

Global evaluations demonstrate that students in South Africa positions towards the tail end when compared with countries that were listed in trends in comparative research of mathematics and sciences. The proof of poor performance of learners in natural sciences in South African school, shows an average success of learners to range between 15 per cent and 25 per cent being too poor (Heeralal, 2004).

Experts contended that single explanation in the disinterested Science leaarners may be explained in terms of methodologies of instruction in chemistry. It was within this motivation that Osborne and his colleagues proposed improvements in content and style of teaching that could greatly improve students ' interest in natural science.

The Ugandan Government has funded and adopted various ways of supporting science education. Significant resources are spent on promoting science and technology at different levels of educational institutions in Uganda. It is disappointing to hear that such actions produce the desired outcomes. Few students take science related subjects and those who take them continue to perform dismally. Generally, poor education outcomes have detrimental effects on individuals, country's economic and social development.

The momentous scientific position in achieving the Kenya's millennium development goals and expansion has stimulated specifically the administration making a prerequisite for each student to concentrate on two science subjects provided in secondary school. Despite the well laid down policy, achievement among these science topics continues to decline yearly. Dismal achievement in science comprises Chemistry, which one of the most "common" science subject that has continued to register high school enrollment (KNEC, 2010).

In Kenya, the students' examination results remained low given the value attached to chemistry (KNEC, 2013). The 2014 Kenya National Examinations Council (KNEC) Report shows continued decline in chemistry achievement. In Kwale Otieno (2012) avers that low achievement in Chemistry by learners could be attributed to inappropriate learning environment, negative socio-cultural effects, the context characteristics of students; attitude factors particularly adverse attitude of teachers' capabilities and insufficient application of training resources.

Ngema (2016) proposes that aspects that lead to low achievement include in particular, the shift in curriculum, the allocation of time for each science subject, the teaching pressure on teachers, insufficient content knowledge of among tutors, as well as training media.

In Nakuru County, Records at the Ministry of Education and the Kenya National Examinations Council (KNEC) indicate a decrease in academic success over the past four

years in the region. The county reported an average of 3.5 in the KCSE last year, compared to 6.8 registered in 2015, according to county directorate of education (Macharia,2018). In Naivasha Sub County, performance in chemistry by students has been below the National average. The present study therefore sought to determine whether institution-based factors has a reciprocal influence in effective teaching in chemistry: a survey of high school teachers in Naivasha sub-county, Nakuru County.

1.2 Statement of the Problem

Some of the main goals of the fight for independence was the need to provide decent education for all Kenyan children. Despite this focus, information from the Sub county Education Office, for the last four years in a row shows that students KCSE performance in chemistry has remained below average. It therefore shows that if the problem persists, Realizing the MDGs and the growth of Kenya's agenda will not be achieved. This problem led the research to inquire into the effect of institution-based issues on effective teaching in chemistry in secondary school teachers in Naivasha sub-county, Nakuru County.

1.3 Purpose of the Study

The aim of the study was to determine influence of institution-based factors on effective teaching in chemistry in Naivasha sub-county, Nakuru County.

1.4 Objectives of the Study

1. To determine effect of availability of instructional resources on effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

2. To examine effect of work load on effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

3. To investigate effect of in-service training on effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

1.5 Research Questions

1. Does availability of instructional resources affect effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

2. Does work load affect effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

3. Does in-service training affect effective teaching in chemistry among secondary school teachers in Naivasha Sub-County, Nakuru County

1.6 Significance of the Study

This research will be significant to ministry of education who will understand the determinants of effective teaching. The government will find the recommendations valuable while dealing with the problem regarding ineffective teaching in schools.

1.7 Delimitations of the Study

This research was carried among high school teachers in Naivasha sub-County, Nakuru County. The researcher has a prior knowledge, and this enhanced data collection.

1.8 Limitations of the Study

Research had been confined to availability of instructional resources, teachers' workload, in-service training as well as effective teaching.

1.9 Assumptions of the Study

It was presumed:

i. Participants provided the necessary data

ii. Participants were able to comprehend the problem under investigation

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The section discusses related literature regarding institution-based factors affecting effective teaching in chemistry. The variables under review comprise availability of instructional resources, workload, and in-service training. The study further reviews conceptual as well as theoretical framework.

2.2 The Concept of Effective Teaching

Teachers are being asked to teach with multiple resources in today's science education reform efforts, often in different ways than they have been trained or learned to teach themselves. It is important to note that chemistry teaching should be outcome-oriented and students focused, which can only be done if the students are motivated and the teachers are well disposed for using the correct methods and tools to teach the students (Adesoji & Olatunbosun, 2008).

In chemistry education, it is hoped that teachers should have a strong degree in knowledge as well as understanding in the content prior to bringing it into learners. This is seen to boost successful instruction in high institutions of learning. Tutors must grow students' attention during learning as well as their feeling towards the subject through their teaching process. It is expected that teachers as experts with strong exposure and experience in chemistry can encourage student adjustment, align curriculum offerings with mental development rates, understand the basic cognitive of students and inspire students to learn the subject (Avwiri, 2011).

2.3 Availability of Instructional Resources on Effective Teaching

The provision of teaching and learning tools increases schools' effectiveness as these are fundamental aspects that can offer good student academic success. The insufficiency of human and material capital at learning institutions remains to be significant aspect accountable in student education outcomes. This means that schools with inadequate facilities such as libraries, labs, classrooms, instructional materials are unable to produce successful results (Atieno, 2014).

Considering the views of numerous authors such as Abubakar (2016) as well as Udonsa and Udonsa (2015) retained in their research that Adamawa State's high schools were largely unequipped to provide training; the students do not have sufficient desks as well as being congested. In Nigeria, Takwate (2018) conducted a research to investigate allocation, availability and maintenance of school facilities in conjunction with the achievement in academia. The results showed a significant association between allocative efficiency, affordability, maintenance quality and academic success of students in that region. The report suggested that government ought to properly provide all of the state's senior secondary schools with effective facilities preparation and allocation processes, school principals would periodically perform detailed evaluations of amenities in their institutions to locate areas that require attention.

Lemmer (2000) causes which affect low high school student’s success in all subjects are numerous. The key factors of low success in any subject includes shortage of equipment and material services, high turnover of teachers and administrators, workload of students, lack of trained instructors, ineffective instructional techniques, insufficient communication pupils abilities and also instructors in the language of education.

Students studying in science-based topics such as chemistry are closely linked to hypothetical and hands-on-experience, although others are disconnected during learning or scientific applications (Felder et al. 2013).

Padmanabhan (2001) avers that sufficiency of TLR defines the performance of an school program. Textbook and curriculum resources are vital instruments for efficient teaching and learning, their lack or inadequacy allows teachers treat topics in an abstract manner, presenting them as dull and non-exciting.

Achimugu (2016) carried a study to examine issues impacting the successful delivery of the high school chemistry program in the State of Kogi, Nigeria. The findings specify that insufficient resources, low teacher engagement, lack of sufficient time to prepare the program, insufficient workshop and voluminous complexity of the chemistry curriculum were among the factors found adversely affecting the successful execution of the chemistry curriculum.

Read and Kable (2007) discourse that applied knowledge often contributes an important part of chemistry research, the curriculum consists of several subjects that can be experimentally tested with the intention of providing a stimulating and exciting atmosphere to encourage students to learn about chemistry, which is generally believed to be intangible, quantitative and uninteresting.

The supply of laboratory facilities supplies and materials, laboratory staff, working practices in laboratory and protection steps, extensive required textbooks and specific times assigned to the subjects' teaching (Adefunke 2008).

Nyanda (2011) observes that it is clear that the absence of well fitted research lab for tutors and learners makes it impossible to teach and study science subjects. In addition, the study

showed that most science students believed that they cannot master the idea, understanding and essence of science without practical research.

The research by Uhumuavbi and Okodugha (2014) suggest that using the lab as an instructional tool enables the learners advance persuasive competences. Moreover, it contributes to improved knowledge processing and even to the creation of positive attitudes towards school subjects. It is argued that the students are active participants in the laboratory. This technique familiarizes the learners with brain functions including examining, reasoning, categorizing, measuring, as well as interpreting data.

Ndihokubwayo (2017) notes that tutors are confronted with barriers such as material scarcity, time constraints, and absence in improvisational proficiencies in daily teachings of sciences. They further reported that approximately 95 percent of teachers who work in laboratory schools and just 5 percent of their counterparts in non-classroom schools demonstrate adequate knowledge of the research laboratory practices. Nevertheless, in all of the studied classes, students had common responses as per value of experiment and improvisation in the laboratory.

Cossa and Uamusse (2015) opine that instructional resources as well as laboratory facilities and are inadequate because of a shortage of funds. They observe that in Rwanda, for example, lab equipment is inadequate which was up to 17% of institutions with these labs. According to Sandifer and Haines (2009), practical work is however seen to be the best approach to teach and understand science successfully. This implies that in the short supply of laboratory equipment, effective teaching will be vulnerable.

Laboratory practice is widely understood to be critical component in understanding scientific concepts. Therefore, if there is no laboratory practicals at individual or group level, it means

that all that has been learned will be passive knowledge (Jonassen, 1991). Chemistry lessons is usually performed in labs. This suggests that laboratory is extremely valuable information supply during scientific education, as well as a significant indicator of good attainment in academia (Dahar, 2011).

Muleta and Seid (2016) conducted A research to determine factors impacting the introduction of realistic technical programs in chosen high and introductory schools within Afar Region. Results indicated that up to 68 percent replied that tutors never participate in lab work. This shows that lack of attempts by science teachers to use local content for basic tasks, lack of a separate and well-equipped laboratory for each subject, and less commitment by local authorities and administration of the school could affect student choice for scientific education.

Lunetta, Hofstein and Clough (2007) avers that studying science is improved, and the degree of comprehension is increased as students participate in practical studies in science laboratory. Laboratory has been accorded a significant function in teaching. In this respect, educationalists have proposed that the use of laboratory practices will offer rich benefits in studying science

Njoka (2015) the analysis in a research showed that some schools lacked labs for chemistry definitely. In other instances with labs and reasonably fitted, it nevertheless found that they lacked essential specifications such as a fumigation chamber, gas taps, first aid kit, and water. Further, it was established that the main activities in the laboratories were teacher demonstrations though when group practicals were used, the number of students per group were unusually big. It is recommended that all schools should have adequately equipped laboratories.

It is believed that sound knowledge of a chemistry teacher during application of Information Communication Technology in instruction in chemistry will engender entrepreneurial skills which in turn will provoke industrial revolution of the country. Eze (2012) maintains that education in whatever form it takes is not complete without effective use of ICT and that the significance of ICT in education includes: exposure to a range of digital tools, content immediacy, study everywhere, social digital, interactive instructional approach, accurate and up-to - date knowledge, links to electronic libraries, distance learning, individualization in instruction, reduce time on many routine task, teaching science subjects made interesting, etc.

Achimugu (2016) examined the chemistry teachers' view of factors impacting the successful use of ICT in Chemistry instruction Kogi state. The results showed that chemistry teachers had the perceptions that factors that includes absence of motivation and non-training of tutors, absence of technical support staff, as well as lack of funds among others affect their effective use of ICT in chemistry education.

Agommuoh (2015) further asserted that the utilization of ICT in instruction science will create studying extra real, relevant and experimental as large amount of data and materials on any topic can be brought to the classroom from all over the world thereby, greatly facilitating the gaining in information and providing students with unique chances of improving their learning.

In South Africa, implementation of chemistry curriculum is influenced by inadequacy of practical lessons, shortage of both laboratory facilities and relevant textbooks. Others are: teacher unprofessionalism while on the job, poor in-service attendance by tutors, workshops, lack in laboratory attendants or presence of unqualified ones in schools, and absence of

laboratory safety equipment for first aid interventions in case of accidents (Ijidike & Oyelana, 2015).

According to Ijidike and Oyelana (2015) shortage of laboratories contributes to ineffective chemistry teaching in schools. To enhance the competence of the laboratory so as to be used in instruction, the facility must have adequate water supply, a good power supply system, enough furniture, good ventilation, and a clean environment. In addition the facility should be supplied with adequate stock of instructional materials such as chemicals, apparatus, operational equipment, charts and models

2.4 Work load on Effective Teaching

According to Bennaars, et al. (1994), it is understood that workload is the amount of work a single person or company needs to do. The workload of the teachers should be quantitatively and qualitatively considered. If a teacher's responsibilities and tasks are described as are the job requirements of other teachers, only number is expected (Farrant, 2005).

The productivity of teachers is affected favorably much activities to tackle. According to Denga and Ekpo (1994) overloading can result in stress and concomitant gross inefficiency. On the other hand, the findings by Marshall (1993) was important in pointing out the effect of workload. In this research, it was meant on establishing connection between the workload and leadership performance. The finding demonstrated that the workload has a substantial impact on the success of guidance.

Tutors at New Zealand high schools have shown diverse workloads. The Ingverson et al (2005) survey found that senior managers were working an average of fifty hours per week, and tutors operated above forty hours weekly. It shows that due to increased stress levels, the periods in learning institutions caused substantially the weak execution of all instructors.

Finally, the study found that teachers and schools ought to develop several approaches to better control workloads.

In South Africa, Maforah and Schulze (2012) defined workload as a aspect that adversely affects the teachers. The teacher's understanding, judgment and purpose on workload is personal and challenging; any school judgment is supposed to be against a school's aim and objective. Tutors are thus the key leaders in instilling information into the students; thus, a heavy workload may have adverse effects on success.

A research by Koech, Tikoko, and Chemwei (2014) suggests that the high teacher attrition in Kenya is accounted by a variety of school reasons. It entails excessive workload and little – additional hours contributing to high instructor turnover and low results. While this analysis analyzed structural variables, the methods and some related data results of teachers were excluded, e.g. workload per week and a new TSC provision of 30 lessons a week.

Kafata and Mbetwa (2016) claim important aspects which lead to dismal achievement in Kitwe district of Zambia comprised lack of laboratory apparatus and chemicals, overcrowded classes leading to high pupil-teacher ratio, pupils' pessimistic perception towards learning, absence in classroom space as well as shortage in resources for teaching besides learning.

It is important to note Iwu, Gwija, Benedict and Tengeh (2013) study in South Africa who wanted to find out teacher job satisfaction and learner performance. Their findings demonstrate that strongly motivated educators are happy with jobs; they therefore perform better than their negatively motivated peers. With respect to motivation, the findings also indicate that a combination of intrinsic and extrinsic influences appear to affect the motivation of the educators. For example, work environments, job stability, and potential prospects for development were listed as contributing factors in order of significance.

Lack of Tutors are often perceived as having a detrimental effect on teaching and learning experience and knowing the reasons that affect these shortages is completely critical for instructional planning and decision makers. The situation is comparable in Kenya, where teacher recruiting was marginal given the rise in the availability of teachers graduating from universities and other teacher training colleges, and the ever-increasing demand for secondary school teachers due to higher enrolment rates (Wamukuru, 2016).

In South Africa, Tonder and Fourie (2015) opines that instructors are under pressure from all participants, particularly parents as well as education department, to be very precise in matters relating to learning procedure. Having a record of learner success is a unceasing task, implying teachers should devote much time on routine tasks, hence less instructional time and more workload.

Gwambombo (2013) undertook an analysis to correlate workload of teachers and academic success of learners at Mbeya City's group secondary schools. The study revealed amount of work of tutors is high and is having an adverse influence on the success of learners in high schools. The suggestions include employment of qualified teachers to increase the teaching ability, use emeritus tutors while enabling qualified personnel to enter education career.

Nyawara (2011) reports that there is a lack of tutors in the Kombewa Division's public primary schools. The key result of the analysis was that overloading jobs adversely affects instructor efficiency. Several division teachers agree to the fact that work overload leads to poor results. Because it is apparent that the workload affects employee accomplishment, this study suggests that the workers be given ample loads to boost their efficiency.

Hosain (2016) therefore concludes that workload scheduling should be sufficient and modified to work best. The researches hoped that their findings could help university

administrators, investigators and instructors build along with enforcing an efficient management program to solve the workload related challenges.

It has been widely agreed that workload burden will lead to low morale, decrease performance, high absence and decrease professional engagement (Klassen et al. 2012). Peters (2012) avers that tutor's workload has risen over the last years and is considered being greater than that of other occupations. The rise in workload has influenced teachers ' job satisfaction and placed pressure on them (Timms, Graham & Cottrell, 2007).

Muse, Ndirangu and Imonje (2019) observe that the constant growth in the number among secondary school learners as a result of launch in free primary education and secondary schooling in part has piled pressure on schools to add more classrooms so as to accommodate more students. It can be argued that this addition of more classrooms without corresponding recruitment of more teachers has consequently increased the workload of the existing teachers; more so the lesson allocation.

Okono et al (2015) affirm that the amount of lessons faced by an instructor influences their preparation for each class and between classes daily. This is because teachers have other duties apart from teaching which also require time in order to be accomplished.

It has been argued that teachers are frequently seen to carry their tasks home and at the same time face high expectations from schools (Butt & Lance, 2005). It therefore implies that workload of teachers could be explained to be activities that can take the greater amount of period to complete their work (Ekanem, 2012). This means that rise in workload presents tremendous obstacles to tutors (Ballet & Kelchtermans, 2008). Although this rise do not alter the actions of teachers while instructing, it is believed it will impact on the standard of teaching as well as learning, besides the value of education services offered will be deteriorating (Shah et al, 2011).

Muse, Ndirangu and Imonje (2019) reports that with regard to the workload of teachers and the execution of the chemistry curriculum, over half of chemistry teachers participated in teaching physics or biology. In addition to chemistry teaching, 68.2 per cent of teachers also held positions of responsibility. Thus it was concluded that both the lack of certain important TLMFs and the increased workload of the teacher impede the perfect execution of the curriculum of the chemistry subject.

Tonder and Fourie (2015) recommends that instructors are hampered with an growing administrative and technical workload, which provides little help. Based on the results, it is proposed that a novel solution focused on employment of interns to help instructors cope with huge demands of workload. Therefore, quality in delivery of school services depends on management of institutions thinks of teachers' position concerning workload.

Adiele (2017) avers that the dilemma with how schools are run is that school administrators do not know how much work it is appropriate for tutors to engage in a given time. Adiele (2017) further points that bad working conditions similarly compensate in uneven spreading of teacher workload. Of other institutions, social science subject tutors are in larger numbers, while other disciplines are in short supply. This is due to the unequal harmonization of workload which makes those who are more likely to have less workload.

Ayeni and Amanekwe (2018) thus recommends that Public Local Legislatures and private secondary school owners should hire a sufficient trained tutors to encounter the workload requirement for successful instruction, whereas education facilities must be improved to facilitate the application of the workload and increase the academic success of high school students.

2.5 In-service Training on Effective Teaching

Qualified and sufficient number of dedicated teachers is needed to teach the content or direct the curriculum. It is well known standard of every learning program hinge on tutor preparedness in terms of their scholarly as well as technical credentials and knowledge and their level of competence and commitment to their primary functions (Oluremi, 2013).

Pereira *et al*., (2013) avers that in-service training is a curriculum that improves employed tutors' skills so as to perform ordinary tasks to become effective at the job. It implies that in-service training is a package aimed at providing updates, improvement, transformation, and assistance for teaching specialists throughout training. It has been accepted by Demirtaş (2010) that over time, technologies, strategies, theories, methods, and curricula change in education. To adapt to those changes, teachers require in-service training (IST).

The overarching aim of IST initiatives is to improve teacher productivity in the classroom and ultimately to maximize student success (Hewson, 2007). A precisely comparative relationship between the teachers ' professional experiences and their participation in IST programs was determined (Balta, 2014). It is understood that the more teachers partake in IST courses, the greater the success of students (Damar, 1996).

Onashakpokaiye (2011) emphasized that educators have different roles to play in the instruction and scholarship process and need to be knowledgeable in their own field of expertise, as well as being able to adapt specific instructional approaches and techniques and to consider students ' learning processes. Ololube (2009) found that tutors ought to combine knowledge in content and instructive expertise during regular classroom practices.

Ojukwu (2016) maintains that deficient credentials of teachers, poor teaching techniques, inexperienced tutors, and inability to manipulate teaching media remained possible reasons for the low performance of students. On the basis of the results, it was proposed that ministry of education and private school owners aim at warrant that skilled as well as competent tutors are hired.

On the other hand, Omorogbe and Ewansiha (2013) recounts that unfortunately, science education is faced with myriad of challenges due to to low achievement of learners arising from insufficient instruction methodologies, lack of proper subject matter expertise, qualifications, ineffective teacher preparation and deficiency of in-service preparation as well as nonexistence of sufficient instructional tools.

Apparently, effective chemistry education is yet to be attained even in other countries, for instance in Sweden, Broman, Ekborg & Johnels (2011) noted that many students regard chemistry as an irrelevant and meaningless subject; which comes from their understanding of the subject to be a tutor-centered one.

In Ireland, Childs (2014) indicated that successful adoption of chemistry curriculum is undermined by factors such as transfer between educational levels, student background study, student body composition, study language question, and student cognitive ability. Furthermore, scientific misconceptions among students, impact of Information Technology (IT) on instruction, and ignorance of chemistry education research amongst most lecturers also affect the implementation of chemistry curriculum.

The teacher qualification factor in student's performance is a subject of great concern. Organized studies have repeatedly found that the most effective learning-enhancing

interventions are specifically linked to students or provided by staff, such as pedagogical strategies, classroom preparation and increased engagement (Kremer, Brannen et al. 2013).

It is anticipated that good scientific education is a successful teaching in science. Omoifo (2012) recounts that good teaching takes place as students understand and accomplish multiple science goals and can not only replicate scientific knowledge (Omoifo 2012). Students learn how to read, improve logical comprehension and cognitive skills through successful learning, thus helping students adjust their innate, daily methods of interpreting concepts to integrate empirical ideas. Hence the capability of students in problem resolution increases their level of learning. Therefore, teachers who have in-service training are able to demonstrate effective teaching in chemistry as a subject.

Ibrahim (2008) declares that there are signs that some teachers often rely on traditional standard strategies , procedures or solutions used during their teaching and are unable to explore alternative alternatives in accordance with what the current program suggests or prescribes. Additionally, Copriady, Zulnaidi and Alimin (2018) recommends that teachers in chemistry who have less classroom experience needed further in-service preparation and cooperation to improve their skills, while seasoned chemistry teachers also needed in-service coaching. Implication of this research suggested institutions were expected to coordinate joint events between teachers of varying backgrounds. Collaboration are required to increase tutor performance in content matter.

Qualification of a teacher is a mandatory for achieving the Chemistry Curriculum goals. It is the most significant element in enhancing the Chemistry success of students. Teacher qualification is the academic and professional credentials requiring an individual to become a registered teacher at all educational levels. This also involves the development of appropriate

expertise, abilities and skills and imagination required for a high-quality successful participation in the teaching profession (Ufonabasi, 2014).

Ufonabasi (2014) further reports that It was inferred on the basis of these results that instructor competence and expertise have a significant impact on the standard of chemistry instruction. Such qualities promote research with sufficient access and practical human capital in order to enhance and inspire the teaching of chemistry.

The value of the teachers depends on the extent of their teaching and planning. Odia and Omonfonmwan (2007) argued that tutor instruction establishments continued to develop inadequate educators regarding a clear understanding of content terms of subject matter as well as teaching skills. It can be noted that in-service preparation and instruction is an evolving process for teachers throughout their working lives. This type of training can be given at any time before leaving work.

Okhiku (2005) states that in-service preparation refers to exercises arranged and coordinated by practitioners throughout work and is designed at allowing the instructor to learn practical competences in order to fulfill the duties for which he was working effectively.

Ibrahim (2015) emphasizes that the advancement of workers through lectures, in-service preparation or courses is one of the most effective opportunities to improve teaching in classrooms. It is an opportunity to assist teachers / readers in their classroom in developing their instructional methods, approaches, managing new teaching materials or having the knowledge and skills required for successful delivery of lessons.

Manduku, Edward and Cheruiyot (2017) recommends Agreed attempts by the State, School Principals and Colleges to ensure that the in-service teacher preparation system is adequately developed and maintained to help more teachers. In the same way, universities need to track

their goods (alumni) through surveys, In-service Teacher Training Programmes (ITTP) and interaction and evaluate their success with respect to the experience their alumni have earned.

2.6 Theoretical Framework

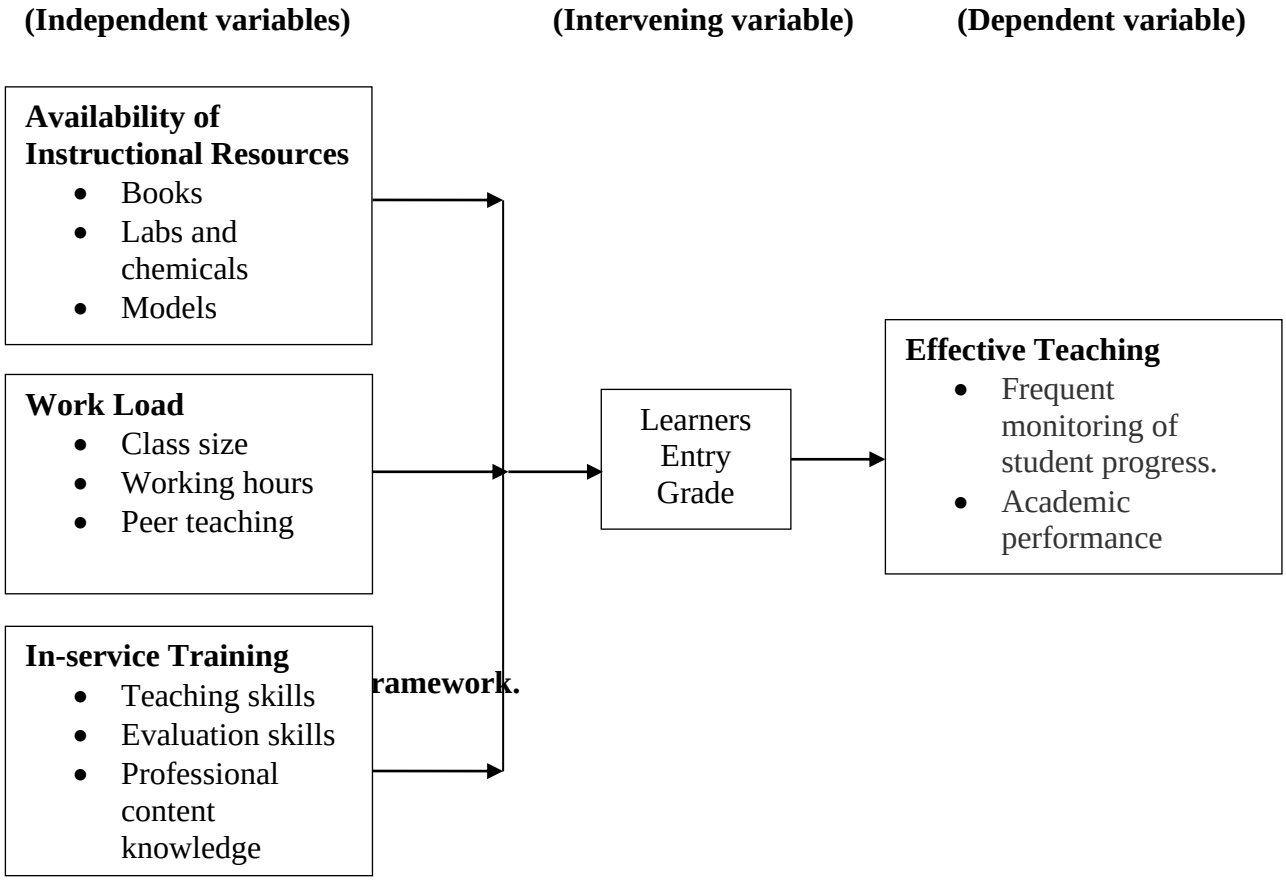
This research is rooted in Social System theory advocated by Hoy with Miskel (2013). According to Hoy and Miskel (2013) schools are open systems which include inputs, processes of transformation, outputs and feedback. In this preposition, the open system depicts organization not only as being influenced by conditions but also as being based upon them. The cyclic cycle of the open-system, it begins with inputs, creation, and output. Organizations take feedback from, transform and generate outputs from the world (Neal, 2013).

Hoy and Miskel (2013) believes that input requirements include labor, students, and environmental capital, as well as other related aspects such as human, material , financial, or information resources. Change mechanism signifies the successful internal mechanisms within the process of transformation. In teaching it relates to program structure and substance, organizational environment fitness, student and teacher engagement levels, instructor and administrator leadership, teaching quality and quantity, planning and vision, instructional time, school and classroom, mutual success and intellectual optimism (Hoy & Miskel, 2013). Similarly, according to the Scheerens (2013) school effectiveness model, the open-system theory transition process consists of nine dimensions: firstly is the student tasks, increasing the skills of the staff, considering on high expectations for all, monitoring progress across levels, considering on learning, effective teaching effective leadership, generating a positive school culture as well as school home school association. Furthermore, school outputs as the third component in the system comprises of the instruction connections phase. Effectiveness metrics can emerge as of every stage of this phase that includes input, process change and output (Aydin et al ., 2013). Significant outcomes for students from a

social-system viewpoint include academic performance, imagination, self-confidence, ambitions, anticipations, graduation and dropout levels. Significant metrics on the teachers side are work satisfaction, absence and attrition.. In order to boost schools' efficiency, instructors should focus on primary metrics, which are variables impacting the trailing efficiency or output measures (effectiveness). Therefore, instructors need to institute improvements in the social system as a critical factor in the enhancement of school productivity, since process of enhancing the feeling of self-efficacy among members in a school to increase their innovative behavior and effectiveness is supported by the social system.

2.7 Conceptual Framework

The following conceptual framework was used to guide the study as shown in figure 2



ramework.

Figure 2. 2 :Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section entails study design plus target population. Besides, sampling procedure, sample size as well as validity and reliability of research instrument will be looked at. Furthermore, it entails method of data collection and analysis procedure as well as ethical considerations.

3.2. Research Design

A study design refers to procedure of requirements for the processing data in way that seeks to incorporate economic and operational importance to the research objective (Ahuja, 2010). The research employed survey design. In this context, this design research is described as collecting information from a survey of individuals by answering questions (Check & Schutt, 2012). This methodology allows for a range of ways of hiring volunteers, collecting data, and using specific instrumentation techniques.

3.3. Target Population

Groves *et al* (2011) proclaim that the target population for a sample consists of the complete set of elements that employs survey data to draw interpretations. It thus defines all groups about which the survey results are supposed to generalize. The setting of research goals is the first step in the design of a survey. The second move would be to identify accessible elements. The study population for the research constituted chemistry teachers in Naivasha Sub County in Nakuru County. They were chosen because they are well prepared to comprehend the problem being investigated. In Table 1 the target population is seen.

Table 1: Target Population

Number of schools	Number of chemistry teachers
35	177

3.4 Sampling Procedure and Sample Size

Sampling refers to retrieval method of retrieval of a sample from an accessible population. It is difficult to evaluate any single item of a population in the inquiry, such that a community of individuals is chosen for assessment (Alvi, 2016). The present research used simple random sampling to select tutors. Mugenda and Mugenda (2003) avers that the sample size varying between 10 and 30% is a fair reflection of the target population and thus the 30% is suitable for this research. Hence this study's' sample size was 53 respondents.

3.5. Research Instruments

The current research applied structured questionnaire for gathering data from the selected participants. Questionnaires are easy to administer and could be useful in data collection in a large geographical location. Furthermore, respondents' anonymity and confidentiality is maintained.

3.6. Validity of Research Instrument

Validity describes how much the data gathered covers the real investigative field. Validity basically refers to measurement of what should be measured (Field 2005). In this study, rationality of research questionnaire was done with the assistance of university supervisor.

3.7 Reliability of Research Instrument

Reliability involves how robust and reliable a calculation of a process produces (Carmines and Zeller, 1979). Additionally, it also applies to consistency of data. It is believed that a scale or test is reliable if repeat tests taken under constant conditions yield the same outcome (Moser and Kalton, 1989). In this study, split-half technique was used and gave a spearman's coefficient of 0.82 indicating that the questionnaires have been accurate.

3.8. Data Collection Procedure

Permission remained sought from the principals of the selected schools. Furthermore, introduction letter was issued to the respondents informing them about the objective of the research. Research instruments were then issued to the respondents and data collected afterwards.

3.9. Data Analysis Procedure

In this case, data which have been gathered was sorted and coded appropriately into the SPSS software. Presently, data were evaluated using descriptive statistics such as frequency and percentage. Data on the tables was based on the analyzed data.

3.10. Ethical Considerations

Almost all unethical study leaves volunteers and researchers feeling insecure and exposed in a negative way. Therefore, it is important to ensure that proper preparation and ethical principles are adhered to prevent unintended testing dilemmas such as this (Bouma, & Ling 2004). The study has been dedicated to ensuring that data collection methods are accountable; the study is also concerned with an ethical code of ethics the guarantees the safety of all the participants.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The section presets the response rate, demographics, and descriptive study review.

4.2. Response Rate

The initial sample scope was 53 respondents. Here, the total number of duly filled and returned questionnaires was 47 respondents. This therefore gave a return rate of 89%. This was seen to be satisfactory to provide data for the study.

4.3. Demographic Data----to begin here.

4.3.1 Gender

In this section participants' demographic profile has been analyzed and the finding displayed in Table 2.

Table 2: Gender

Variable	Frequency	Percent
Male	26	55.3
Female	21	44.7
Total	47	100.0

It was noted that 55.3% of participants were males whereas 44.7 percent of respondents were female. That demonstrates the difference between male and female respondents stood not skewed and therefore the findings were expected to provide a clear picture of the problem under investigation.

4.3.2 Level of Education

The academic standard of the respondents was evaluated and summarized in table 3.

Table 3: level of education

Variable	Frequency	Percent
Diploma	9	19.1
Degree	34	72.3
Masters	4	8.5
Total	47	100.0

The study found that 72.3% of respondents were degree holders, 19.1% were with diploma. Finally, 8.5% represented those with post graduate education.

4.3.3 Administrative Position

The study analyzed respondents' administrative functions and summarized in table 4

Table 4: Administrative role

Variable	Frequency	Percent
Class teacher	12	25.5
patron of a club	26	55.3
director of studies	9	19.1
Total	47	100.0

It is noteworthy from Table 4 that all sampled instructors were occupied with one responsibility or another. Specifically, 55.3% were coordinating clubs in schools while 25.5% were class teachers. Finally, 19.1% were performing as directors of studies throughout the relevant institutions.

4.4. Descriptive Analysis

Descriptive analysis was computed in order to determine the respondents' overview f the variable being investigated. Percentage and frequencies were the main tools of analysis.

4.5. Instructional Resources

The primary objective for the study was intended to ascertain the impact of availability in instructional resources on effective teaching in chemistry among high school teachers in Naivasha Sub-County. The following analysis represents the results.

Table 1: Instructional Resources

Statement	SD	D	A	SA	T
There is adequate text Books and reference materials	8.5%	55.3%	19.1%	17.0%	100.0%
There is adequate physical Laboratories	14.9%	31.9%	44.7%	8.5%	100.0%
There is adequate chemicals and apparatus	12.8%	46.8%	25.5%	14.9%	100.0%
There is adequate ICT Resources	25.5%	23.4%	36.2%	14.9%	100.0%
There is adequate teaching models	10.6%	42.6%	19.1%	27.7%	100.0%
There is adequate classrooms for teaching	8.5%	36.2%	40.4%	14.9%	100.0%

Concerning the study done on availability of instructional resources, 63.8% disagree that there is adequate textbooks and reference materials and 53.2% agrees that there is adequate physical laboratory. This shows that when instructional resources are inadequate effective teaching in chemistry could be hampered. Moreover 59.6% disagree that there is adequate chemicals and apparatus while 51.1% agrees that there is adequate ICT resources. Furthermore, 53.2% disagree that there is adequate teaching models while up to 55.3% agrees that there is adequate classrooms for teaching. This finding shows that in the absence of significant teaching resources, effective teaching could be disadvantaged.

4.6. Workload

The next aim this research was to examine impact of workload on effective teaching in chemistry between high-school teachers in Naivasha Sub-County. Results is listed in Table 6.

Table 2: Workload

Statement	SD	D	A	SA	T
High teacher-student ratio in my Class	8.5%	27.7%	63.8%	0.0%	100.0%
My lessons are above the maximum number	2.1%	23.4%	53.2%	21.3%	100.0%
I sometimes prepare laboratory experiments	14.9%	10.6%	46.8%	27.7%	100.0%
We have peer teaching in our school	2.1%	31.9%	36.2%	29.8%	100.0%
I have other administrative duties besides teaching	8.5%	19.1%	46.8%	25.5%	100.0%
I sometimes feel burnout with the number of lessons	8.5%	29.8%	36.2%	25.5%	100.0%

The study reveals that up to 63.8% agrees that the teacher –student ratio is high in their class while 73.5% agrees that their lessons were above the maximum number. This could be an impediment to effective teaching. Furthermore 74.5 percent agrees that they sometimes prepare laboratory experiments while 66% agrees that they have peer teaching in their school. This clearly shows that when teachers work as a team they could improve learners' educational achievement. Moreover, This was noticed 72.3% also agrees that they have other administrative duties besides teaching and 61.7 agree that they sometimes feel burnout with the number of lessons. This could be an indicator of the reason why learners have been constantly non -performing in chemistry subject.

4.7 In-service Training

Another research goal was to investigate effect of in-service training on effective teaching in chemistry among high school tutors in Naivasha Sub-County, Nakuru County. Its finding is shown in Table 7.

Table 3: In-service Training

Characteristic	SD	D	A	SA	T
I have in-service training to enhance teaching skills	10.6%	46.8%	34.0%	8.5%	100.0%
I have in-service training to enhance Evaluation skills	10.6%	38.3%	34.0%	17.0%	100.0%
I have in-service training to enhance Professional content knowledge	10.6%	21.3%	36.2%	31.9%	100.0%
I have in-service training to enhance class management	19.1%	29.8%	27.7%	23.4%	100.0%

Concerning continuous professional development, 54.7% of participants disagreed that they did training as they teach to enhance instruction skills while 51% agree that they have in-service to enhance evaluation skills. On the other hand 68.1% of respondents agrees that they have in-service training to enhance professional's content knowledge while 51.1% of the respondents agreed that they have in-service training to enhance class management.

4.8 Effective Teaching

The dependent variable for the study was effective teaching. Table 8 illustrates the descriptive statistics for the variable.

Table 4: Effective Teaching

Characteristic	SD	D	A	SA	T
There is adequate time for frequent monitoring of student progress.	10.6%	31.9%	46.8%	10.6%	100.0%
The Academic performance have been improving in the last five years	12.8%	53.2%	25.5%	8.5%	100.0%
learners have a positive attitude towards the subject	17.0%	38.3%	29.8%	14.9%	100.0%

The study shows that 57.4% agree that they have adequate time for frequent monitoring of student progress while 42.5% disagreeing with the statement. This indicates that when monitoring of student progress is not done in a well-structured manner, effective teaching could be hindered. Moreover, up to 66% of the respondents disagree that the performance in academia has improved in for the past 5 years. However, 44.7% agreed that learners have a constructive approach to the subject matter. Therefore, effective teaching may perhaps be improved by enhancing students' strong stance on the subject and monitoring of student progress.

CHAPTER FIVE
SUMMARY, CONCUSSION AND RECOMMENDATIONS

5.1. Introduction

This section introduces the summary of study followed by the concussion stemming after the study conclusions and recommendations

5.2. Summary

5.2.1 Instructional Resources

Providing instruction and erudition resources increases Education productivity. According to present study, 63.8% disagree that there is adequate textbooks and reference materials and 53.2% agrees that there is adequate physical laboratory. This shows that when instructional resources are inadequate effective teaching in chemistry could be hampered. Moreover 59.6% disagree that there is adequate chemicals and apparatus while 51.1% agrees that there is adequate ICT resources. This view agrees with Nyanda (2011) observes that the absence in laboratory for both tutors as well as learners makes it impossible to teach and study science subjects. In addition, the study showed that most science students believed that they cannot master the idea, understanding and essence of science without practical research.

Furthermore, 53.2% disagree that there is adequate teaching models while up to 55.3% agrees that there is adequate classrooms for teaching. This finding shows that in the absence of significant teaching resources, effective teaching could be disadvantaged. This finding corroborates with Atieno (2014) who asserts that schools with inadequate facilities such as libraries, labs, classrooms, instructional materials are unable to produce successful results

5.2.2 Work Load

The performance of teachers is affected favorably by getting too much to do or trying to handle too much work. According to the study, up to 63.8% agrees that the teacher – student ratio is high in their class while 73.5% agrees that their lessons were above the maximum number. This could be an impediment to effective teaching. It has been widely agreed that work load burden will lead to low

morale, decrease performance, high absence and decrease professional engagement (Klassen et al . 2012). Furthermore 74.5 percent agrees that they sometimes prepare laboratory experiments while 66% agrees that they have peer teaching in their school. This clearly shows that when teachers work as a team they could improve On academic success by learners. Moreover, this was noticed that 72.3% also agrees that they have other administrative duties besides teaching and 61.7 agree that they sometimes feel burnout with the number of lessons. This could be an indicator of the reason why learners have been constantly non - performing in chemistry subject. Kafata and Mbetwa (2016) claim important aspects which lead to dismal achievement in Kitwe district of Zambia comprised lack of laboratory apparatus and chemicals, huge pupil-teacher ratio because of congested classrooms, pupils' pessimistic perception concerning learning, inadequate classroom space as well as shortage of resources for teaching.

5.2.3 In-service Training

The standard of every educational program relies to a large degree on the technical and professional credentials and expertise of the teachers. The primary goal of in-service initiatives is to ensure the teachers' success in the classroom and ultimately to improve student performance (Hewson, 2007).

Concerning continuous professional development, 54.7% of Participants differed. to have in-job preparation to enhance instruction skills while 51% agree that they have in-service to enhance evaluation skills. On the other hand 68.1% of respondents agree that they have in-service training to enhance professionals' content knowledge while 51.1% of the respondents agreed that they have in-service training to enhance class management. Instructors need in-service training so they can adapt to new trends in education.

5.3. Concussion

The study concludes that effective teaching in chemistry has be hampered by inadequate provision of instructional materials and other important resources such as physical laboratory, ICT resources, adequate chemicals as well as textbooks. Regarding teachers work load, it was observed that

teachers had a lot in their table in addition to other administrative responsibilities. This could affect effective teaching in their subject areas. Finally, it was observed that numerous of those respondents denied that they had been trained during service to enhance training skills and class management

5.4. Recommendations

The research suggests the following:

1. Department of Education should endeavor to provide adequate instructional materials and other important resources such as physical classrooms and laboratory as well as ICT resources for the enhancement of actual instruction.
2. Adequate science teachers should be availed to institutions of learning to allow proper instruction in schools. This will reduce teachers work load and promote their efficiency in teaching.
3. Teachers should be provided with technical support to engage in continuous professional development to abreast their tutoring skills.

5.4. Recommendations for further Study

Learners are key components in teaching and learning. A study into the impact of learners' characteristics as well as entry behaviour on academic achievement could be carried out. This could help in strengthening the current findings.

REFERENCES

Abubakar, B. (2016). Review of administrative efficiency and effectiveness and secondary school students' academic achievement in Adamawa State, Nigeria. *Journal of Academic Research in Humanities*, 2(1), 211 – 219.

Achimugu, L. (2016). Factors affecting the effective implementation of senior secondary education chemistry curriculum in Kogi state, Nigeria. *International Journal of Scientific and Research Publications*, 6(5), 562-566.

Achimugu, L. (2016). Senior secondary school chemistry teacher's perception of the factors affecting the effective utilization of ICT in teaching and learning chemistry. *International Journal of Scientific and Engineering Research (IJSER)*, 7(10), 1906-1909.

Adefunke TO 2008. Quality assurance in the upper basic education through effective curriculum implementation. *Nigerian Journal of Curriculum Studies*, 15(30): 23- 33.

Adesoji, F. A., & Olatunbosun, S. M. (2008). Student, Teacher And School Environment Factors As Determinants Of Achievement In Senior Secondary School Chemistry In Oyo State, Nigeria. *Journal of international social research*, 1(2).

Adiele, E. E. (2017). Planning Teachers' Workload for Effective Service Delivery in the School System. *International Journal of Scientific Research in Education*, 10(3), 272-277. Retrieved 31st August, 2019 from http://www.ijsre.com

Ahuja R. (2010). *Research Methodology*. New Delhi: Rawat Publication

Alavi, H. R., & Hoseini, A. R. (2009). The effect of educational factors on the academic performance of the university students in chemistry. *Chemical Education Journal*, 13(2), 13-14.

Alvi, M. (2016). *A manual for selecting sampling techniques in research*. University of Karachi, Iqra University

Amir, K., Mohamed, H. C., & Mnjokava, C. E.(2016). Learners' Attitudesand Performance in Science Subjects in A-Level in Secondary Schools, in Mbarara, Uganda. *Journal of Educational Research*, 2(5),10-25.

Atieno, A. J. (2014). *Influence of teaching and learning resources on students' performance in Kenya certificate of secondary education in free day secondary Education in Embakasi district, Kenya*. Unpublished Thesis). UON.

Avwiri, E. H. (2011). Approaches for the effective teaching of chemistry in Nigerian secondary schools. *Journal of Research in Education and Society: International Perspective*, 2(1), 236-240.

Aydin, A., Sarier, Y., & Uysal, S. (2013). The Effect of School Principals' Leadership Styles on Teachers' Organizational Commitment and Job Satisfaction. *Educational sciences, Theory and practice*, 13(2), 806-811.

Ayeni, A. J., & Amanekwe, A. P. (2018). Teachers' Instructional Workload Management and Students' Academic Performance in Public and Private Secondary Schools in Akoko North-East Local Government, Ondo State, Nigeria. *American International Journal of Education and Linguistics Research*, 1(1), 9-22.

Ballet, K. & Kelchtermans, G. (2008). Workload and willingness to change: Disentangling the experience of intensification. *Journal of Curriculum Studies*, 40(1), 47–67.

Bennaars, G.A. Otiende, J. E and Boisvert, R. (1994). *Theory and practice of education*. Nairobi: East African Educational Publishers Ltd

Bouma, G. D., & Ling. R. (2004). *The research Process*. 5th edn., Oxford, New York.

Butt, G. & Lance, A. (2005). Secondary teacher workload and job satisfaction do successful strategies for change exist? *Educational Management Administration & Leadership*, 33(4), 401–422.

Carmines, E. G. & Zeller, R. A. 1979. *Reliability and Validity Assessment*. Newbury Park, CA: Sage.

Check, J., & Schutt, R. K. (2012). *Survey research. In J. Check & R. K. Schutt (Eds.). Research methods in education.* (pp. 159–185). Thousand Oaks, CA: Sage Publications.

Copriady, J., Zulnaidi, H., & Alimin, M. (2018). In-Service Training for Chemistry Teachers' Proficiency: The Intermediary Effect of Collaboration Based on Teaching Experience. *International Journal of Instruction*, 11(4), 749-760.

Cossa, Eugénia Flora Rosa, & Uamusse, Amália Alexandre. (2015). Effects of an In-service Program in Biology and Chemistry Teachers' Perception of the Role of Laboratory Work. *Procedia - Social and Behavioral Sciences*, 167, 152-160. doi: 10.1016/j.sbspro.2014.12.656.

Dahar, M.A. (2011). Effect of the Availability and the use of Science Laboratories on Academic Achievement of Students in Punjab (Pakistan). *European Journal of Scientific Research*, 51(2), 193-202.

Farrant, J. S. (2005). *Principles and Practice of Education*. Malaysia: Longman.

Field, A. P. 2005. *Discovering Statistics Using SPSS*. VA: Sage Publications Inc.

Denga, D. I., & Ekpo, T. N.(1994). *Executive stress. Its rape and management*. Calabar: Rapid Educational publishers.

Ekanem, E. E. (2012). Beginning teacher educators development and faculty workload management of Universities in Cross River State of Nigeria. *Review of Higher Education in Africa*, 4, 41–61.

Groves, R. M., Fowler Jr, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., & Tourangeau, R. (2011). *Survey methodology*.UK: John Wiley & Sons.

Gwambombo, I. (2013). *The Effect of Teachers' Workload on Students' Academic Performance in Community Secondary Schools: A Study of Mbeya City* (Doctoral dissertation, The Open University of Tanzania).

Hassan, A. A., Ali, H. I., Salum, A. A., Kassim, A. M., Elmoge, Y. N., & Amour, A. A. (2015). Factors Affecting Students' Performance in Chemistry: Case Study in Zanzibar Secondary Schools. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 9(11), 4086-4093.

Heeralal, P. J. H. (2004). *Improving the Performance of Physical Science Learners: A Case Study At Mandlethu School, Mpumalanga Province, South Africa*. University of South Africa.

Hosain, M. D. (2016). Teaching Workload and Performance: An Empirical Analysis on Some Selected Private Universities of Bangladesh. *International journal of English and education*,5(3),12-24.

Hoy, W. K., & Miskel, C. G. (2013). *Educational Administration*. UK: M c Graw- Hill International.

Ibrahim, A. I. (2015). In-service staff training programme for effective science teaching. *American Journal of Educational Research*, 3(2), 185-190.

Ibrahim A.I. (2008). *Principles of curriculum planning and implementation*. Ilorin: tajudeen printing press.

Ijidike, P. I. (2015) Factors influencing effective teaching of chemistry: A case study of some selected high schools in Buffalo City Metropolitan Municipality, Eastern Cape Province, South Africa. *International Journal of Educational Sciences*, 8(3), 605-617. https://doi.org/10.1080/09751122.2015.11890282

Ingrarson, L, et al (2005). *Reduction of teacher workload, Messy university (1995)*. In study on teacher workload by the Newzealand PPTA. New Zealand.

Iwu, C. G., Gwija, S. A., Benedict, O. H., & Tengeh, R. (2013). Teacher job satisfaction and learner performance in South Africa. *Journal of Economics and Behavioral Studies*, 5(2), 838-850.

Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and Development*, 39(3), 5-14.

Kafata, F., & Mbetwa, K. S. (2016). An investigation into the failure rate in mathematics and science at grade twelve (12) examinations and its impact to the school of engineering: A case study of kitwe district of Zambia. *International Journal of Scientific & Technology Research,* 5(8), 71-93.

Kenya National Examinations Council (2010). *The performance of students in KCSE in selected subjects from 2006 to 2009*. Nairobi, Kenya: Government Press.

Koech, S. J., Tikoko, B. J., & Chemwei, B. (2014). Institutional factors that influence teacher turnover in public secondary schools in Baringo district, Kenya. *International Journal of Education and Research*, 2(4), 451-462.

Klassen, R., Wilson, E., Siu, A. F. Y., Hannok, W., Wong, M. W., Wongsri, N., Jansem, A. (2012). Preservice teachers' work stress, self-efficacy, and occupational commitment in four countries. *European Journal of Psychology of Education*, 28(4), 1289–1309.

Kremer, M., C. Brannen and R. Glennerster (2013). "The challenge of education and learning in the developing world." *Science*, 340(6130), 297-300.

Lunetta V, N., Hofstein A., & Clough M. (2007). *"Learning and teaching in the school science laboratory: an analysis of research, theory, and practice".* Hand book of research on science education. NJ: Lawrence Erlbaum, Mahwah.

Macharia. W. (2016). *Nakuru Governor Decries Poor Academic Performance In The County*. Retrieved on 27th August 2019 from: https://www.capitalfm.co.ke/news/2018/03/nakuru-governor-decries-poor-academic-performance-county/

Maforah, T. P. & Schulze, S. (2012). The job satisfaction of principals of previously disadvantaged schools: new light on an old issue. *South African Journal of Education*, 32(3), 227-239.

Manduku, J., Edward, B., & Cheruiyot, A. (2017). In-service teacher training programmes: implications on teacher effectiveness in secondary schools in Kenya. *European Journal of Education Studies*, 3(7),189-201.

Marshall, C. (1993). *The unsung role of the career assistant Principal.* Reston, VA: National Association of Secondary School Principals.

Maundu, J. N. (1980). *A study of the relationship between Kenyan Secondary School Pupils' performance need to achieve and their performance in school subjects*. Nairobi. University of Nairobi.

Moser, C. A. & Kalton, G. (1989). *Survey methods in social investigation*. Aldershot, Gower.

Mugenda, O., & Mugenda. A. (2003). *Research methods: quantitative and qualitative approaches*. Nairobi: Acts Press.

Muleta, T., & Seid, M. (2016). Factors affecting implementation of practical activities in science education in some selected secondary and preparatory schools of Afar region. *African Journal of Chemical Education*, 6(2), 123-142.

Muse, B., Ndirangu, C., & Imonje, R. (2019). Determinants of Implementing Chemistry Curriculum in Arid and Semi-Arid Lands: A Case of Secondary Schools in Garissa, Kenya. *International Journal of Learning, Teaching and Educational Research*, 17(12).

Naylor, C. & Schaefer, A. (2001). Teacher workload and stress: A British Columbia perspective. *Education Quarterly Review*, 8(3), 33–36.

Nbina, J. B. (2012). Analysis of poor performance of senior secondary students in chemistry in Nigeria. *African Research Review*, 6(4), 324-334.

Ndihokubwayo, K. (2017). Investigating the status and barriers of science laboratory activities in Rwandan teacher training colleges towards improvisation practice. *Rwandan Journal of Education*, 4(1), 47-54.

Ndirangu, P. (2007). *An investigation of the relationship between test anxiety and academic performance in secondary schools in Nyeri district, Kenya*. Nakuru: Egerton University

Neal, L. A. (2013). *An Analysis of Self-Assessed Leadership Styles and Interpersonal Communication Competencies of Kansas Public School Superintendents*. Baker University.

Ngema, M. H. (2016). *Factors that cause poor performance in science subjects at Ingwavuma Circuit* (Doctoral dissertation).

Nkemakolam, O. E., Chinelo, O. F., & Jane, M. C. (2018). Effect of Computer Simulations on Secondary School Students' Academic Achievement in Chemistry in Anambra State. *Asian Journal of Education and Training*, 4(4), 284-289.

Njoka, E. M. (2015). *Extent of utilization of laboratories in teaching and learning chemistry in public secondary schools in Meru south district, Kenya*. Kenyatta University: Dissertation.

Nyanda. F. (2011). *Effects of teaching science subjects in absence of science laboratory: a case study of community secondary school Morogoro Municipal*. Research Project: Sokoine University of Agriculture.

Nyawara, O. P. J. (2011). *The Influence Of Workload On Performance Of Teachers In Public Primary Schools In Kombewa Division, Kisumu West District, Kenya*.(Doctoral dissertation). University of Nairobi.

Odia, L. O. and Omofonmwan, S. I. (2007) Educational System in Nigeria Problems and Prospects. *Journal of Social Science*, 14.1(81-86)

Ojukwu, M. O. (2016). Perception of students on causes of poor performance in Chemistry in External Examinations in Umuahia North Local Government of Abia State. *International Journal of Education and Literacy Studies*, 4(1), 67-73.

Okhiku, I. I (2005) In-Service Training and Professional Development of Secondary School Teachers. *I.* 8: (1 & 2)

Ololube, N. P (2009). *Understanding teachers' professional competencies for educational effectiveness*. Owerri: Springfield Publishers Ltd.

Olubu, O. M. (2015). Effects of Laboratory Learning Environment On Students'learning Outcomes In Secondary School Chemistry. *International Journal of Arts & Sciences*, 8(2), 507.

Oluremi, O. F. (2013). Enhancing educational effectiveness in Nigeria through teacher's professional development. *European Scientific Journal*, 9(28).

Omorogbe, E., & Ewansiha, J. C. (2013). The challenge of effective science teaching in Nigerian secondary schools. *Academic Journal of Interdisciplinary Studies*, 2(7), 181.

Onashakpokaiye, E. O. (2011). The Influence of teachers' attitude on students' learning of Mathematics in Nigerian secondary schools. *Journal of Research in Education and Society*, 2(1), 15-16.

Otieno, O. J. (2012). *Determinants of Students Poor Performance In Chemistry In Public Secondary Schools Of Kwale County, Kenya.* (Doctoral dissertation, Kenyatta University).

Padmanabhan, Y. (2001). *Internal efficiency in primary education.* Retrieved on 31st May, 2019 from: http//www.sterioso41188eci.htm

Peters, J. (2012). Workload, stress and job-satisfaction among Waldorf teachers : An Explorative study. *Research on Steiner Education*, 3(2), 111–117.

Read JR, Kable SH 2007. Educational analysis of the first year chemistry experiment 'Thermodynamics Think-In': An ACELL experiment. *Chemistry Education Research and Practice*, 8(2): 255-273.

Saad, A. R. (2014). *Evaluation of provision and maintenance of infrastructural facilities in boarding secondary schools in Yola metropolis Adamawa State, Nigeria*. An Unpublished M.Ed. Thesis, Ahmadu Bello University, Zaria. P. 12.

Saage, O. (2009). Causes of Mass Failures in Mathematics Examination among students. *A Commissioned paper presented at Government Secondary School*. Karu Abuja Science Day 1st March.

Scheerens, J. (2013). The use of theory in school effectiveness research revisited. School *Effectiveness and School Improvement*, 24(1), 1-38.

Shah, S. S. H., Jaffari, A. R., Aziz, J., Ejaz, W., Ul-Haq, I. & Raza, S. N. (2011). Workload and performance of employees. *Interdisciplinary Journal of Contemporary Research in Business*, 3(5), 256–267.

Takwate, K. T. (2018). Planning, Allocative and Administrative Efficiency of School Facilities Management as Correlates of Academic Performance of Senior Secondary School Students in Adamawa State, Nigeria. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 1(3), 114-125.

Timms, C., Graham, D. & Cottrell, D. (2007). "I just want to teach": Queensland independent school teachers and their workload. *Journal of Educational Administration*, 45(5), 569–586.

Tobias, S., & Raphael, J. (1997). *The Hidden Curriculum-Faculty Made Tests in Science: Part 1: Lower-Division Courses Part 2: Upper-Division Courses* (Vol. 1). Springer Science & Business Media.

Tonder, D. V., & Fourie, E. (2015). Alleviating the Intensification of Educator Workload through Internships: The Relieve Educators Administrative Demands (READ)- Model. *International Journal of Educational Sciences*, 9(2), 219-232.

Ufonabasi, E.R.(2014). Teacher Qualification and Experience as Determinants of Quality Chemistry Education in Nigeria. *Journal of Education and Practice*, 5(24), 124-131.

Udonsa, A. E. & Udonsa, C. (2015). Gender disparity in Mathematics performance among secondary school students in Adamawa State, Nigeria. *Journal of Sociology, Psychology and Anthropology in Practice*, 7(1), 49 – 56.

Uhumuavbi, P. O., & Okodugha, I. E. (2014). Adequacy of laboratory and laboratory equipment in Edo central senatoial district of Edo State. *Journal of Faculty of Education*, 14 (1), 54-63.

APPENDIX I: INTRODUCTION LETTER

Dear respondent

I am a PGDE student at Nairobi University doing research on:

"Institution-based factors affecting effective teaching in chemistry: a survey of secondary school teachers in Naivasha Sub-county, Nakuru County."

You are invited to kindly provide data by responding the attached instrument to the best of your expertise. Your response is handled with absolute secrecy and will be used for study purposes.
Regards.

Sincerely,

Emily Ogutu

APPENDIX II: QUESTIONNAIRE

SECTION A: DEMOGRAPHIC DATA

1) State your Gender

   Male [ ] Female [ ]

2) What is your highest level of education(*tick appropriately*)

   Diploma [ ] Degree [ ] Masters [ ]

3) Indicate your administrative role

   Class teacher [ ] patron of a club [ ] Deputy Principal [ ] director of studies [ ] none [ ]

SECTION B: AVAILABILITY OF INSTRUCTIONAL RESOURCES

Please rate the following statements by ticking appropriately. The key is given as follows:

(1= SD=Strongly Disagree; 2= D=Disagree; 3= A=Agree; 4= SA=Strongly Agree)

No	Statement	1	2	3	4
1.	There is adequate text Books and reference materials				
2.	There is adequate physical Laboratories				
3.	There is adequate chemicals and apparatus				
4.	There is adequate ICT Resources				
5.	There is adequate teaching models				
6.	There is adequate classrooms for teaching				

SECTION C: WORK LOAD

Please rate the following statements by ticking appropriately. The key is given as follows:

(1= SD=Strongly Disagree; 2= D=Disagree; 3= A=Agree; 4= SA=Strongly Agree)

No	Statement	1	2	3	4
1.	The teacher-student ratio is high in my Class				
2.	My lessons are above the maximum number				
3.	I sometimes prepare laboratory experiments				
4.	We have peer teaching in our school				
5.	I have other administrative duties besides teaching				
6.	I sometimes feel burnout with the number of lessons				

SECTION D: IN-SERVICE TRAINING

Please rate the following statements by ticking appropriately. The key is given as follows:

(1= SD=Strongly Disagree; 2= D=Disagree; 3= A=Agree; 4= SA=Strongly Agree)

No	Statement	1	2	3	4
1.	I have in-service training to enhance teaching skills				
2.	I have in-service training to enhance Evaluation skills				
3.	I have in-service training to enhance Professional content knowledge				
4.	I have in-service training to enhance class management				

SECTION E: EFFECTIVE TEACHING

Please rate the following statements by ticking appropriately. The key is given as follows:

(1= SD=Strongly Disagree; 2= D=Disagree; 3= A=Agree; 4= SA=Strongly Agree)

No	Statement	1	2	3	4
1.	I have adequate time for frequent monitoring of student progress.				
2.	The Academic performance have been improving in the last five years				
3.	learners have a positive attitude towards the subject				

Thank You for Participating!