ANALYSIS OF TEACHING STRATEGIES ON STUDENTS' PERFORMANCE IN SCIENCES: A CASE OF REV. MUHORO SECONDARY SCHOOL FOR THE DEAF; NYERI COUNTY, KENYA

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DECLARATION

This thesis is my original work and has not been presented for any other university for any degree

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DEDICATION

I dedicate this work to my wife Janipher Olubuyi Naminde, my children; Elias Kangu, Catherine Aliciah and Vera Anyango for their patience and support while pursuing this work. God bless you all.

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ABBREVIATIONS AND ACRONYMS

AAAS	American Association for the Advancement of Science
CDE	County Director of Education
DEO	District Education Officer
EFA	Education for All
IEP	Individualized Educational Program
KCSE	Kenya Certificate of Secondary Examination
KICD	Kenya Institute of Curriculum Development
KIE	Kenya Institute of Education
KSDC	Kenya Society of the Deaf Children
KSL	Kenyan Sign Language
MoEST	Ministry of Education Science and Technology
NRC	National Research Council
TSC	Teachers Service Commission
TIMSS	Trends in International Mathematics and Science
UNESCO	United Nation Education Scientific and Cultural Organization

ABSTRACT

The study sought to analyze teaching strategies being used in class on deaf students' performance in sciences at Rev. Muhoro Secondary Schools for the Deaf in Nyeri County, Kenya. The study used Descriptive Case Study design. The principal and teachers who took part in the study were sampled purposively while students were sampled a long stratus. The sample size of the study comprised of; 1 principal, 7science teachers and 48 students producing a sample of 56 participants. Data collection was done by use of questionnaires, interview and lesson observation. It was then analyzed by both quantitative and qualitative data collection strategies. Analyzed quantitative data was then presented by use of descriptive statistics such as; percentages, frequency tables and charts while data from principal, teachers, students' and lesson observation were reported in narrative form based on major themes. The study revealed, learner-centered teaching method was the best method in sciences classroom, many teachers had little understanding of IEP, many lacked necessary skills for communicating science knowledge to deaf learners, charts videos and computer resources had not been adequately utilized and that time for science learning was inadequate hence affecting science syllabus coverage and understanding in class. It was therefore recommended that, there was need for in-service teacher training in Total Communication to equip teachers with skills that were in line with changing global needs in deaf education, teachers be encouraged to attend SMASSE- Insets where they can learn about resources utilization in class and that, science curriculum be adapted to be in line with the learning pace of deaf students. It was also stressed that, only teachers who had trained in Special Needs Education should be posted to teach in deaf schools and that, inspectorate services should be enhanced to ensure teachers were using IEP in their teaching.

CHAPTER ONE: INTRODUCTION

1.0 Background to the Study

Historical analysis of the patterns and trends in education reveal that, people live and work in a highly changing society whose existence and sustainability is dependent on science. The increasing technological and industrial revolution in education, agricultural, health, and industrial growth marks one of the important milestones in history. While this has been used as a benchmark of development, it has gone a long way to define the economic power of many countries. Science subjects are increasingly viewed as subjects of life-long utility among students, society and the country at large. This has been reiterated by McIntosh (1994) who states that scientific literacy has become a necessity for everyone as the need to use scientific information to make choices that a rise in everyday life increases.

Early educators such as Dewey (1964) Montessori (1968) and Froebel (1974) believed that, effectiveness of teaching and learning are determined by the type of teaching strategies applied in classroom. National Research Council (2005) echoes the same sentiments when it asserts that, pedagogical practices that address students' initial understandings and preconceptions about topics, provides a foundation of factual knowledge and conceptual understanding.

While reviewing good teaching strategies in sciences, Roth and Gainier (2007) explored science learning in high achieving countries. This was based on "Trends in International Mathematics and Science Assessment of 1999". In their study, they used video tape to examine a random sample of 100, 8^{th} grade science lessons in five countries; Czech

Republic, Australia, Netherland, United States and Japan which were later analyzed for major themes.

According to Roth and Gainier (2007) education in Czech Republic had gone a notch higher producing well rounded individuals capable of driving the country's innovation. Strategies employed in classroom placed high premium on students' accurate understanding of science concepts. Students were usually exposed on challenging, often theoretical science knowledge and ideas and held accountable for understanding materials through scientifically, technical and challenging public discussion (Roth and Garnier 2007). Lessons began with discussion which were then followed by calling students in front of the class to be quizzed by others orally and then graded on their multiple understanding of content idea as the lesson progressed. Practical and hands-on-activity were less emphasized and when used were specifically connected on the development of scientific ideas (Roth and Garnier 2007).

In Japan, teaching strategies emphasized scientific education as a gateway to industrial, technological advancement (Roth and Garnier 2007), this had enabled Japan to remain competitive on the global market where industrialization and technology are key. Lessons were developed conceptually and coherently with little emphasize on theoretical ideas (Roth and Gainier 2007), consequently learning was inductive oriented with strong focus on one or two main ideas that were developed in-depth and supported with data, phenomena and visual presentations. Teachers encouraged brainstorming of ideas to reach at coherent conclusion which were then followed by a summary of main ideas of discussion enabling learners to reach at a more sophisticated understanding (Roth and Garnier 2007).

In Netherlands, Roth and Gainier (2007) observed that, learning science subjects were quite unique. In class, students assumed responsibility for their own learning and were expected to monitor their own work as well as progress. Text book and homework defined science lessons, content and organization, they observed. Class discussions were emphasized as a way of supplementing text book with teacher role being secondary, mainly responding on areas of difficulty in assignment as students continuously engaged in scientific discourse (Roth and Gainier 2007).

In Kenya, a study conducted by KIE (1989) revealed, commonly used teaching strategies in class were, lecture, problem solving, examples and experimentation. However, Maina (2012) established that on average lecture, examples and problem solving were commonly used. Despite many teachers preferring these teaching strategies Baxter, Bass and Glaser (2000), Maree and Frasers (2004) caution that, a method as lecture contributes little to the development of skills, nurturing of inquiry attitudes and conceptual understandings of science. Ingosi (2011) noted that pedagogical practices that involved effective strategies were what distinguished good teaching from poor teaching. It's highly important to note that, learning in deaf schools is mainly done through Sign language, Bilingual Communication, Code Switching or Total Communication and hence it was important to carry out research on teaching strategies adopted by teachers in classroom and evaluate their contribution on performance in sciences at Rev. Muhoro Secondary School for the Deaf.

1.2 Statement of the Problem

Despite critical role played by science education in promoting scientific and technological development in the country, the performance in national examination in

these subjects had been generally poor. MoEST (2005) found out that, the performance in Mathematics and science subjects at secondary education level had been characterized by poor performance in national examinations. According to Aduda (2009), the most recent outcry was made by the then Minister of Education Prof. Ongeri, who noted that, there had been a drastic drop in performance in sciences in 2008 Kenya Certificate of Secondary Education (KCSE).

Of more concern is that, this poor performance has been poorer in secondary schools for the deaf in Kenya. The trend has been observed for some years now and is quite disturbing. A five year period 2009-2013 had shown that, the performance at Rev. Muhoro Secondary School for the Deaf had been oscillating at mean score of 1.944

Table 1.1: Rev. Muhoro KCSE Mean Score Performance 2009-2013

KCSE Mean Score performance in Sciences	2009	2010	2011	2012	2013	Mean Average
Biology	2.16	1.93	2.26	1.8	1.65	1.96
Physics	1.83	1.83	2.00	1.8	2.60	2.012
Chemistry	1.76	2.23	1.98	1.7	1.64	1.862
Cumulative Mean Average						1.944

While we appreciate that, there had been some research to correct the trend in hearing schools, the same in deaf schools has not happened. It is likely that, achievement of scientific goals will remain difficult if the trend is not checked (Eshiwani, 1998). This issue becomes even more urgent as research (McIntosh, Sulzen, Reeder, and Kidd 1994; Molander, Pedersen and Norell, 2001 and Moores and Martin 2006) indicates that science subjects had been greatly neglected in the curriculum for deaf learners. These findings

prompted the present study whose aim was to analysis extent to which teachers' teaching strategies were contributing on performance in science in KCSE.

1.2.1 Purpose of the Study

The purpose of the study was to analyze teaching strategies being used by teachers teaching science subjects at Rev. Muhoro Secondary School for the Deaf and evaluates their contribution on performance in KCSE. Findings revealed, there was a strong relationship between teaching strategies being used in class and performance.

1.3 Objectives of the Study

1) To establish which teaching methods teachers use on deaf learners in a science class.
2) Analysis extent to which teachers incorporate IEP in teaching science subjects
3) To assess the Medium of instructions used by teachers in communicating science knowledge to learners
4) To evaluate if teachers utilize time allocated for science subjects in class appropriately.
5) To establish resources used in teaching and learning of science subjects for deaf learners.

1.4 Research Questions

1) Which teaching method do teachers use on deaf learners in a science class?
2) To what extend are teachers incorporating IEP during learning of sciences subjects?
3) What are the Medium of instructions being used by teachers in communicating science knowledge to learners?
4) Are teachers utilizing time allocated for science subjects for deaf learners appropriately?

5) What are the resources used in teaching and learning of sciences subjects for deaf learners?

1.5 Significance of the Study (Rationale)

Findings of this study are likely to be important to the following stakeholder;

1.5.1 Teachers

The teachers at Rev. Muhoro are likely to review their teaching strategies hence adopt methods that promote learning of science subjects in class. This in turn is likely to lead to improvement in performance in sciences at Kenya Certificate of Secondary Education (KCSE).

1.5.2 Kenya Institute of Curriculum Development (KICD)

Kenya Institute of Curriculum Development (KICD) is likely to adapt teaching time to be in line with the learning pace of deaf learners. Findings revealed the current curriculum was too wide making it difficult for teachers to cover the syllabus within the stipulated time.

1.5.3 Ministry of Education Science and Technology (MoEST) and Quality assurance Standard QUASO)

Ministry of Education Science and Technology (MoEST) in conjunction with Quality Assurance and Standard (QUASO) are likely to step up school inspection program to ensure teachers were using appropriate teaching strategies such as; proper time utilization, correct teaching methods, IEP, correct medium of instruction and resources in their teaching. Further, they are likely to intensify SMASSE-inset to train teachers on

resources utilization and improvisation in class hence improving performance in sciences at Kenya Certificate of Secondary Education (KCSE).

1.5.4 Teachers Service Commission

The Teachers Service Commission (TSC) is likely to review its recruitment procedures where by only teachers that are trained in Special Needs Education with knowledge in learning psychology of deaf learners are recruited to teach in deaf schools. Formerly recruitment has been done arbitrarily with little focus on skills possessed by such teacher other than the certificate. This trend has always affected communication across the curriculum hence poor performance in sciences at Kenya Certificate of Secondary Education (KCSE).

1.6 Limitation and Delimitation

1.6.1 Limitation

During the study, some respondents did not respond to questions as required. Equally, some participants left some areas in questionnaires blank. There were also challenges with video recording of teachers as only a few of them consented to be recorded thus forcing the researcher to rely much on questionnaire and observation in collecting data. This was a bit tiring since it meant that, the researcher had to be physically present in class to observe teachers after every science lesson for a period of one month of the study.

1.6.2 Delimitation

The study focused on only one Case, Rev. Muhoro Secondary School for the Deaf in Mukurwe-ini Sub-County, Nyeri County of Kenya. The Principal, Science teachers and selected students from each class were the respondents in this study. The study explored

only four aspects of teaching strategies' believed to have a greater bearing on performance in sciences. These included; teaching methods used in class, use of Individualized Education Program (IEP), medium of instructions, time utilization and teaching resources being used in classroom.

1.7 Theoretical Framework

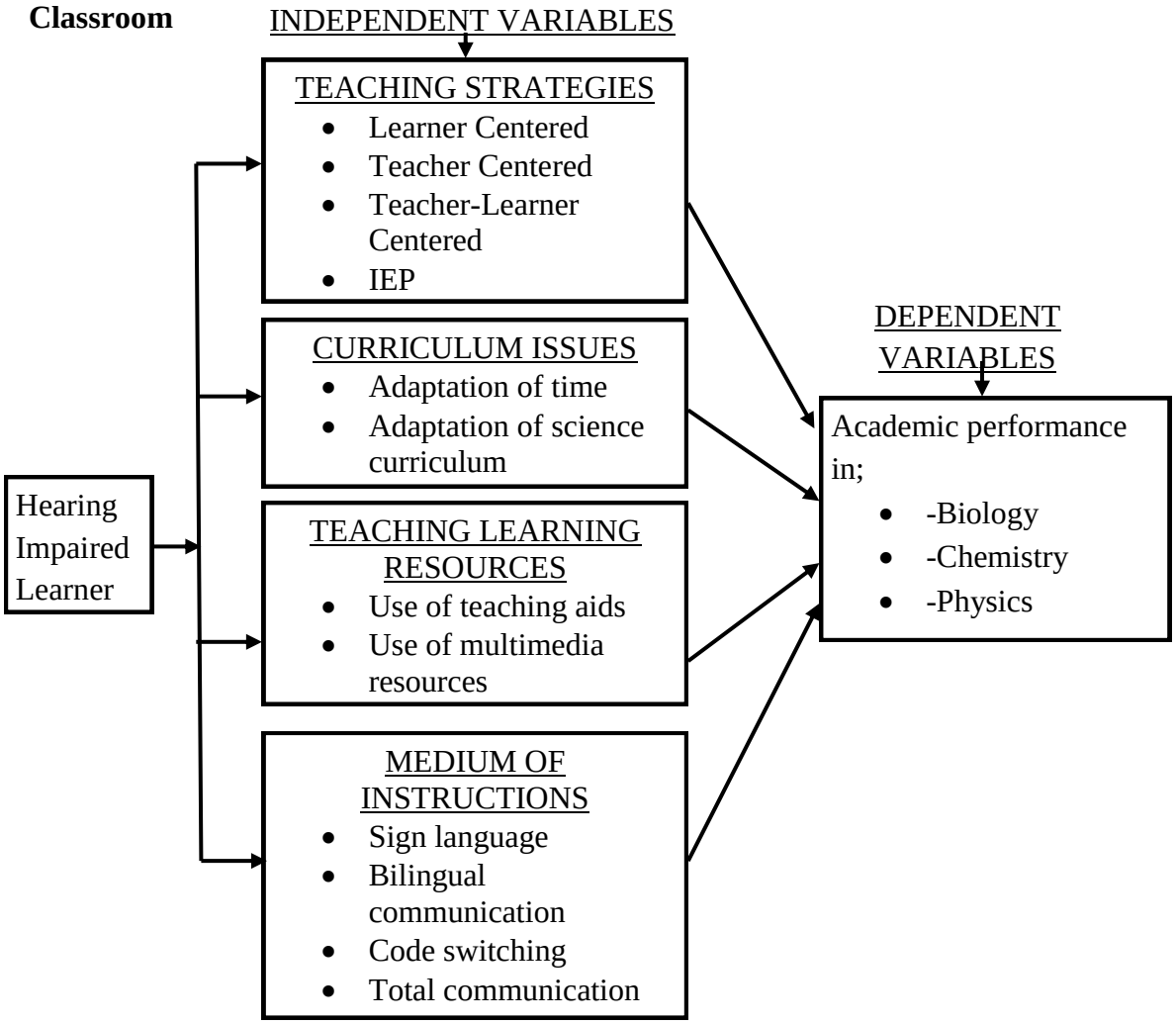
The study was guided by Felder and Silverman (1998) Dimension Model Theory to Sciences Learning. According to Felder and Silverman (1998), there are four Dimensions of learning styles related to each students preferred mode of receiving information in class. The four Dimensions are based on the type of information students receive in class (sensory or intuitive) Modality in which they receive it (visual or verbal) Process by which they receive it (actively or reflectively) and the Order in which they receive it (sequentially or globally).

The theory stresses that in any learning, all learners are unique and therefore, there is need to adopt teaching strategies that effectively takes into account learning styles of all learners. The fact that, students who are deaf require extended services such as proper teaching methods, use of teaching resources, correct medium of instruction, use of Individualized Education Program (IEP) to monitor improvement and adaptation of time makes the theory an effective preposition for this study. Lang (2002) concurs when he states that, deaf students actively engage in learning process when learning is based on visual aids. Felder and Silverman (1998), noted that, the use of pedagogical strategies that provides students with time to think and reflect in class and strategies that structure student-student and teacher-student interaction should be emphasized as a way to learning

1.8 Conceptual Framework

The conceptual framework shows the interrelationship between the variables of the study and the main focus of Felder Silverman Dimension Model Theory to Science Learning (Felder Silverman 1998). In this conceptual framework, teaching methods, curriculum issues, teaching resources and medium of instruction are the main variables in learning science subjects. If the learners are to take an active role in learning, then the teacher in class will have to explore effective teaching strategy, adapt time and science curriculum to the needs of the deaf learners, use teaching resources in teaching, Individualized Education Program (IEP) and correct medium of instruction in class. These strategies are in line with Felder Silverman Dimension Model theory to science learning which advocates for learning based on the learners needs. The resultant effect of such strategies is increased accommodation and assimilation leading to improved performance in sciences at Kenya Certificate of Secondary Education (KCSE).

Figure 1.1: The Conceptual Framework Model on Effective Teaching Strategies in Classroom



Source: Research Own Conceptualization of the Research Problem;

1.9 Operational Definition of Terms

Bilingual Education - Ability to communicate in two languages (Ogunniyi, 1997)

Code Switching -Ability of a teacher in classroom to alternate between two or more languages

Deaf -Term used to label those whose hearing loss necessitates the provision of special services (Sheetz, 2004)

Individual Education Program -A tool for monitoring instructions in class to ensure that instructions are presented at a pace of learning based on the abilities and interests of each learner (Njeri, 2010)

Performance -Process of collecting, analyzing and reporting information regarding the performance of an individual a group, organization, system or component (Nasibi, 2002)

Science -This is an enterprise that builds and organizes knowledge in the form of testable explanation (scientific principals)

Strategy -Teaching techniques specifically designed for a particular special education population to assist with learning (Njeri, 2010)

Teaching - A process that facilitates changes in the learners' behavior through imparting of knowledge, skills and values. It involves explaining, persuading, illustrating, demonstration, guiding, inventing and instructing (Nasibi, 2002)

Total Communication -A philosophy for communication for students with hearing impairments designed to provide an equal emphasize on oral and signing skills to facilitate communication (Gallimore, 1993)

Visual aids -Teaching and learning resources that appeals to the sense of sight. (Tanner and Allen, 2004)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter covers; goals of science education, methods of teaching, use of individualized education program (IEP), medium of instruction, time allocated for science syllabus coverage and resources used in teaching and learning science subjects for deaf learners

2.1 Goals of Science Education

Current policies in Kenya education system have focused on attainment of Education for All (EFA) by 2015. This commitment was re-affirmed in Sessional Paper no. 1 of 2005, which committed the government to give quality and relevant education to every learner as a way of enhancing equity, economic growth and expansion of employment opportunities (Ayiela, 2012). Scientific knowledge remains key to this achievement. It's therefore imperative that teachers are well aware of the task expected of them once they step in science classroom.

According to Bajah (1998), Cobern (1994), National Research Council (1996), Oversby (1998) and UNESCO (1994), the purpose and goals of science education are to, develop creativity in learners, improve scientific and technological literacy of citizens, and prepare citizens for an active contribution towards their own culture and to inculcate the spirit of scientific thinking in the learner. American Association for Advancement of Science (1989) argued that, an understanding of science concepts and principles is crucial to developing scientific literacy and meaningful, productive careers which require people who have the ability to learn, reason, think, make decisions, and solve problems as well

as engage in scientific discourse. These views have been echoed by National Research Council (1996) which indicates that, scientific literate persons are those who can think, ask questions, and provide logical and coherent answers to any situation in everyday experiences. Constructivist theorists as John Dewey believe that education must engage with and expand experience and that methods used to educate must provide for exploration thinking, reflection and interaction with the environment necessary and uphold democracy (Kliebard, 1992). This research study sought to find out if teachers at Rev. Muhoro School were aware of these goals and how the teaching strategies adopted in class were contributing on performance in sciences

2.2 Teaching Methods Used on Deaf Learners in Science Class

In history of education, a great deal of research has focused on the practice of teaching as opposed to learning on the methods used and the problem that hinders teacher effectiveness (Njeri 2010). Patton, Palloway and Cronin (1990) noted that, 38% of special education students hardly receive any instruction in science and that 90% of teachers who teach science to students with special needs often employ textbook centered teaching approach. This reveals many educators are not usually aware of essential practices in science classroom which even becomes more difficult for them to design and execute instructional in classroom.

According to Maina (2012) the two methods documented by KIE used in curriculum coverage are the heuristic and didactic approaches. Heuristic methods which include; question and answer, demonstrations, investigations, probing, group work and discussions encourage active participation and involvement of students in the learning process compared to didactic approaches which tend to be teacher centered. Nwagbo

(2001) while quoting research report on teaching approaches in many schools argues that, teachers usually shy away from more effective activity oriented teaching methods in preference for methods that are easy and mostly inappropriate such as lecture which is purely teacher centered, leaving students as passive recipient of knowledge supplied in classroom. Fosnote (1996) cautions that in any learning environment, students should no longer be passive recipient of knowledge supplied by teachers and teachers should no longer be purveyors of knowledge and classroom managers

Dewey a strong proponent of child centered learning approach views a teacher as a helper whose key role is to challenge the learner to discover things for himself (Njeri 2010). Ossai (2004) noted that, even in a good curriculum with a well stocked laboratory; there will still be poor results in the hands of an incompetent teacher. A study conducted by Akubue (2008) on *"Some Strategies for Effective Teaching in Social Studies"* did establish that, the use of appropriate teaching strategy in class tends to bring about achievement of lesson objectives.

In Kenya, the issue of poor teaching strategies according to Njeri (2010) was raised by Ominde report of 1964. In this report, the Kenya Education Commission blamed the drill method of teaching for neglecting activity and pupil participation resulting in low achievement in education. The report encouraged teachers to adjust their teaching strategies to suit the needs of particular learners and to use activity methods so as to make education a child centered approach. It is highly important to note that these recommendations from different educators and teachers have not yet changed even after undergoing the relevant training (Njeri 2010). This study sought to find out if teachers of science at Rev. Muhoro Secondary School for the Deaf in Nyeri County were using

relevant teaching strategies at their disposal for teaching science subjects and whether they were following the learner centered approach advocated by Dewey and Ominde Commission of 1964.

2.3 Use of Individualized Education Program to Monitor Learners Learning Pace.

Roles of teachers of the deaf students are changing rapidly, as the classroom settings and demographic factors of learning become more demanding. Teachers are increasingly faced with challenging roles of monitoring student performance in class to address the prevailing low performance. According to Jodi (1996), Individualized Education Program (IEP) is a developmentally appropriate curriculum based on each learner needs. Developmentally appropriate, means that each child's unique progress and growth are used to determine what he or she should accomplish.

Gibbs (1992) noted that, individualized learning gives students greater autonomy and control over choices of subject matter, learning methods and pace of the study. Keefe (2007) agrees when he acknowledges that every learner has unique experiential background and unique set of talents and personal interest which must be taken into consideration during learning in class. There are no two individual learners who exhibit the same behaviour patterns or posses the same goals or aspiration in class (Njeri, 2012). While evaluating newly trained teachers of the deaf (Rittenhouse, 2004) found out that, while they were typically energetic and willing to attempt to tackle new ideas, they often lacked skills necessary for successful maintenance and development of Individualized Educational Program (IEPs). Similar concerns have been expressed that many teachers lack the necessary training and knowledge to implement IEPs in class (Alberta Teachers' Federation, 2009; Gallagher & Desimone, 1995; Martin, Greene & Borland 2004; Rosas

2009). As teachers continue to lack these important skills, a study conducted at the Institute of Science in America on importance of Individualized Education Program (IEP), reveals it's was key to students' improvement in class.

El-zraigat (2012) carried out a study on challenges of educating students who were deaf and hard of hearing in Jordan. He surveyed 30 teachers and four Principals drawn from four schools. In his study, he found out that many teachers lacked the necessary expertise in planning Individualized Education Program (IEP). Ndurumo (1993) in Kenya established almost the same findings. He noted that, students who were deaf benefited more from Individualized Education Program (IEP) as their needs and interests were catered for in class based on their learning pace. He further noted that, failure of deaf students to master academics subjects was as a result of failure by teachers of the deaf to cater for their individual differences. Ndurumo (1993) study highlighted urgent need to introduce Individualized Educational Program (IEP) to address the prevailing poor performance. Present study sought to find out if teachers at Rev. Muhoro School were incorporating IEP in their teaching during learning of science in class and how this was facilitating achievement of science goals in curriculum.

2.4 Medium of Instruction Used in Communicating Science Knowledge to Learners

Education of the deaf worldwide has been one of the most controversially discussed topics (Adoyo, 2002). This had resulted into difficulty in finding appropriate classroom communication that effectively provides access to curriculum content. At independence, many schools were following Oral learning approach (Ayiela, 2012). The approach mainly focused on use of hearing aids, speech and lip reading to try and make Deaf function like hearing individuals. In 1980, Total Communication was introduced;

however research had noted that many teachers lacked necessary Sign Language skills to engage learners in science classroom at the time. Omuthani (2012) cites Crume (1999) who observes that, many teachers of learners with hearing impairments are unable to teach properly because they cannot communicate with them clearly. Furthermore, most of them sign very poorly and this has been found to create obstacles in the teachers endeavor to provide instruction in science class to learners with hearing impairments (Omuthani, 2012).

Adoyo (2002) and Ayiela (2012) seems to agree when they states that, although teachers interacted daily with learners who are native speakers and who could provide them with an ideal environment for signing there was still poor attitude towards this indigenous language as a medium of instruction. Mitchell and Karchmer (2006), while commenting on this, argued that, teacher preparation programs must adapt to meet the changing needs of deaf education in class. Conner, Lang, and McKee (1993), noted that; ability to sign clearly, lecture at a good pace, communicate content expectations and assignments clearly increase the levels of understanding among learners who are deaf and hard of hearing. Omuthani 2012 seems to agree when he states that instructional materials accomplishes 83% of what is learnt through sight making learning very interesting even to dull and hyperactive students.

Students who are deaf being bilingual in their communication approach, teachers of science need not only to train in science pedagogy, but also in dual language development in order to be effective in classroom. Ogunniyi (1997) suggested that, there should be continuous language development at all levels to improve science instructions which may include using mother tongue (Sign Language) as medium of instruction in

class. Code switching, had also been found to be effective in learning science subjects. This involves switching from the language of catchment area (KSL) to English and then transferring this knowledge to unlock scientific terminologies in class. El-zraigat (2012) carried out a study on challenges of educating students who were deaf and hard-of-hearing in Jordan. He used qualitative approach with a target population of 30 teachers and four Principals. He found out that most teachers who taught students who were deaf and hard of hearing lacked the necessary pre-requisite skills such as Sign Language and basic skills essential to make adjustment on needs of deaf learners in class. He concluded that most of these teachers had trained to handle students in regular classes and not deaf students.

Ndurumo (1986) conducted a similar survey in Kenya and found out that, deaf learners are usually blamed for their inability to grasp information during classroom teaching even when speech and speech reading are used as a method of instruction. This clearly demonstrates how misplacement of skills may have far reaching implication on the learning of science in schools for the deaf. However, according to Ayiela (2012), the government now follows a policy where-by all learners with special needs have to be given the necessary support services whether they are attending regular or special schools. In light of this, the present study sought to find out if teachers at Rev. Muhoro had the pre-requisite skills to function in schools for the deaf and whether they were aware of Special Needs Education Policy on the needs of deaf learners and how this was impacting on performance.

2.5 Time Allocated for Science Syllabus Coverage

Teaching time for science subjects in schools for the deaf is often limited due to their slow pace of understanding. The curriculum has not been flexible in terms of time, teaching, learning resources, methodology and mode of access, presentation and content Ayiela (2012). This is in spite Kenya Institute of Curriculum Development (KICD) having specialists to design curriculum for Special Needs Education (SNE). Similar sentiments were raised by the task force on appraisal of SNE (2003) which reported that curriculum used in ordinary schools is rigid and overloaded and as a result, it does not take care of the individual differences of each learner. Adoyo (2004) echoes the same sentiments when he states that the deaf follows a normal curriculum that is centrality rigid providing little room for flexibility. In the current curriculum, science subjects at secondary level are allocated two single and one double lesson in which the syllabus is expected to be completed. Though the time may not be enough, teachers have to find a way to ensure that the syllabus is covered on time.

A study by Rosenshine and Stevens (1986) on direct instruction found out that, more effective teachers maintained a strong academic focus and spent less time on non-academic activities. Brophy and Good (1986) reports that teachers who plan and organize on a daily basis prior to instruction produce higher levels of student achievement as this align the objectives to be achieved to the desired level. Shostak (1990) recommended planning the first 5 minutes as "entry" into the lesson which may includes clarification of expectations, reflection using an advanced organizer, and introduction of the lesson topic. In a similar fashion, the last 5 minutes of the lesson should be directed to closure to reinforce the key points of the lesson and transfer learning by bringing in applications which relate to age-appropriate experience.

Patton, Polloway and Cronin (1990) in their survey of special education teachers on time management in science noted that, among special educators who did teach science, nearly half devoted less than 60 minutes a week on science instructions. This research demonstrates a continuing lack of responsiveness on the part of science teachers to adjust the learning environment, so that the deaf students feel a sense of success and accomplishment.

A survey by Maina (2012) on curriculum factors influencing performance in Mathematics in class in four provinces in Kenya revealed that, there was positive correlation between amount of time spent on content coverage and performance in Mathematics. UNESCO (2005) echoes the same sentiments when it indicates that, there is consistent positive correlation between instructional time and students' achievement which even appears stronger in developing countries. Such empirical findings clearly demonstrate that, there is need for curriculum adaptation in deaf schools which may include among other factors, the hard decision of adding extra time on normal one to enable deaf students' complete tasks successfully. While Kenya National Examinations Council had adapted time for doing examinations, Kiswahili, English and Chemistry Papers, Ayiela (2012) observes that, this important task is yet to be effected by Kenya Institute of Curriculum Development (KICD) which has maintained normalcy in curriculum at all levels. The study therefore sought to find out strategies adopted by teachers in classroom to accelerate syllabus coverage and how this was impacting on performance in sciences in Kenya Certificate of Secondary Education (KCSE).

2.6 Resources Used in Teaching and Learning Science Subjects

The current situation of science teaching and learning in Kenya is a concern to many stakeholders. Many students are either finding it difficult to perform or for various reason their interests being drawn away from studying these subjects. Salau (1996) observes that, many students found science subjects to be difficult, boring and not interesting to them. Perhaps of most significant has been lack of resources, suitable accommodation and lack of motivation and guidance in literature on how to utilise the available resources to convey science knowledge to deaf learners. In the words of Ajileye (2006) insufficient resources for teaching and learning sciences constitute a major cause of student underachievement. Bloom (1994) noted that, blame for failure in class rests on poor classroom practices and not inability of the students to learn. Bishop (1986) echoes the same sentiments when he asserts that, unless there is a ready and continuous supply of teaching learning equipment and adequate support services, any innovation introduced in curriculum will be a passing fancy.

Omuthani (2012) study on *"Factors affecting KCPE Performance of Learners with Hearing Impairments in Special Schools in Selected Counties in Kenya"* notes that, instructional materials such as diagrams, pictures, graphs and flow charts are very essential in the teaching and learning of hearing impaired learners as they reduce language and reading demands. Summer (1985) seems to agree when he states that, visual methods of teaching and learning create a more lasting experience and relate most readily to other sensory experiences.

Hannon and D'Netto (2007) conducted a study on the use of multimedia resources in learning science in Australia. They surveyed 241 online students with the purpose of

finding out if learners from different cultural background would find online environments culturally inclusive in terms of engagement with the content and with the learning and teaching environment. They found out that, there was no significant difference between Australian students and non-native Australian one. They concluded that, the use of multimedia resources in learning sciences availed a multitude of opportunity to students in class. For example, a student could view lectured content which may have been spoken and signed in multimedia presentation at their own convenient and repetitively thus making easy for many learners to master the concept taught in class. These views supports a Chinese saying, that says "If I hear I forget, if I see I remember, if I do I know" as cited by (Harrison, 1983).

A similar study on the use of multimedia and internet resources was conducted by Maina (2012) in Kenya. The study established that, there was improved factual recall of Mathematics concepts in deaf schools when multimedia resources were used in learning. By seeing pictures and photographs of what had been learnt over and over again, some concepts become more visible and self explanatory to students (Omuthani, 2012). It's highly important to note that, all studies pointed on the importance of resources use in learning environment. The present study therefore sought to find out how teachers at Rev. Muhoro Secondary School for the Deaf were incorporating resources in their teaching during science learning and how this was impacting on performance.

2.7 Summary

The Ominde Commission advocated learner-centered-learning approach in class. Dewey a strong proponent of child centred further advocated for its follow-up in curriculum. The present study sought to find out if teachers at Rev. Muhoro were aware of these

recommendations and whether they were following the Learner-centered-method advocated by Ominde and Dewey.

Students who are deaf follow normal curriculum according to Adoyo (2004). However in spite of this, literature reveals no research had been carried out in Kenya to find out if the time allocated for science learning in deaf schools has been adequate. Although some researchers had attempted to look at the scope of time in other subjects in curriculum, science subjects remains. The present study sought to fill this gap.

Literature revealed that few teachers were using Sign Language when teaching in class. Some lacked basic skills necessary to make adjustment on the needs of deaf learners and even more teaching was based on speech and speech reading. Present study sought to find out the competence of teachers at Rev. Muhoro School in the medium of instruction. There has been a lot of research in other areas in curriculum for deaf learners which have shown that the use of resources in learning correlated positively with the performance. However, such studies cannot be directly used to give similar recommendation for review of teaching strategies in sciences. This study sought to cover this existing gap.

Researchers have shown that, individualized education program was key to student with disability improvement in the learning process. These studies highlighted urgent need to introduce individual education program in curriculum to monitor the performance of learners in class. The present study sought to find out if teachers at Rev. Muhoro secondary school were incorporating IEP in their teaching as a step to bridging weak areas in performance.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents; research design, variables, location of the study, target population, sampling techniques, and sample size, research instruments, piloting, validity and reliability, data collection techniques, data analysis, logistical and ethical considerations.

3.1 Research Design

The study used descriptive Case study design. This design was chosen because it gives a detailed investigation into the phenomenon under the study. According to Nachmias and Nachmias (1981) there are virtually no specific requirements guiding Case research. They assume a holistic view of the process under the study (Gummesson, 1988) and hence the approach was useful in responding to how and why questions about poor performance in sciences at Rev. Muhoro Secondary Schools for the Deaf. The study used both qualitative and quantitative data collection strategies even though most of the Case studies emphasize qualitative approach. This was meant to minimize limitations of each method.

3.1.1 Variables

In this study, independent variables are; teaching strategies, curriculum issues, teaching/learning resources and medium of instructions while academic performance in science is the dependent variable. The researcher sought to analyze teaching strategies being used in sciences class and establish their relationship on performance in KCSE.

3.2 Location of the Study

The study was conducted at Rev. Muhoro Secondary School for the Deaf located in Mukurwe-ini Sub-County, Nyeri County, Kenya. The site was selected due to ease of

access and given that it was an old school, it provided rich data that enabled the researcher to make comparison on performance trends in subsequent years. This contributed to the reliability of the study. Equally the school was strategically located and familiar to the researcher. This made the work of the researcher easier since he was able to built rapport with the participants easily.

3.3 Target Population

The target population comprised of 1 principal, 23 teachers, and 210 students of Rev. Muhoro. The principal provided data on how students who are deaf had performed in sciences over the years, while teachers and students gave their views on array of teaching methods they were using in classroom, the most preferred strategies in teaching science subjects, implication of time on learning science subjects and whether they incorporated an Individualized Education Program (IEP) in their teaching.

3.4 Sampling Technique

Sampling is a process of selecting a number of individuals for a study in such a way that the individuals selected represent a large group (Namalwa 2013). The researcher used purposive sampling technique when sampling Teachers and Principals to take part in research. According to Orodho (2005), Purposive sampling techniques is handpicking the cases to be included in the sample on the basis of one's judgment of their typicality. The goal is to select cases that are likely to be "information rich" with respect to purposes of the study he contends. The main reason for using purposive sampling technique to sample principals and teachers was that; the sample size for study was small based on the research design adopted. On the other hand stratified random sampling techniques were used to select a sample size of 48 deaf students. The school had three streams with a

population of 210 students and 23 teaching staff. Out of this population of 210 students, 140 were deaf students while 70 were hearing students. The classes of deaf students were double streamed with hearing students occupying the third stream. Only Form Two to Four science students took part in the study with each Form producing 8 participants to ensure equal representation. Form one students did not participate owing to the fact that, they were yet to settle and would not have had reliable information touching on this study. On the other hand, out of 23 teachers, there were 7 science subjects teachers- Chemistry, Biology and Physics who took part in this study. The school principal also took part in the study by informing the researcher on how science subjects had been performed for years. This formed a sample size of 56 participants. The result of the study were then generalised to the whole population.

3.4.1 Sample size

The sample size consisted of 48 students, 7 science teachers and 1principal making a total sample of 56 participants as shown in the table below;

Table 3.1:-Sample size

School	No. of students	No. of teachers	No. of head teacher	Total
Rev. Muhoro Sec	48	7	1	56

3.5 Research Instruments

The study used questionnaires, interview and lesson observation schedules as instruments for data collection. There were two sets of questionnaires meant for science teachers and students respectively, then interview schedule for principal. The questionnaires included questions related to effective teaching strategies in sciences and respondents rating on the

extent to which these teaching strategies were contributing or impeding learning of sciences subjects in class. In addition, the questionnaires were used in finding out some of the measures to be put in place to sort out any gap identified. Interview schedules on the other hand were used in finding out teaching strategies that were being used in sciences classes and their contribution on performance and how sciences had been performed for five years. Further, the researcher made observations and recorded aspects of teaching strategies being used by teachers in classroom. This was done following the observation guide that had been prepared. Recording was done by a video recorder and later analyzed according to major themes.

3.6 Pilot Study

Before the actual study, the researcher carried out pilot study at Murang'a Secondary School for the Deaf. The school was picked because it was among schools that were perpetually performing poor in sciences and the fact that it was familiar to the researcher, building rapport with the participants was easy. Only Biology subject was used in the study. Three biology teachers and six students were picked to fill the questionnaire while the principal was interviewed using interview schedule that had been prepared. The researcher also pre-tested observation schedules. This was quite essential as it helped the researcher in estimating reliability and validity of the researcher instruments. Bell (1993) observed that; piloting is one way of checking reliability of research instruments. This is important as it helps in eliminating; ambiguity, misunderstanding and inadequate items hence making research instruments valid and reliable (Wiersma 1985). This necessitated the researcher to carry out a pilot study to ensure instruments were accurate without any flaw before the actual research was initiated.

3.6.1 Reliability and Validity

According to Mugenda (2008) validity is the accuracy, trust worthfulness and meaningfulness of inferences that are based on the data obtained from the use of a tool or a scale for each construct or variable in the data. In this study, validity of research instruments was determined through professional judgment by the supervisors. On the other hand, reliability is the degree to which a research instrument yields the same results or data after repeated trials. After the pilot study, reliability coefficient of all the instruments was determined. This was done through administering instruments to the participants involved in the study at different times in close succession using test-retest method. This was done in two consecutive days after which correlation between the two sets of data was determined using Pearson Product Moment Correlation Formulae. A reliability coefficient of 0.3 was obtained indicating existence of strong relationship. For lesson observation schedule the researcher made two different observations. One was done during morning session and the other during afternoon session for a period of two days. The degree of agreement between the two observations was then evaluated by the researcher together with the supervisor. The items on the list were then reviewed and re-defined for accuracy before the actual study.

3.7 Data Collection Techniques

Teachers teaching sciences subjects were given a questionnaire to fill. They were also observed in their respective classes and both qualitative and quantitative data collected following observation guide prepared. Each class was observed twice a week for a period of one month. Brief discussions were also conducted with science teachers to exhaust all the information required for this study. Interviews with the principal was held at her own discretion and the venue decided by her within the period of the study. Lastly students

were given questionnaires to fill under the supervision of the researcher assistance in their classes. They were also observed in their respective classes on how they were participating in the learning process when different teaching strategies were being used.

3.8 Data Analysis

Data collected by the researcher was analyzed both quantitatively and qualitatively. Quantitative data from closed, open ended questionnaires and lessons observations schedules were analyzed and presented by descriptive statistics while qualitative data were analyzed based on major themes and then reported in narrative form.

3.9 Logistical and Ethical Considerations

Before the study, the researcher sought an introductory letter from the graduate school and a research permit from the Ministry of Education Science Technology and Innovation. The researcher also made preliminary visit to the County Director of Education (CDE) and County Commissioner in Nyeri County and then District Education Officer (DEO) in Mukurwe-ini Sub-County to brief him on the purported study at Rev. Muhoro Secondary School for the Deaf. The researchers also made a reconnaissance visit to the school with the aim of familiarizing himself with the environment before embarking on the actual process of data collection. Lastly, the researcher moved in the school to get approval of the school Principal before proceeding to solicit participants' consents who included; principal, science teachers and the students. After this stage, the researcher briefed the participants on the process of data collection which included; maintaining of anonymity when filling the questionnaire.

CHAPTER FOUR

DATA ANALYSIS PRESENTATION AND DISCUSSION

4.0 Introduction

This chapter deals with data analysis, presentation and discussion.

4.1 Data Analysis

The study employed three tools for data collection. These were questionnaires, interview and lessons observations. Filled questionnaires from teachers and students were counted and cross checked for any anomalies. Areas in questionnaires not answered were recorded as dash. The Principal was interviewed using the interview schedule that had been prepared earlier. Lessons observation were done and sometimes recorded where the participant consented. Recorded information from lessons observation; interviews and questionnaires were then coded and analyzed by use of qualitative and quantitative research methods.

4.2 Data Presentation

For effective presentation, the chapter is analyzed into six sections. These includes; a summary of background information of the participants, teaching methods teachers use on deaf learners in science class, extent to which teachers incorporate Individualized Education Program (IEP) in the learning process, medium of instruction used in communicating science knowledge to learners, teaching methods used in utilizing time on content coverage and teaching resources used in teaching and learning science subjects for deaf learners. Each analyzed section is followed by interpretation and discussion

4.2.1 Background Information

This section focused on two variables; gender and qualification. On gender, responses were as shown in figure 4.1

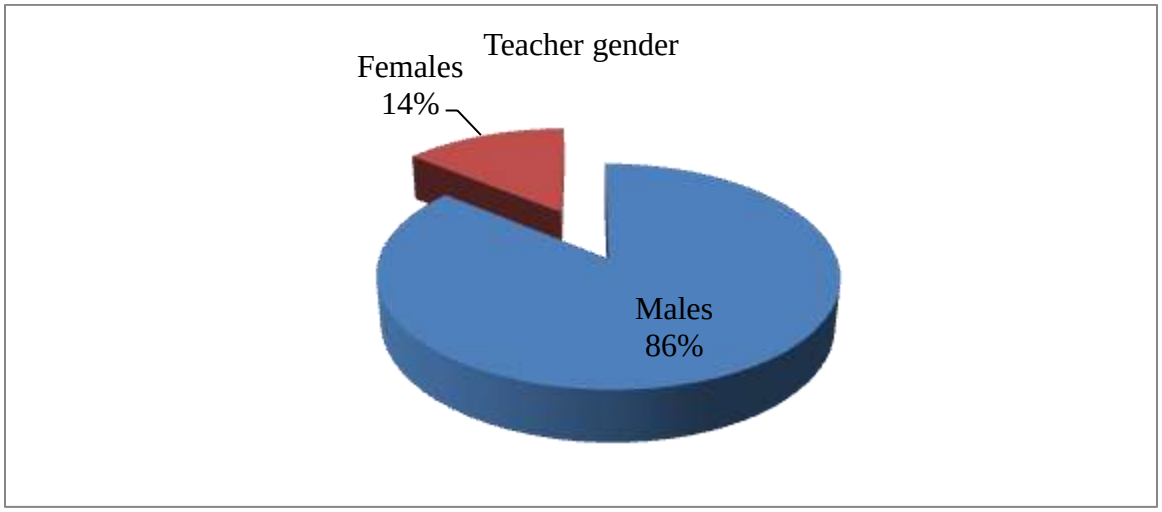


Figure 4.1: Teachers Gender

Findings revealed 86% of the participants were males while 14% were females. Although the selection was unfair to the female gender, it was difficult to balance gender participation since there were only 7 teachers whose genders were as indicated in figure 4.1. On teacher qualification, the responses were as shown in figure 4.2

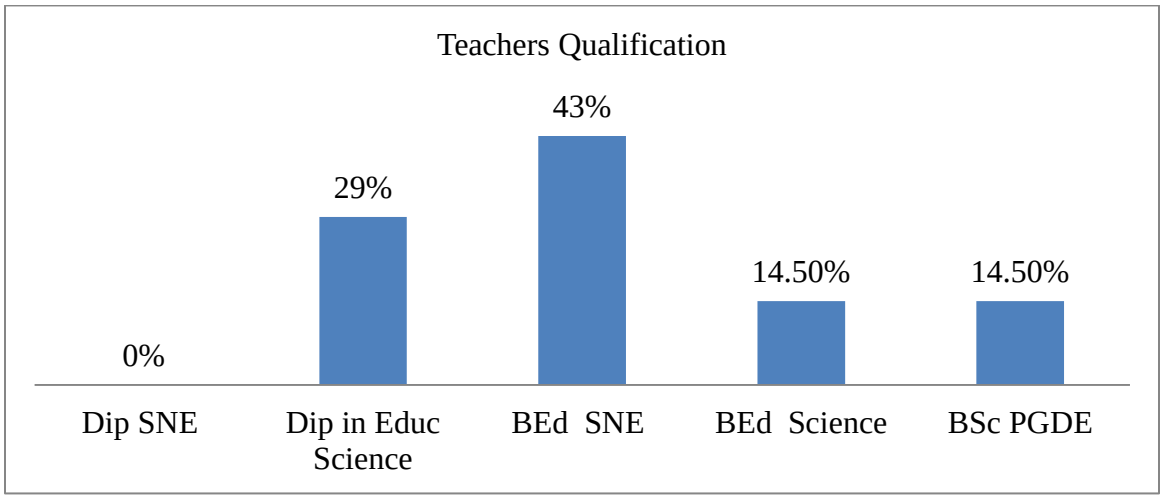


Figure 4.2: Teacher Qualification

Findings report, 0% of teachers had Diploma in Special Needs Education, 29% Diploma in Education Science, 43% Bachelor of Special Needs Education, 14.5% Bachelor of Education Science and 14.5% with Bachelor of Science with a Post Graduate Diploma in Education.

When asked on any training done after their graduation, 1 teacher had taken KSL Course, 1 attended SMASSE where as another had trained in examination marking skills. On teaching experience; 2 teachers reported having experience ranging from (0-2 years), 1, (3-5 years), 1, (6-9 years) and 3, 10 years and above.

Analysis of data revealed, out of 7 teachers who took part in this study, 43% possessed the required qualification to work as teachers of deaf students, 1 had taken in-services teacher training in KSL Course, thus acquiring necessary qualification to be recognized as a teacher of deaf students. The remaining three participants though qualified as teachers, had trained to teach hearing students and did not have any other qualification to justify their presence at Rev. Muhoro School, as teachers of deaf students.

4.3. Teaching Methods Teachers Use on Deaf Learners in A science Class

Teachers and students were asked to state commonly used teaching method in science class. Their responses were as shown in figure 4.3

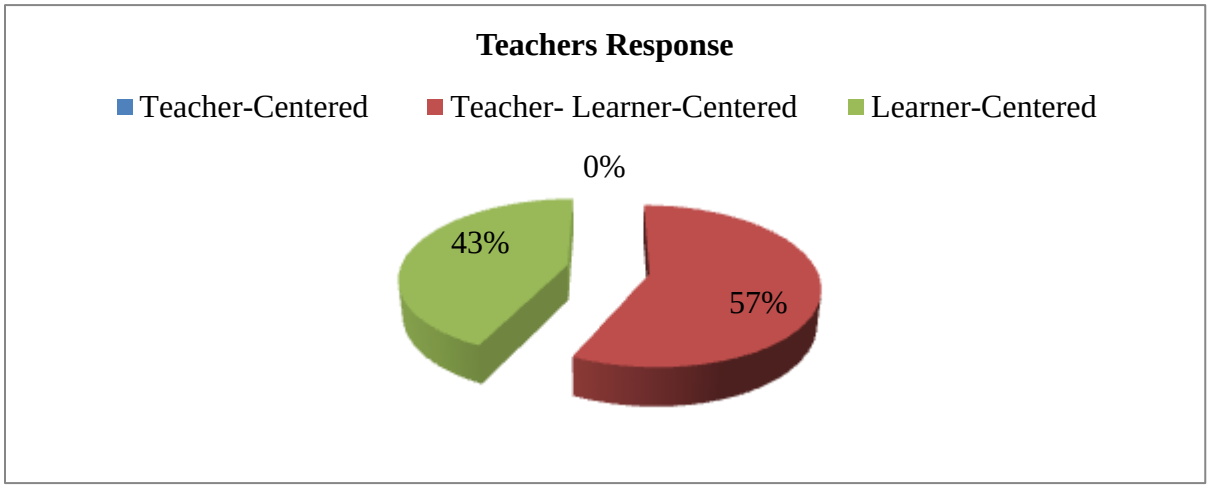


Figure 4.3 Teachers Responses on Commonly Used Teaching Method in Science Class

Zero percent- 0% of teachers reported using teacher-centered method, 43% learner-centered method while 57% teacher-learner-centered method. Learners were equally asked to state the commonly used teaching method in sciences. Their responses were as shown in figure 4.4

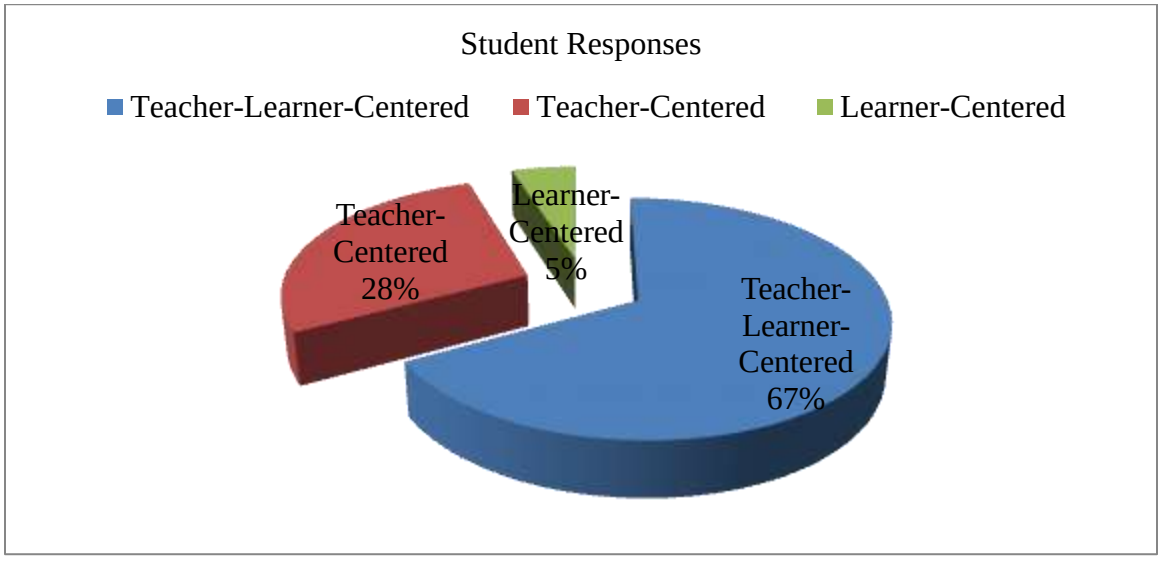


Figure 4.4: Students Responses On Commonly Used Teaching Method In Sciences

Twenty eight percent (28%) of the students reported teachers were using teacher-centered method to teach, 5% reported teacher to be using learner-centered method while 66%

reported teachers were using teacher-learner-centered method. Findings from teachers and students revealed commonly used teaching method in sciences was teacher-learner-centered method. However, when teachers were asked to rate students understanding of science subjects when teacher-centered method, learner-centered method and teacher-learner-centered methods were used, their responses were as shown in figure 4.5

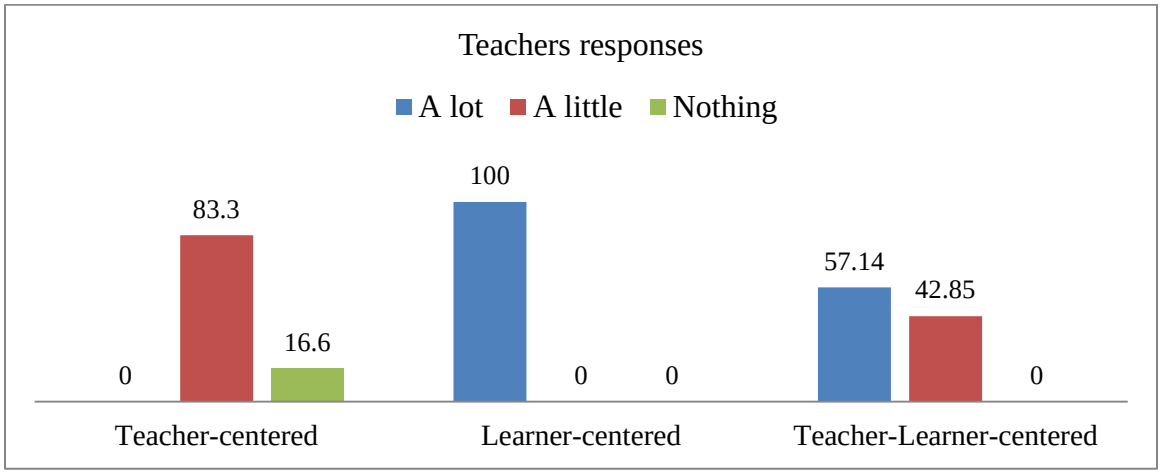


Figure 4.5: Teachers Responses on How Students are Likely To Understand Science in Class When Different Teaching Methods are used

Zero percent (0%) of teachers reported that when teacher-centered method is used; learners were likely to understand science a lot, 83.3% reported a little while 16.6% nothing. When learner centered method is used, 100% reported learners will have to understand science subjects a lot, 0% a little, 0% nothing. When teacher-learner-centered is used 57.14% reported learners will understand science a lot, 42.85 a little while 0% nothing. Similarly, students were asked to rate their understanding of science subjects when learner-centered, teacher-centered and teacher-learner-centered methods were used. Their responses were as shown in figure 4.6

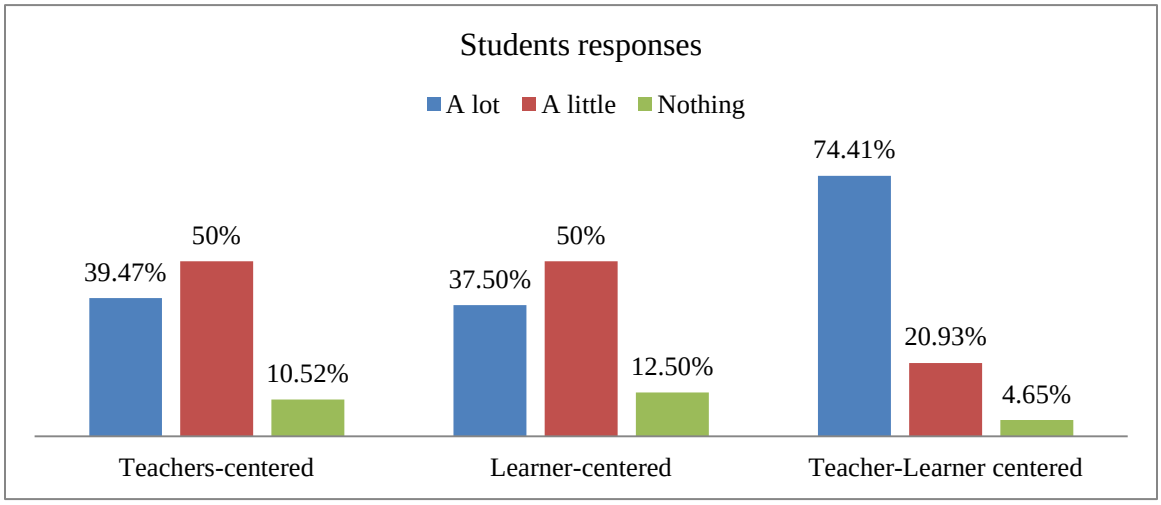


Figure 4.6: Students Responses on how they are Likely to Understand Science when Different Teaching Methods are used in Class

Thirty nine point four seven percent (39.47%) of students reported they were likely to understand sciences a lot when teacher-centered method was used, 50% reported to understand a little while 10.25% nothing. On learner-centered method, 37.5% reported to understand a lot, 50% a little while 12.5% nothing. When teacher-learner-centered method is used, 74.41% reported to understand a lot, 20.93% a little while 4.65% nothing.

Analysis of teachers' responses revealed learner-centered was the best method for teaching science while teacher-centered was the worst one. Students' responses revealed teacher-learner-centered method was the best while learner-centered as the worst method to use. Interview with the principal reported that learner-centered method was the best for teaching sciences. Observation in learning trends supports learner-centered method as it provided opportunity to each learner to demonstrate his/ her understanding of science knowledge in class. However, teachers' responses seemed to contradict the method they were using with what they believed was the best teaching method in science class. Inspite

of them knowing that learner-centered method was the best method for teaching science; most of them were deliberately using teacher-learner-centered method. These findings agree with Nwagbo (2010) who observes that, teachers usually shy away from more effective activity oriented teaching methods in preference for methods that are easy and mostly inappropriate.

Even though learners had shown preference for teacher-learner-centered method; this teaching method had failed to guide science learning as majority of the teachers were already using it and the performance had not been good. Observations in class revealed this method cultivated passive learning in class. Most of the learners assumed the teacher was the sole knowledge in class and hence could not engage in self directed studies without the teachers' input. They were actually passive recipient of the knowledge supplied by teachers in class. Fosnote (1996) proceeded with caution that, in any learning environment, students should no longer be passive recipients of knowledge supplied by teachers and teachers should no-longer be purveyors of knowledge and classroom managers. It was indeed intriguing to see a Form Two student asking the teacher the meaning of water when he was teaching on materials necessary for the process of photosynthesis. This implied that learners solely depended on the teacher in all aspects of their learning. They could not understand the meaning of water which was a simple term a class One student should have been able to comprehend. These finding raised the need for a learner-centered approach, an approach that allows learners unlimited time and to move at a pace that allows for continuous monitoring of achievement of learning objectives giving instant feedbacks and timely intervention. Akubue (2008) study on *"Some Strategies for Effective Teaching in Social Studies"* seems to agree when he

establishes that, the use of appropriate teaching strategy in class tends to bring about achievement of lesson objectives.

Teachers were again asked to state teaching method they preferred when teaching practical, concepts, doing revisions and when demonstrating. Their responses were as shown in figure 4.7

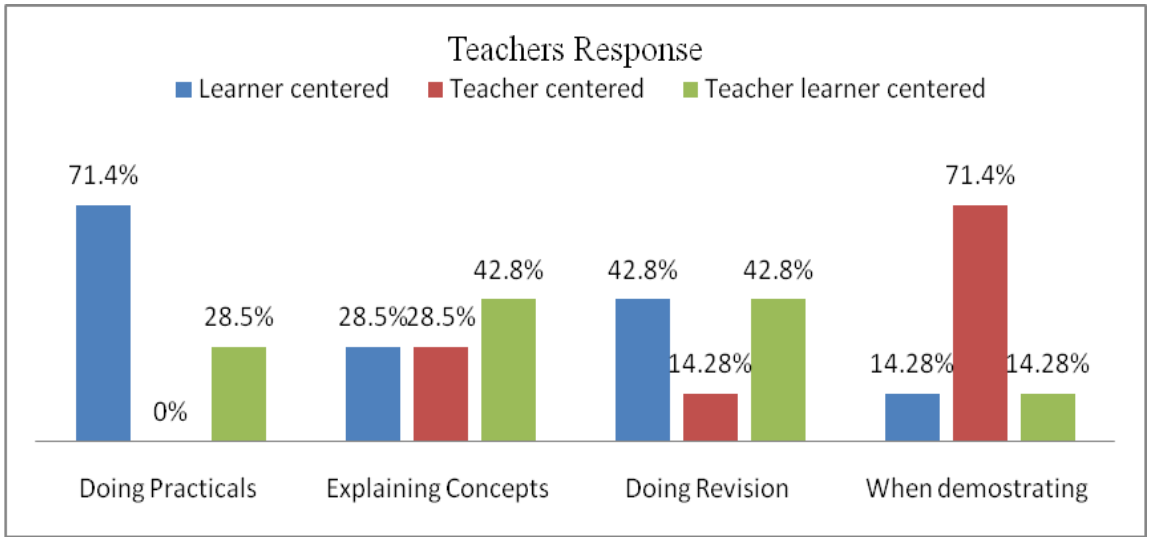


Figure 4.7: Teaching Method Preferred When Doing Practical, Explaining Concepts, Doing Revision, and When Demonstrating

From figure 4.7, Seventy one point four percent (71.4%) of teachers reported to prefer learner-centered method when doing practical's, 0% teacher-centered method, while 28.5% teacher-learner-centered method. When asked about concept teaching, 28.5% preferred learner- centered 28.5% teacher-centered, while 42.8% teacher-learner-centered method. When doing revision, 42.8% reported to prefer learner-centered method, 14.28% teacher-centered method while 42.8% teacher-learner-centered method. When demonstrating 14.28% reported to prefer learner-centered method, 71.4% teacher-centered method while 14.28% teacher-learner-centered method.

Analysis of the findings revealed, majority of teachers **(**71.4%) preferred learner-centered method when doing practical's while teacher-centered method was lowest at 0%. Teachers reported that, this method engages learners in the actual learning process. By manipulating materials by themselves, the learners were able to draw relationship between variables being studied in class leading to better understanding. Observations in learning trend equally support learner-centered method as it provided opportunity to all learners to demonstrate their understanding of subject matter in class. These findings concur with Dewey (1964) who observes that, in any learning environment, the role of the teacher is that of challenging the learner to discover things for himself as cited by (Njeri 2012)

When explaining the concept, majority of teachers (42.8%) preferred teacher-learner-centered method while learner-centered method was lowest at 14.28%. The teacher stated that this method was worth as it involved learners in actual learning through questions and answer methods to ascertain those who were understanding and those who were only in class. However, observation in class revealed that, the teacher remained the principal focus in the learning process. The teacher kept on repeating one concept every time but whenever he had to ask the students the meaning of the same concept; most of them responded by saying, *"I have forgotten"*. Learning seemed to be more of drilling other than understanding. Ominde report of 1964 cautions on drilling method in learning as it neglect students activities and participation leading to low achievement in education.

When doing revision, both learner and teacher-learner-centered method were viewed as best methods at 42.8% while teacher-centered as the worst at 12.5%. Teachers reported that, teaching and learning must be a coordinated effort if it's to achieve the intended

purpose of benefiting the learner. If it was out of this, then the whole process was destined to fail.

When demonstrating, teacher-centered method was seen as the best method at (71.4%), while learner-centered method and teacher-learner-centered method at (14.28%). It was reported that some demonstrations were too hazardous to be handled by learners hence need for teachers to demonstrate such experiments. Though the school had a well stocked laboratory some teachers took a completely different approach to their teaching. Some assigned students in groups and took a back seat in office storytelling as the students did demonstration in the lab by themselves. This was detrimental to them and to their success in sciences. These findings concurs with Ossai (2001) who states that, even in a good curriculum with a well stocked laboratory, there will still be poor results in the hands of an incompetent teacher

4.5 Extent to Which Teachers Incorporate IEP in teaching Process

Teachers were asked to state if they were using IEP in teaching and monitoring performance in sciences. Their responses were as shown in the figure 4.8

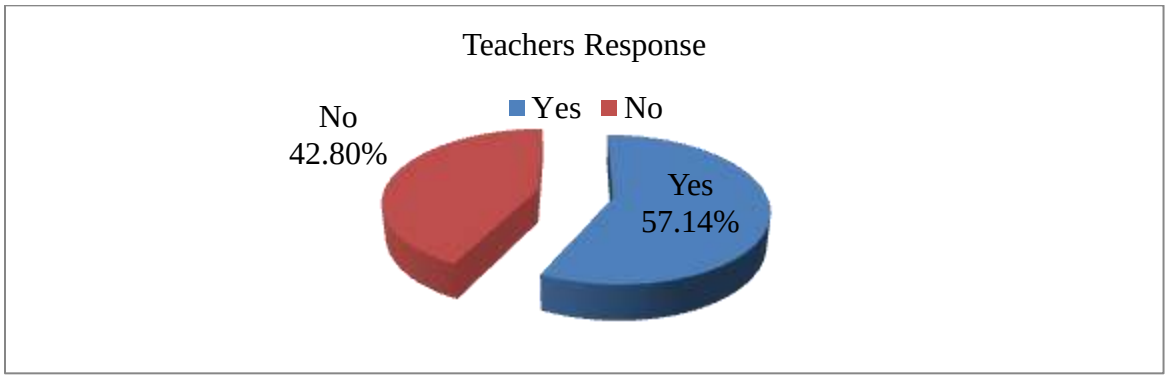


Figure 4.8: Teachers Responses on Whether their Teaching Incorporated IEP in teaching science subjects

Findings revealed 57.14% of teachers were using IEP to monitor learners' performance in sciences while 42.80% were not. Students were equally asked to state if they had an IEP or not. Their responses were as shown in figure 4.9

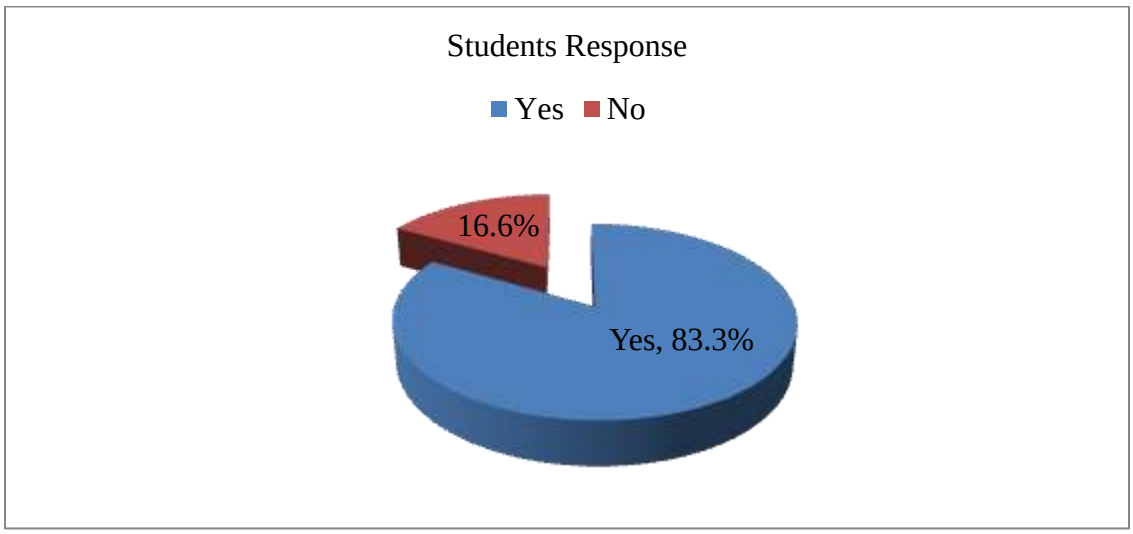


Figure 4.9: Students Responses on Whether they Had an IEP

From the findings, majority of the students (83.3%) reported having an IEP while (16.6%) reported they did not have. Teachers were also asked to give frequency at which they discussed IEP with their students. Their responses were as shown in figure 4.10

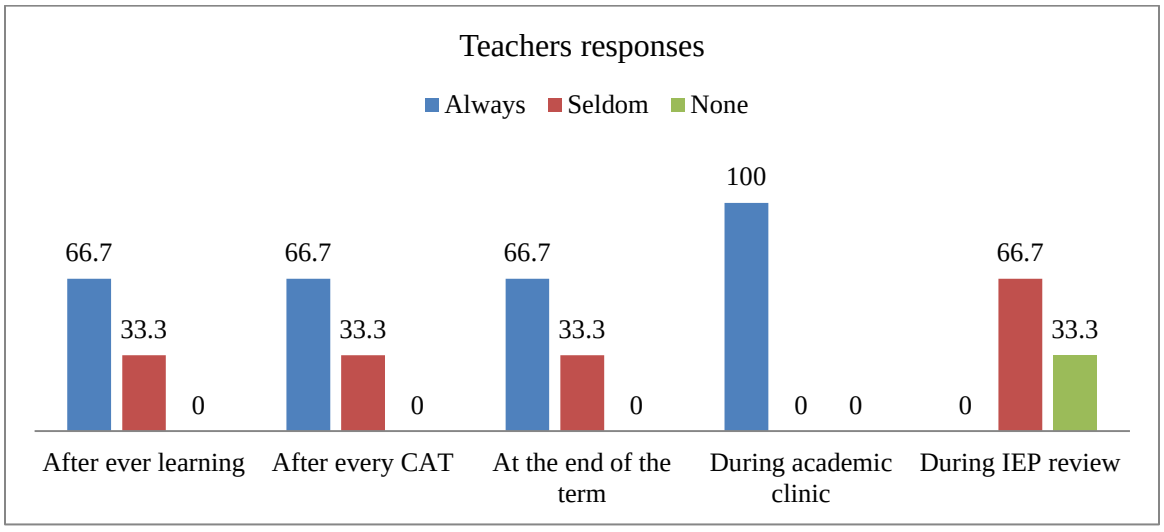


Figure 4.10: How Often Teachers Discuss IEP with their Students

Sixty six point seven percent (66.7%) of teachers reported to have discussed IEP with their students after every day, (33.3%) did this seldom while 0% none. Sixty six point seven percent reported to have discussed after every CAT, 33.3% seldom while 0% none. Sixty six point seven percent (66.7%) discussed at the end of the term, 33.3% did it seldom while 0% none. One hundred percent (100%) discussed during academic Clinics, 0% did it seldom while, 0% none. Zero percent (0%) discussed during IEP review, 66.7% did it seldom while 33.3% none. Interview with the principal reported the school was using IEP in monitoring students' academic performance, though this was being used to a lesser extent.

Analysis of teachers' responses revealed that majority of them (66.7%) discussed their IEP with their students after every day, CAT, at the end of the term and One hundred percent (100%) during Academic Clinics. Interview with the Principal indicated teachers were using IEP in monitoring learners performance though this was being done to a less extend.

Observation in learning trend revealed that, though teachers maintained higher standards of academic learning which were not limited to Academic Clinic, marking of exercise books, follow up on students corrections and doing revision of continuous assessment tests, there was no documentary evidence to support existence of IEP in school. Most of them existed as brief case IEP which did not seem to follow IEP format expected of such learners. These findings support Rittenhouse (2004) study on evaluating newly trained teachers of the deaf, she established that, while they were typically energetic and willing to attempt to tackle new ideas, they often lacked skills necessary for successful maintenance and development of Individualized Education Program.

Similar study by El-zraigat (2012) on challenges of educating students who were deaf and hard of hearing in Jordan established almost the same findings. In his study of 30 teachers and four Principals drawn from four schools he found out that many teachers lacked the necessary expertise in planning and maintaining Individualized Education Program (IEP). Students' responses were not utilised in this section since from the beginning, their responses seemed to address their personal convenience. Most of them seemed not to comprehend exactly what IEP meant even after being assisted by the researcher assistant. They equated it to continuous revision, academic Clinic that were being done in school as a parcel of addressing general inefficiencies in academics hence their inclusion here would have simply watered down the recommendations to be made.

4.6 Medium of Instruction Used By Teachers in Communicating Science Knowledge to Learners

During a study on medium of instruction used by teachers in communicating science knowledge to learners; teachers were asked to indicate how students were likely to understand science when the following mediums of instructions were used. Their responses were as shown in figure 4.11

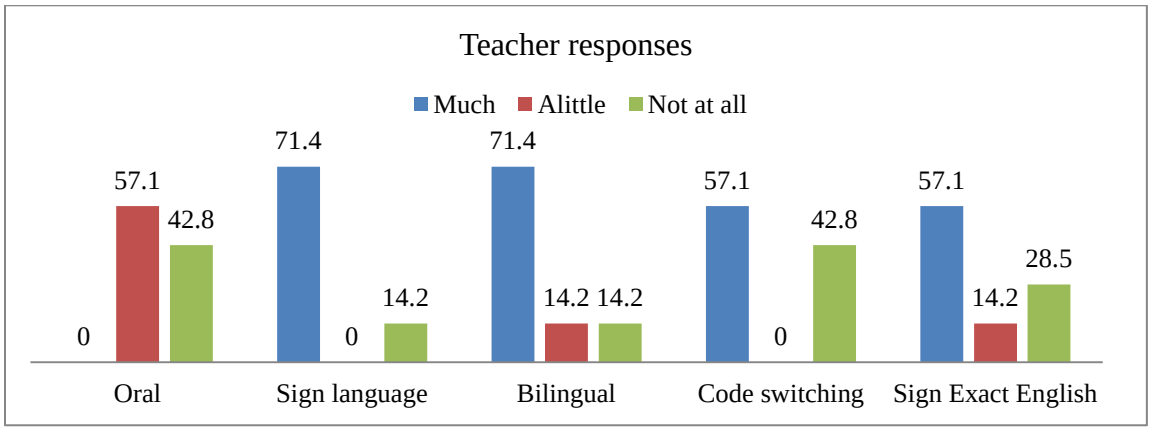


Figure 4.11 Teachers Responses on how Students were Likely to Understand Science When Different Medium of Instructions are Used.

Teachers reported that when Oral language was used 0% of students were likely to understand science much, 57.1% a little while 42.8% not at all. When Sign Language is used, 71.4% reported that students were likely to understand science much, 0% a little, 42.2% not at all. When Bilingual Communication was used, 71.4% reported that students were likely to understand science much, 14.2% a little, 14.4% not at all. When Code Switching was used; 57.1% reported that learners were likely to understand science much, 0% a little while 42.8% not at all. When SEE was used, 57.1% reported that students were likely to understand science much, 14.2% a little while 28.5% not at all.

Majority of teachers (57.1%) reported that when Oral language was used in teaching, little learning was likely to take place. This may have been informed by facts that, majority of students in class were deaf with almost one or few cases being hard of hearing. Given that some teachers were using Oral language in their teaching, it was evident that this was a major factor behind poor performance in sciences. These findings agree with El-zraigat (2012) study on challenges of educating students who were deaf and hard-of-hearing in Jordan. In his study, he used qualitative approach with a target population of 30 teachers and four Principals. He found out that most teachers who taught students who were deaf and hard of hearing lacked necessary pre-requisite skills such as Sign Language and basic skills essential to make adjustment on needs of deaf learners in class. He concluded that most of these teachers had trained to handle students in regular classes and not deaf students, a characteristic of Rev Muhoro Secondary School teachers.

Seventy one point four percent (71.4%) of teachers reported that, when Sign Language was used, students were likely to understand science in class. This higher percentage may have been due to the fact that, Sign Language is visual language capable of conveying all

the information essentially required by deaf students in science class. When the language was used well, there was no doubt that learning would take place. This concur with Conner, Lang and McKee (1993) who note that, ability to sign clearly, lecture at a good pace, communicate content expectations and assignments clearly increases the levels of understanding among learners who are deaf and hard of hearing. However, the current situation at Rev. Muhoro needs to be re-examined if we are to ensure learning objectives for science are achieved.

Teachers equally reported that when Bilingual language was used, 71.4 % of students were likely to understand science in class. This may have been due to the fact that languages being used were able to accommodate both deaf and hard of hearing students' needs which was the characteristics of most of deaf classes at Rev. Muhoro School. Though some teachers were able to communicate in two languages, most of them found it difficult to switch from one language to another hence need for re-training on conditions under which this should be done when teaching. These findings agree with Ogunniyi (1997) who observes that, there should be continuous language development at all levels to improve science instructions which may include using mother tongue as a medium of instruction in class.

Teachers' responses revealed Code Switching was an important part of learning sciences. However the percentage was not very high due to the difficult nature most teachers experienced in transiting from one language to another when teaching. For example majority of teachers found it difficult to express themselves in KSL hence switching between KSL to SEE proved difficult. These findings support El-Zraigat (2012)

observation that, most teachers who taught deaf students and hard of hearing lacked the necessary skills to make adjustments on their needs in class.

When SEE is used, 57.1% of teachers reported that, students' were likely to understand science. This may have been due to the fact that, in some classes where the teachers were teaching, students had developed good language competence making it easy for them to apply it in classroom. Equally this may have been informed by the fact that majority of the students in class were post lingual deaf hence being able to follow SEE structure very well. When teachers were asked to indicate any other medium of instruction they were using in teaching but had not been indicated, 3 teachers out of 7 indicated that they were using Total Communication to reach students based on their level of hearing. This represented 43% of the respondents.

Similarly, students were asked to indicate how they enjoyed learning science when the following media of instruction were used. Their responses were as shown in figure 4.12

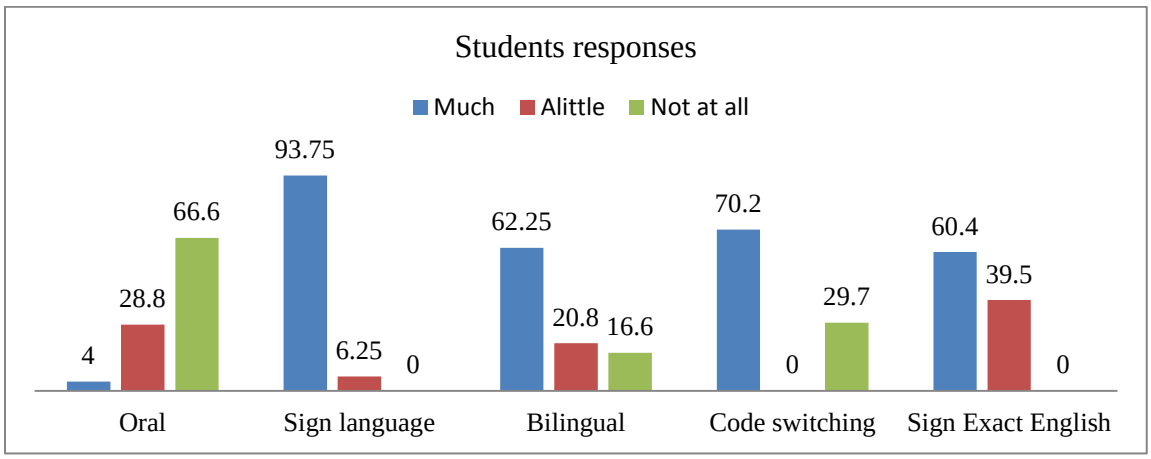


Figure 4.12 Students Responses on How Much They Enjoy Learning of Sciences When the Following Medium of Instructions are Used in Class

Four percent (4%) of students reported to enjoy learning science much when Oral language was used, 28.8% a little while 66.6% not at all. When Sign Language was used,

93.75% reported to enjoy much, 6.25% a little while 0% not at all. When Bilingual method was used 62.25% reported to enjoy learning much, 20.8% a little while 16.6% not at all. When Code Switching was used, 70.2% reported to enjoy learning much, 0% a little while 29.7% not at all. When Sign Exact English is used, 60.4% reported to enjoy learning sciences much 39.5% a little while 0% not at all.

These findings revealed, majority of learners enjoy learning sciences subjects much when Sign Language is used (70.2%). Sixty two point two five percent (62.25%) reported to enjoy when Code Switching is used. However, only 4% of learners reported to enjoy learning science when Oral language is used. This indicated that majority of students were deaf with a few hard of hearing who reported to enjoy learning sciences when Oral language is used. Students' responses agrees with teachers' responses who observed that deaf students were likely to enjoy learning science when Sign Language is used in teaching. These findings support Omuthani, (2012) who states that; instructional materials accomplish 83% of what is learnt through sight making learning very interesting even to dull and hyperactive students.

Even though Sign Language remained the best strategy for teaching science subjects in class, observations revealed that teaching at many levels was Oral based and signing was characterized by long pulling of KSL format to fit in the Oral teaching in which at times left most of the learners confused and laughing among themselves on what the teacher was teaching. Problems in signing equally made it difficult for teachers to switch from SEE to KSL at a will. The teacher could get stuck at various levels of communication hence leading to uncoordinated learning in class.

4.7. Time Allocated for Science Subjects in Class

A question on time allocated for teaching science subjects, teachers and students were asked to state if they were comfortable with the time allocated for teaching/ learning science subject in class. Their responses were as shown in figure 4.13

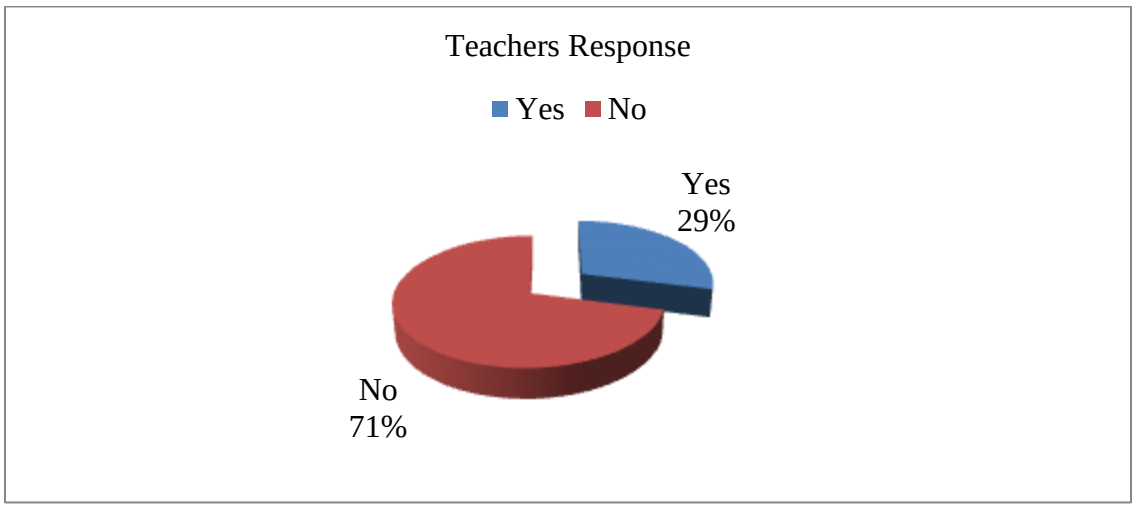


Figure 4.13 Teachers Responses on How Comfortable They Were With the Time Allocated for Teaching Sciences in Class

Twenty nine percent (29%) of teachers reported the time for teaching sciences was enough while 71% reported it was not enough.

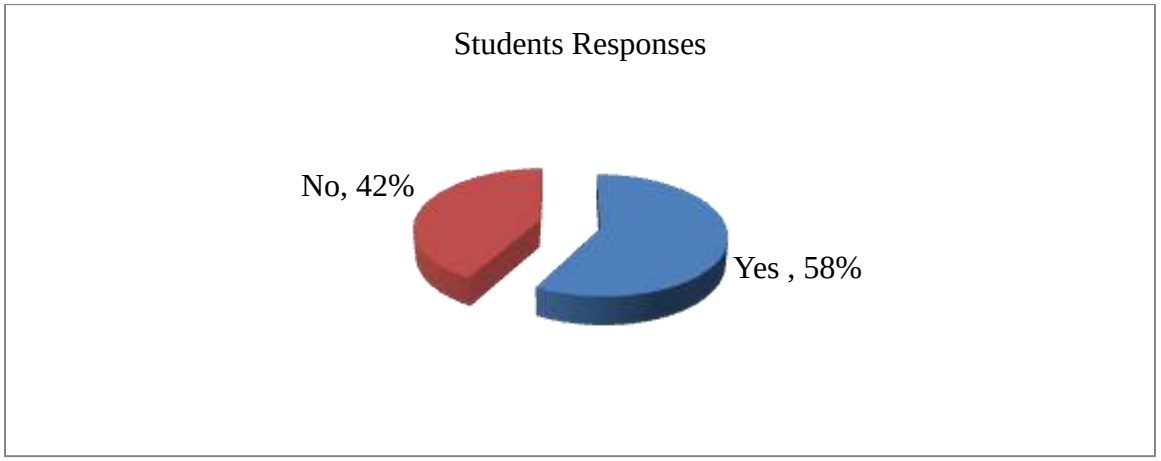


Figure 4.14 Students Responses on How Comfortable they were with the Time Allocated for Learning Sciences in Class

Fifty eight percent (58%) of the students reported the time was adequate while 42% reported it being inadequate.

Majority of teachers and interview with the principal reported the time was inadequate. This was further ascertained by the researchers' observation which revealed the time was inadequate. The bell for lessons could frequently ring before the teacher had done a summary of his/her teaching. This was attributed to broad syllabus and slow learning nature of deaf students. These findings agrees with Ayiela (2012), who observe that the curriculum time had not been flexible in terms of time, teaching, learning methodology and access, presentation and content. However, management of time was equally poor as teachers could leave for class five to ten minutes late and occasionally missed some lessons. These findings supports Patton, Polloway and Cronin (1990) survey of Special Education teachers on time management; they noted that among special educators who did teach science, nearly a half devoted less than 60 minutes a week to science instruction. Poor management of time in class coupled with failure to adapt the curriculum to be in line with the learning pace of deaf students may have played part to the current poor performance in sciences at Rev. Muhoro School.

Though learners' reported time being adequate, their responses may have been informed by the fact that, most of them had a negative attitude towards long hours in class as one teacher had attested when asked why he could not find any extra time to teach. The teacher stated that most of deaf learners had a bad attitude towards extra time. Observation in class equally revealed that, some students signalling the teacher to inform him/her the lesson time was over so that he could leave the class.

Teachers were asked to state their attitude towards science subjects in curriculum for deaf students. Their responses were as shown in figure 4.15

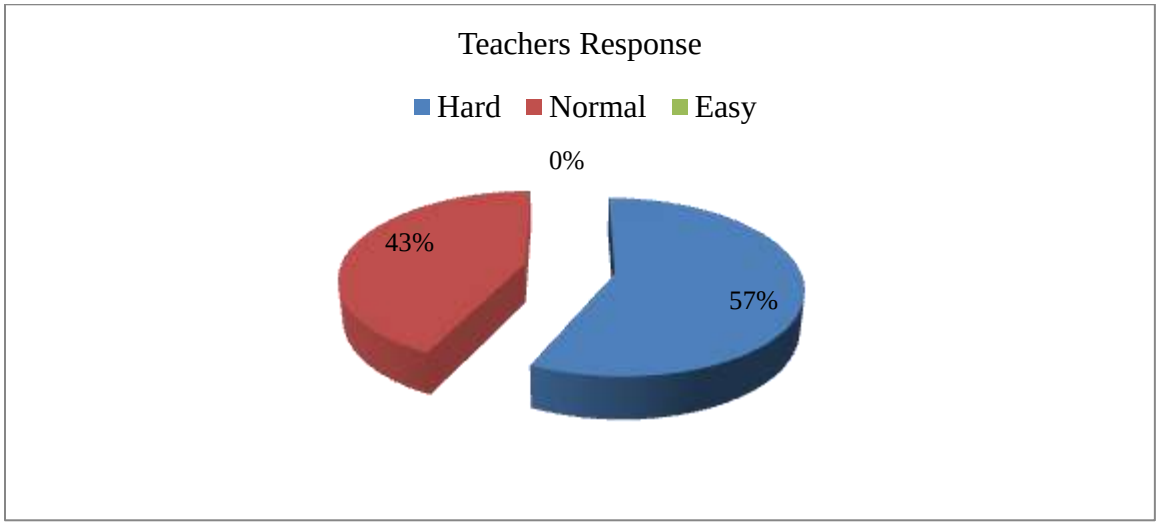


Figure 4.15: Teachers Attitude Towards Science Subjects in Curriculum

Fifty seven percent (57%) of teachers, reported sciences subjects were difficult for deaf learners while 43% felt they were normal as other subjects in curriculum. When students were asked to state their attitude towards science subjects in curriculum, their responses were as follows;

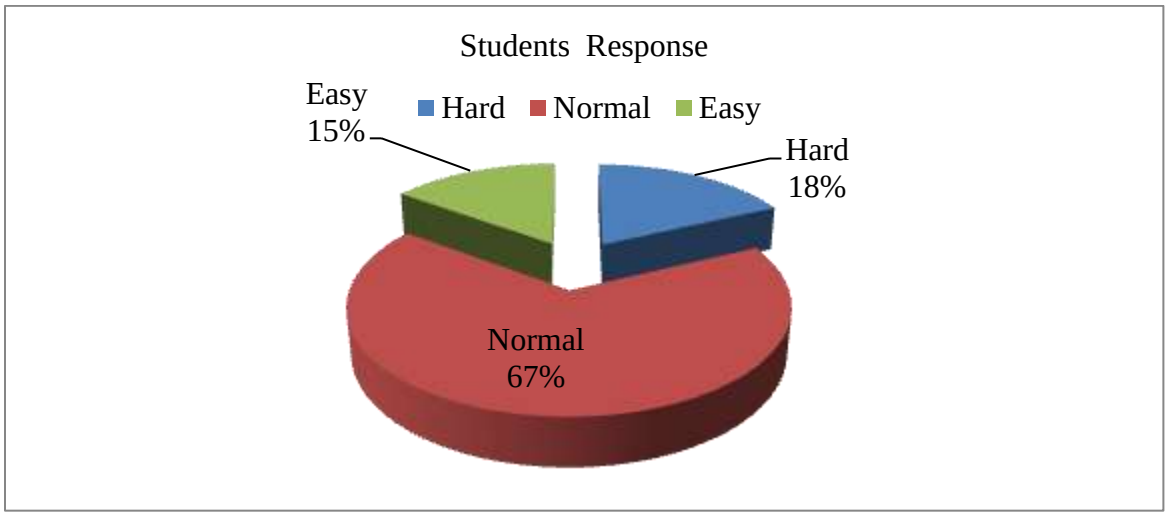


Figure 4.16: Students Attitude Towards Science Subjects in Curriculum

Eighteen percent (18%) of the students reported science subjects being hard, 67% being normal while 15% reported being easy.

Analysis of the results showed that majority of teachers believed science subjects were difficult for deaf learners. However, based on the findings, teachers' attitude may have been informed by the type of teaching methods, medium of instructions and failure to exhaustively use resources in teaching. This created insufficient understanding in class and hence poor performance. A teacher using Oral method in teaching, expecting deaf learners to follow instructions in class and excel in sciences just like their hearing peers, was comparable to a miracle. Though the deaf student held a positive attitude towards science subjects' teachers did not provide a conducive atmosphere to nurture this attitude. Interview with the principal revealed that the deaf students had the potential to excel in sciences if teachers adopted correct teaching methods, developed IEPs, used correct medium of instruction, teaching resources and proper time utilization in class. It is therefore imperative that teachers use all strategies at their disposal essentially important to the learning of science in class. This together with positive attitude, the performance in sciences at Rev. Muhoro was likely to improve.

Teachers were asked to state if they found extra time to teach apart from the normal one allocated for science lessons. Their responses were as shown in figure 4.17

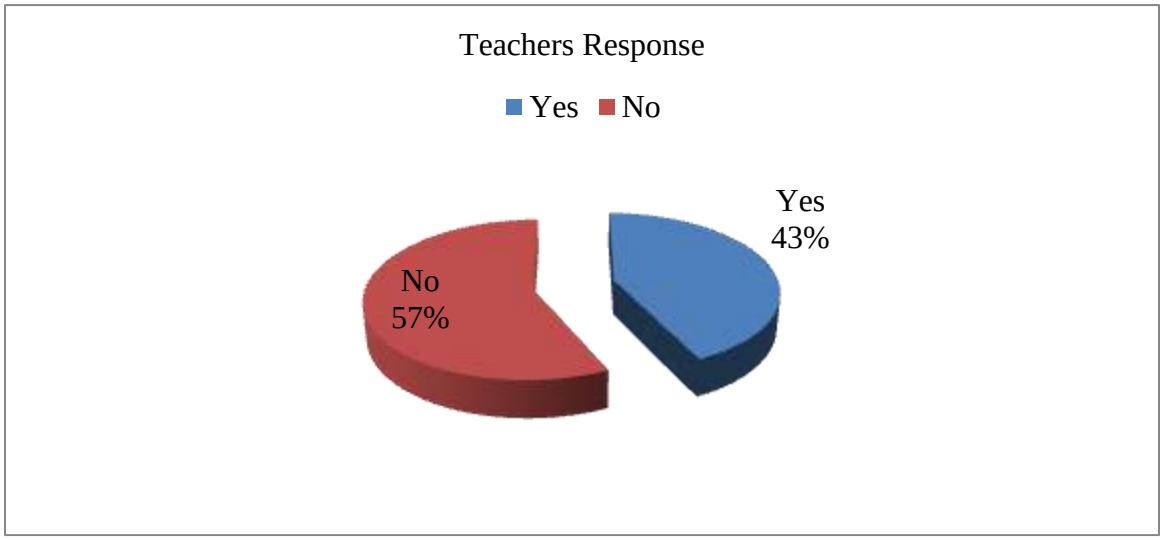


Figure 4.17: Teachers Responses on Whether They Find Any Extra Time to Teach Apart From the Time Allocated for Science Learning in Class

From the findings in figure 4.17, (57%) of teachers reported they did not find extra time to teach deaf students while 43% indicated that they did find time. Students were equally asked to state if they found any other time to study apart from the normal time of the lessons; their responses were shown in figure 4.18 as follows;

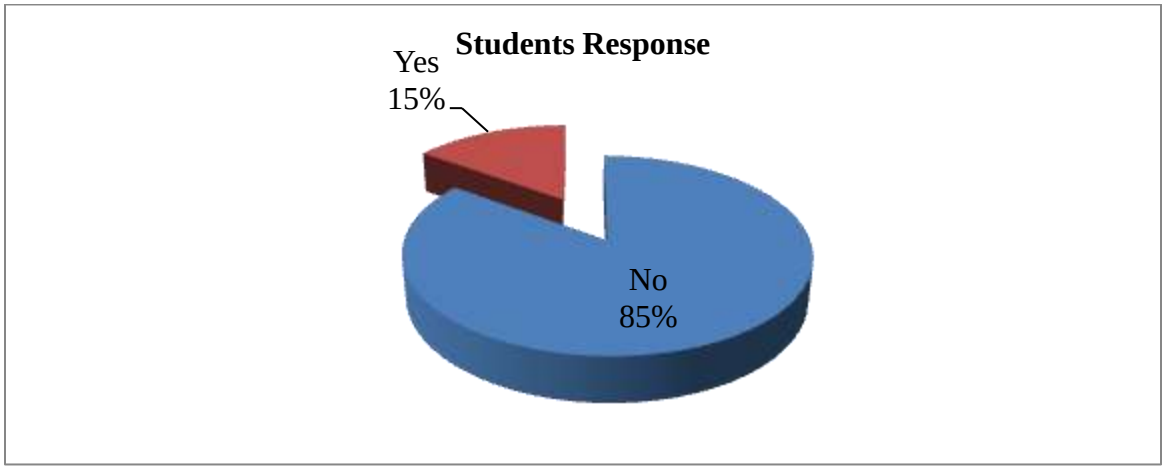


Figure 4.18: Students Responses on Whether They Found Extra Time to Study Apart From the Time Allocated for Learning Sciences

From the findings in figure 4.18, (85%) of students indicated that they did find time to study while 15% reported, they did not find.

Analysis of teachers' responses revealed majority (57%) did not find extra time to teach. When asked to state why they could not find time, 38% stated that the curriculum was broad, leaving little room for extra time, 18.5% stated that students had bad attitude towards extra time, while 18.5% indicated that, the school was boring hence they did not see the need to have extra time to assist learners. Interview with some teachers indicated that some had 30 lessons a week which left them overworked after the normal lessons hence found it hard to get extra time to help weak students.

Majority of the students (85%) reported they did not find time to study. Out of this percentage, (20%) reported, their perceived negative attitude towards their teacher made them not to study, twenty four percent (24%) indicated that the use of Oral language in Class led them not to comprehend what was being taught hence their negative attitude toward the subject, (11%) stated that the time for self directed study was inadequate as they were left with a lot of homework after learning time hence most of their free time was left for doing homework, 9% stated that they did not comprehend what they study on their own hence sit and wait attitude, 11% felt that, the time table was too congested to give room for private study while 10% indicated that the time for studying all the subjects was limited hence devoted the little available time to a few areas he/she could easily understand.

Findings revealed that, there was positive correlations between amounts of time spend on content coverage and performance in sciences. This concurs with UNESCO (2005) report which states that, there is consistent positive correlation between instructional time and students' achievement which even appears stronger in developing countries. The fact that the deaf students are slow learners revealed that, the time available for curriculum

coverage needed adjustment to assist the teachers to complete the syllabus effectively so that they do not hurry through the curriculum.

4.8 Teaching/ Learning Resources Used in Science Subjects for the Deaf Learners

Questions on resources used in teaching science subjects in class; teachers were asked to state how adequate they were using the following resources. Their responses were as follows in figure 4.19

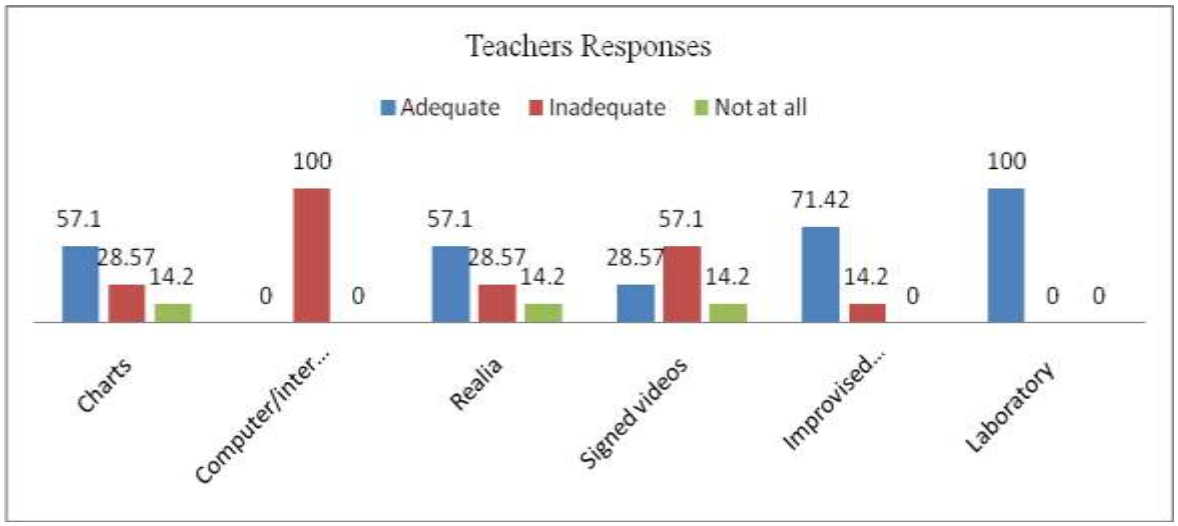


Figure 4.19: Teachers Responses on how adequately they were Using Resources in Teaching/ Learning Science in Class

Fifty seven point one percent (57.1%) of teachers reported using charts adequately when teaching, 28.57% used them inadequately while 14.2% did not use them. Zero percent-0% of teachers used Computer/ internet adequately, 100% inadequately while 0% did not use at all. Realia were adequately used by 57.1% of the teachers, 28.57% reported using them inadequately while 14.2% did not use them at all. Twenty eight percent (28.57%) of teachers reported using signed videos adequately, 57.1% reported to have used them inadequately while 14.2% did not use them at all. On improvised Objects; 71.42% reported to have used them adequately 14.2% used them inadequately while 0% not at all.

One hundred percent- 100% of the teachers reported to have used laboratory adequately, 0% inadequately while 0% not at all.

Students were similarly asked to state how adequate the following resources were being used in learning sciences in class. Their responses were as shown in figure 4.20

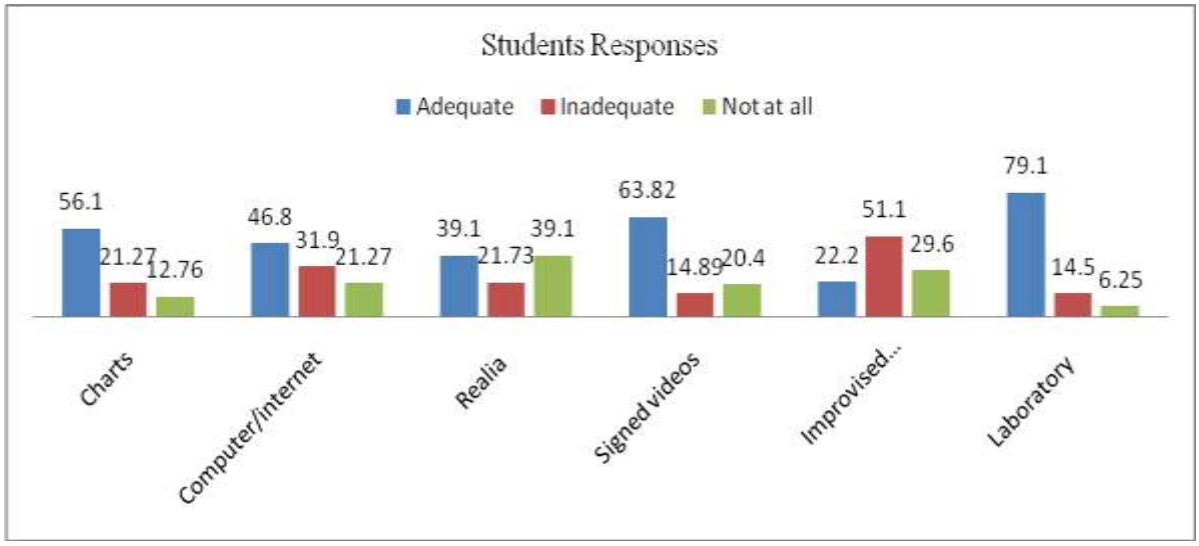


Figure 4.20: Students Responses on How Adequately Teachers Were Using the Following Resources in Teaching Sciences

Fifty six point one (56.1%) percent of students reported their teachers used charts adequately to teach sciences, 21.27% inadequately while 12.76% did not use them at all. On Computer use, 46.8% of students reported teachers used them adequately, 31.9% inadequately while 21.27 not at all. Thirty nine percent (39.9%) of students reported teachers used realia in teaching adequately, 21.73% inadequately while 39.1% not at all. On Signed videos, 63.82% reported teachers used them adequately, 14.89% inadequately while 20.4% not at all. On improvised resources, 22.2% of students reported teachers used them adequately, 51.1% inadequately while 26.6% not at all. On laboratory, 79.1% reported teachers used them adequately, 14.5% inadequately, 6.25% not at all.

Findings from teachers revealed that computer and signed videos were inadequately used while findings from students revealed that Computer, realia and improvised resources were inadequately used. Interview with the teachers revealed that, most of them had inadequate skills in computer operating system. Thirty one point nine percent (31.9%) stated that the school did not have internet even though, it had been connected with internet cables. Twenty one point two seven (21.27%) reported, that the computer room was always under lock and essentially used by computer teacher and examination section in school hence they found it difficult to exploit any opportunity to do with Multimedia resources due to these constraints. Given that learning science is becoming a 21st century innovation which requires use of computers, this may have been one of the major factors contributing to poor performance in sciences. Bishop (1986) echoes the same sentiments when he asserts that unless there was a ready and continuous supply of teaching/ learning equipment and adequate support services, any innovation introduced in curriculum will be a passing fancy.

On the use of signed videos in learning, interview with the teachers revealed videos for science teaching were not available in school, though interview with the principal revealed that, the school had audiovisual materials for learning. This low use may have been due to unavailability of standard videos required by the teachers to use or the fact that these audiovisual dealt with computer operating system and some teachers did not have adequate skills in operating them. Those with skills in computer operating however revealed that, the computer room was always under lock and when opened, it was being used by computer teacher to teach computer studies hence they found it difficult to use the lab.

Responses from students revealed that, relia and improvised objects were used by teachers inadequately. Observation in class equally supported these views. Most teachers handled science classes as if resources were not around and what was not available, no effort was made to improvise. This may have been attributed to lack of knowledge in improvisation and teachers' negative attitude on resources utilization in teaching. However, both teachers and students were anonymous that, laboratory was the most adequately available and used resource. This was evident as the school had well stocked laboratory where practicals were done. Teachers were encouraged by this gesture hence took advantage to help the students convert theory into practice. Findings generally showed there was positive correlation between resources use and understanding sciences in class. Teachers were again asked to state how students were likely to understand their teaching when the following resources were used in class. Their responses were as shown in figure 4.21

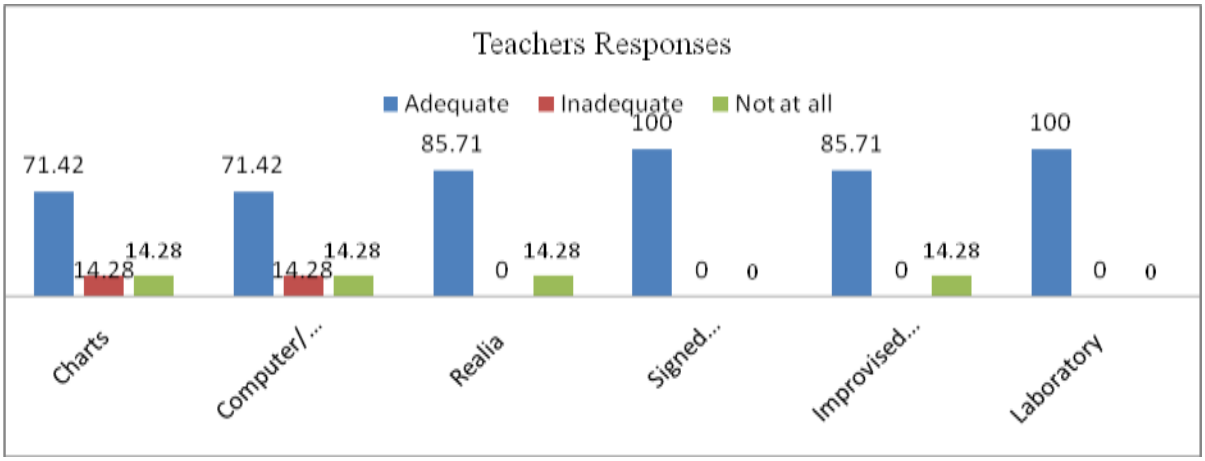


Figure 4.21: Teachers Responses on how Students are Likely to Understand their Teaching When the Following Resources are Used in Class.

Seventy one point four two percent (71.42%) of teachers reported that when charts were used, students were likely to understand science adequately, 14.28% inadequately while 14.28 not at all. When computer/ internet were used, 71.42% reports students were likely

to understand science adequately, 14.28% inadequately while 14.28% not at all. When realia were used, 85.71% were likely to understand adequately, 0% inadequately while 14.28 not at all. When signed videos were used 100% would understand science adequately 0% inadequately and 0% not at all. When improvised resources were used, 85.71% were likely to understand science adequately, 0% inadequately while 14.28% not at all. When laboratory was used, 100% would understand science adequately, 0% inadequately while 0% not at all.

Students were similarly asked to state how adequate they were likely to understand science in class when the following resources were used. Their responses were as shown in figure 4.22

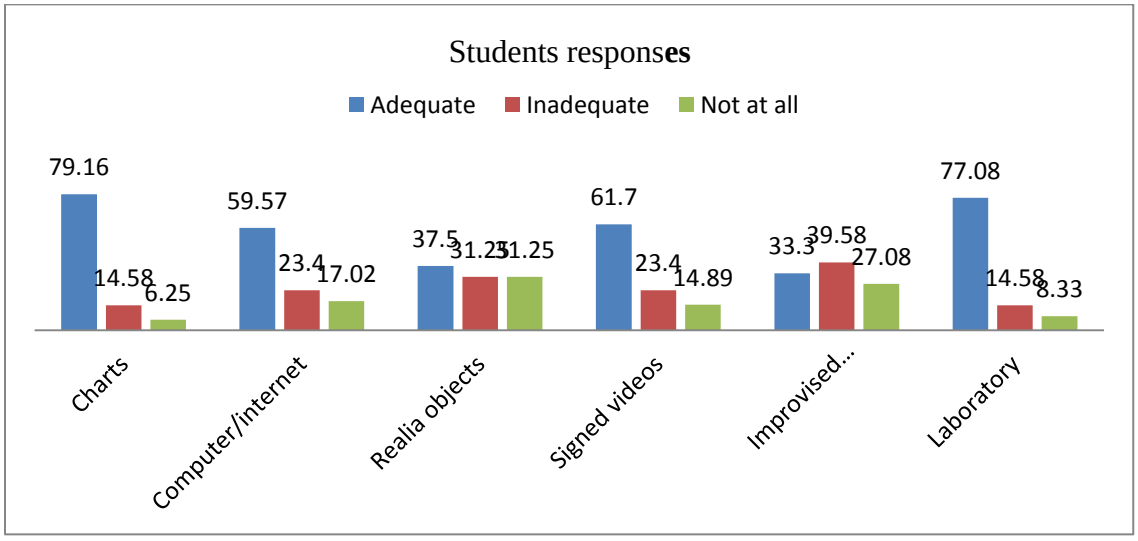


Figure 4.22: Students Responses on how they Were Likely to Understand Science When the Following Resources Were Used

Seventy nine point one six percent (79.16%) of students reported that, when charts were used, they were likely to understand science adequately, 14.58% inadequately while 6.25% not at all. When computer/ internet were used 59.57% reported they were likely to understand science adequately, 23.4% inadequately while 17.02% not at all. When realia

were used, 37.5% reported to understand science adequately, 31.25% inadequately while 31.25% not at all. When signed videos were used, 61.7% reported to understand science adequately 23.4% inadequately and 14.89% not at all. When improvised resources were used, 33.3% are likely to understand science adequately, 39.58% inadequately while 27.08% not at all. When laboratory was used, 77.08% are reported to understand science adequately, 14.58% inadequately while 8.33% not at all.

Teachers were anonymous that resources when used in science class, students were likely to understand science subjects well. These findings agrees with Omuthani (2012) who observes that, instructional materials such as diagrams, pictures, graphs and flow charts are very essential in the teaching and learning of hearing impaired learners as they reduce language and reading demands. Similarly these findings concur with Hannon and D'Netto (2007) study on the use of multimedia resources in learning science in Australia. In their study, they surveyed 241 online students with the purpose of finding out if learners from different cultural background would find online environments culturally inclusive in terms of engagement with the content and with the learning and teaching environment. Their findings indicated that, there was no significant difference between Australian students and non-native Australian students. They concluded that, the use of multimedia resources in learning sciences availed a multitude of opportunity to students in class. For example, a student could view lectured content which may have been spoken and signed in multimedia presentation at their own convenient and repetitively thus making easy for many learners to master the concept taught in class

Even though some students felt realia and improvised resources were not much required for them to understand sciences well, their responses may have been informed by the fact

that most of them did not understand well the meaning of the term improvised resources hence resorted to their convenient way of responding to the question. Such resolution was reached by the researcher in that, during learning students were asking meaning of almost everything the teacher was writing on the chalk board and hence the term may have been misunderstood by many. Interview with the principal revealed that resources were important in learning science subjects as they enabled learners to connect classroom teaching to real life situation.

Observations in class however, revealed that, most of teaching resources such as charts, videos, computer/ internet and improvised resources remained underutilized. This underutilization remained a key factor to poor performance in sciences. These findings support Ajileye (2006) who states that, insufficient resources for teaching science constitute a major cause of students' underachievement. Bloom (1994) equally noted that, blame for failure in classroom rests on poor classroom practices and not in ability of students to learn.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The chapter presents a summary of research findings, conclusions, recommendations for implementation and suggestions for further research.

5.1 Summary of Research Findings

The study sought to analyze teaching strategies used by teachers teaching science subjects and their contribution on students' performance in science subjects. The study used descriptive Case study design with qualitative and quantitative data collection strategies. The study was conducted at Rev. Muhoro Secondary School for the Deaf in Mukurwe-ini Sub-County, Nyeri County of Kenya. Findings are as follows:

5.1.1 Teaching Methods Teachers Use on Deaf Learners in A science Class

The study revealed that, learner-centered method was the best teaching method in science classroom. It was noted that, this method allowed learners unlimited time to interact with the learning materials and to learn at a pace that allowed for timely intervention. Finding further revealed that, most teachers were using teacher-learner-centered method in their teaching. According to observation done in class, the method engaged learners passively in the learning process. Most learners believed the teacher was the sole knowledge owner and hence could not reason to find out a solution even to a simple task in class. They constantly kept on asking the signs for almost everything the teacher was writing on the board. This was a clear indication that they did not comprehend the meaning of the terms. If they were not asking the teacher, they were asking their friends and this created insufficient vocabulary to what was being taught in class. This further slowed the

learning pace as the teacher could only teach part of what had been planned for the lesson hence affecting syllabus coverage.

5.1.2 Extent to Which Teachers Incorporated IEP in Teaching Science Subjects in Class.

The study found out that, even though most teachers maintained higher standards of academic learning, most of them were not using IEP in their teaching as there was no file in school to support its existence. It was noted that most teachers did not comprehend the meaning of IEP and the format of writing it. Observation in teaching trends showed that most teachers instead of using IEP, they engaged in class procedures as marking of exercise books, follow-up on students' corrections in class and doing revision of continuous assessment tests. This lack of understanding on planning and using of IEP had made students who required IEP to lag behind in sciences. Equally students seemed not to comprehend it. This was a clear indication that IEP was not being used in school.

5.1.3 Medium of Instruction Used in Communicating Science Knowledge to Learners in Class.

Findings revealed that, although varieties of communication approaches were being used by teachers, which were not limited to Sign Language, SEE, Bilingual Communication, Code Switching and Oral Communication, more than half of teachers were not fluent in Sign Language, Code Switching and Bilingual Communication approaches. Many teachers exhibited insufficient expressive and receptive skills. Even though a few of them occasionally engaged learners in learning science using Sign Language, signing was characterized by long pulling of KSL format to fit in the Oral teaching in which at times left most of the learners confused and laughing among themselves on what the teacher was teaching. Problems in signing equally made it difficult for teachers to switch from

SEE to KSL at will. The teacher could get stuck at various levels of communication hence affecting communication channel leading to insufficient information to learners. Teaching at many levels was Oral based and thus learners had to depend on lip and speech reading and occasional teacher writing on the board as part of explanation. This in many instances affected students understanding in class which resulted in uncoordinated learning.

5.1.4 Teaching Methods Used In Utilizing Time Allocated for Science Subjects in Class

The study found out that some teachers missed classes; some deliberately went to Class late. This left learners' to do what they viewed best for themselves at the time. Sometimes, the teacher arrived in class and to his or her surprise was told the lesson was over. Analysis of teacher lesson attendance revealed, more than two lessons could go untaught every week. While missing a lesson or being late for class had to have a good reason, observation revealed that this was done deliberately by teachers. This time was spent on storytelling and making fun in the office. Even though, the school principal had the attendance sheet for monitoring absenteeism in class attendance, the sheets served nothing concrete other than filling.

The study also revealed that most teachers could not find extra time to teach learners outside the normal time. When asked the reason why they could not find extra time, some responded by saying that, the school was boring for them to be in while others stated that the curriculum was broad and hence it was difficult for them to get time to spend with the students in class after normal teaching as they were left exhausted. Even though these were some of the reasons advanced, observation revealed that any extra time expended for helping the learners, attracted a fee.

5.1.5 Teaching/ Learning Resources Used in Science Subjects for the Deaf Learners

Findings revealed that all resources were essential to the greater understanding of science subjects in class. Observation revealed that laboratory remained the most utilized resource in school. Although there were variety charts, computers most of them remained underutilized in the learning of science subjects. Many charts hanging in classes and laboratory had been left to gather dust. Computer underutilization was attributed to high traffic use by examination section and computer teacher. However when these functions were not running, the computer remained under lock. This denied science teachers opportunity to use them in teaching. However some teachers equally reported lacking essential skills in operating the computer hence could not exploit them in science learning. This was a sign that they were rarely used. This underutilization had negative bearing on students' motivation and general performance.

5.2 Other Relevant Findings

5.2.1 Changing of Teachers

The study findings revealed that there was rapid changing of teachers during the academic year. The students reported that, they were taught by different teachers in a period of one year. Sometimes this was marked by delays in getting the teacher to pick up from where the previous teacher had left. Furthermore, most of the new teachers had trained in regular/ general education hence they did not have Sign Language skills to enable them have smooth interaction with the deaf students. This resulted in lack of understanding, poor syllabus coverage and generally poor performance in sciences at Kenya Certificate of Secondary Education (KCSE).

5.2.2 Teaching Load

Most teachers reported having workload equal to the teachers teaching hearing students. While the Law requires teachers teaching in special schools to have a workload of 16 lessons in a week, some reported having 30 lessons or more in a week, an average of seven lessons in a day. This left many exhausted due to signing and intensive chalkboard writing hence could not get extra time to assist in remedial teaching and afternoon classes.

5.3 Conclusion

From the summary of the findings given in Section 5.1, it can be concluded that, teaching strategies at Rev. Muhoro School have an impact on the performance in sciences in KCSE as follows;

Findings revealed that majority of the teachers were using teacher-learner-centered method inspite of them knowing that learner-centered was the best method in teaching science subjects. This had made teachers to hold views that, science subjects were difficult for deaf learners. These blanket condemnations had led teachers to adopt experimental teaching approaches which were recipe for failures in science class as they made learners adopt passive learning approach in classroom.

On the use of IEP it was noted that many teachers though maintained higher academic aspirations for their students, there was no record to support existence of an IEP in school as the Law requires. This had made many learners with special needs who required IEP to lag behind hence creating a gap in performance in sciences in national examinations. It's therefore important that teachers be trained on IEP preparation and be encouraged to use it in monitoring students performance in class and giving the necessary intervention.

On medium of instruction, findings revealed that virtually all communication methods in classroom were preferred by all the participants except Oral where participant felt it was not the correct medium of instruction in science class. However, observation in class revealed that many teachers had difficulties in using KSL, Code Switching and Bilingual Communication. This had made it difficult for teachers to have a smooth interaction with the students in class. The net effect of this was poor performance in sciences in KCSE. Teachers should therefore be exposed on in-service programs to enable them have skills in Total Communication as a philosophy for teaching deaf learners.

Finally, findings indicated that teachers were not adequately utilizing computer/ internet, charts, and videos in science class which were some of the methods that could enhance online learning, a modern approach to 21st century learning. This lack of resources utilization had affected the learners' motivation and overall understanding of science concepts in class. This low motivation had in-turn created a gap in performance in sciences at KCSE.

5.4 Recommendations of the Study

The study recommends that:-

1) Ministry of Education Science and Technology (MoEST) in conjunction with Quality Assurance and Standard Officers (QUASO) should intensify inspection of schools for the deaf to ensure that teachers were using correct teaching methods that allowed learners to occupy an active role in the learning environment

2) There is need for intensive immersion of teachers on IEP preparation which may include organizing in-service teachers training Courses on IEP development. This

should be facilitated by MoEST in conjunction with Kenya Institute of Special Education (KISE) and any University offering Special Needs Education.

3) Teachers Service Commission in conjunction with the Ministry of Education Science and Technology should only post teachers who have trained in Special Needs Education and understand the learning psychology of deaf learners.
4) There is need for coordinated efforts between KICD and Special Education stakeholders to work together in adapting science curriculum comprehensively to be in line with the learning pace of deaf students.
5) Teachers Service Commission should ensure that Rev. Muhoro Secondary School is staffed well. There is need to balance students-teachers ratio to avoid teachers getting overworked making it difficult for them to put some extra time to help weak learners.
6) The Ministry of Education Science and Technology in partnership with KISE and Universities offering Special Needs Education should organize relevant in-service training programs for all teachers in special schools where they can be sensitized on instructional materials that enhance learning in deaf schools.
7) The Ministry of Education Sciences and Technology should intensify SMASSE inset to train teachers on how to use and improvise the limited available resources in classroom
8) The Ministry of Education Science and Technology in collaboration with the school should improve infrastructure for computer in school to avoid the current scenario where a teacher cannot access a computer room due to other functions going on.
9) The Quality Assurance and Standard officers in Ministry of Education should step up inspection of schools for the deaf to ensure that they were using resources in teaching sciences subjects.

5.5 Suggestions for Further Research

1. The study was carried out in one school for the deaf. Further research can be done in all other schools to establish how the teaching strategies are affecting performance in sciences. Informed by the fact that this was a case study and hence need to find out the current situation in other schools
2. There is need to carry out research on effect of English language competence on performance of students with deafness in sciences. Informed by the fact that a student could ask the teachers the meaning of water which was a simple term a primary student should be aware of.

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APPENDICES

APPENDIX I : STUDENTS QUESTIONNAIRE

My name is Fredrick Naminde Kangu a Masters of Education Student at Kenyatta University. I am carrying out a study on ***Teaching Strategies on Performance in Science Subjects at Rev. Muhoro Secondary School for the Deaf***. You have been selected as a respondent in this study as your role as a science student. Based on your experience and knowledge please provide your views pertaining to the study. I assure you that the information you provide will solely be used for academic purposes and will be treated with utmost confidentiality. Thank you for your anticipated participation.

A. Background Information

1. Gender Male ( ) Female ( ) **(Tick where appropriate)**

2. Class……..

3. When did you become deaf? **(Tick where appropriate)**

Was born deaf ( )
Less than one year ( )
Between the age of 1-5 years ( )
After the Age of 5 years ( )

4. Which one was your first medium of instruction from birth?

Oral communication ( )
Sign language ( )

5. In secondary school; tick some of the subjects you are studying.

1. Biology ( ) 2. Chemistry ( ) 3. Physics ( )

B) Teaching Strategies

6. a) When do you enjoy studying science subjects?

When on my own ( )
When guided by the teacher ( )
When in a group ( )
Other; specify……..…….……

b) Which teaching strategy is frequently used by your teacher when learning? **(Tick where appropriate)**

Teaching strategy	Leaner centered	Teacher centered	Teacher-learner centered
Biology			
Chemistry			
Physics			

c) On a scale of four rates how much you understand when the teacher uses

Teaching strategy	A lot	Little	Nothing
Teacher centered	( )	( )	( )
Learner centered	( )	( )	( )
Both Teacher – Learner centered	( )	( )	( )

C) Medium of instruction

6. Indicates in the table on how much you enjoy learning science when the following methods of instructions are used in class: **(Tick where appropriate)**

Medium of instruction	Very much	Much	Undecided	A little	Not at all
Oral					
Sign language					
Bilingual					
Code switching					
Sign Exact English					

E) Teaching resources

7. Indicate how adequate teachers use the following teaching resources in Class: **(Tick where appropriate)**

Resources	Very adequate	Adequate	Undecided	In Adequate	Not at all
Charts					
Computer/internet					
Realia objects					
Signed Videos					
Improvised resources					
Laboratory					

8. a) To what extent do you follow and understand in class when the teacher uses;

Resources	Very adequate	Adequate	Undecided	Inadequate	Not at all
Charts					
Computer/internet					
Realia objects					
Signed Videos					
Improvised resources					
Laboratory					

F) Time on content coverage

b) Are you comfortable with the time allocated for science learning in class? **(Tick where appropriate)**

Yes ( ) No ( )

i) If your answer is **NO** why?

……

9. a) What is your attitude towards science subjects in curriculum

Hard ( ) Normal ( ) Easy ( )

b) A part from the time allocated for science learning; do you find any other time to study science subjects?

Yes ( ) No ( )

If your answer is No; state some of the reasons why you don't find time to study.

……..…….……

……..……

G) IEP- To monitor learners' performance

10. a) Do you have an IEP?

Yes ( ) No ( )

If your answer is **YES**; move to (b) if **NO**, then leave out all the questions in this whole section

b) How often do you discuss with your teacher on your progress in sciences?

Timeframe of discussion	Always	Seldom	Undecided	None
After every science learning				
After every CAT				
At the end of the term				
During Academic clinic				
During IEP review				

11. From the time you started discussing your IEP with your teacher, how much have you seen yourself improving in sciences in terms of performance?

A lot of improvement ( ) Nothing ( )

Don't know ( ) Little ( )

Thank you for your participation

APPENDIX II : TEACHERS QUESTIONNAIRE

My name is Fredrick Naminde kangu, a Masters of education student at Kenyatta University. I am carrying out a study on ***Teaching Strategies on Performance in Science Subjects at Rev. Muhoro Secondary School for the Deaf***. You have been selected as a respondent in this study as your role as a science teacher. Based on your experience and knowledge please provide your views pertaining to this study. I assure you that; the information you provide will be used solely for this academic purpose and will be treated with utmost confidentiality. Thank you for your anticipated participation.

A. Background Information

1. Gender Male ( ) Female ( ) **(Tick where appropriate)**

2. What is your qualification?

Diploma in Special Needs ( )

Diploma in Education (Science) ( )

BED Special Needs Education (Science Option) ( )

BED (Science) ( )

Other (please specify)……

3. Which other training have received?

Kenya Sign Language ( ) SMASSE ( ) Exams marking skills ( ) Nothing ( )

4. How many years of teaching experience do you have?

0-2 years ( ) 3-5 years ( ) 6-9 years ( ) 10+ years ( )

B) Teaching Method

5. a) Which teaching method do you employ in science class

Teacher centered ( ) Learner centered ( ) Teacher and learner centered ( )

b) Give reason for your choices above.

……

c) Which Method do you prefer in class when teaching the following areas? **(Tick where appropriate)**

Teaching strategy	Learner centered	Teacher centered	Teacher+ Learner centered
When doing practicals			
When explaining concepts			
When doing revision			
When demonstrating			

d) On a scale of three, rate Students' ability to grasp science information when you use the following teaching strategies

Teaching strategy	**1. A lot**	**2. Little**	**3 Nothing**
Teacher centered	( )	( )	( )
Learner centered	( )	( )	( )
Teacher – Learner centered	( )	( )	( )

C) Medium of instruction

6. a) How many years do have working as a science teacher of the deaf learners?

0-2 years ( ) 3-5 years ( ) 6-9 years ( ) 10+ years ( )

b) Which sciences subjects do you teach?

1. Biology ( ) 2. Chemistry ( ) 3. Physics ( )

Other (Please specify……..…….

c) Which class do you teach? **(Tick where appropriate)**

Form 1 ( ) Form 2 ( )

Form 3 ( ) Form 4 ( )

d) Which medium of instruction do you usually use in class when teaching science? (**Tick where appropriate)**

Kenya Sign Language ( ) Spoken English ( )

Sign Exact English (Manual Coded English ( ) Written English ( )

e) How can you classify your Kenya Sign Language skills to communicate with learners who are deaf? (**Tick where appropriate)**

Beginner ( ) Intermediate ( ) Advanced ( )

f) How do you rate your communication skills in KSL when teaching science subject(s) based on the above parameters?

Excellent ( ) Good ( ) Satisfactory ( ) Fair ( ) Not sure ( )

7. a) Indicates in the table below how much you think your classmates enjoy science when the following modes of communications are used: **(Tick where appropriate)**

Communication approach	Very much	Much	Undecided	A little	Not at all
Oral					
Sign language					
Bilingual					
Code switching					
Sign Exact English					

b) Briefly explains why students understand the medium you have chosen but do not follow when others are used if any

……

…….

(**E) Teaching resources**

8. a) How often do you use the following teaching resources in teaching your subject area in Class: **(Tick where appropriate)**

Resources	Very adequate	Adequate	Undecided	Inadequate	Not at all
Charts					
Computer/internet					
Realia objects					
Signed Videos					
Improvise resources					
Laboratory					

b) How much are students likely to understand your teaching when the resources you have stated in (7a) above are used in class.

Resources	Very adequate	Adequate	Undecided Inadequate	Inadequate Not at all	Not at all
Charts					
Computer/internet					
Realia objects					
Signed Videos					
Improvise objects					
Laboratory					

c) Do you use any other materials to increase student interest in learning and understanding sciences concepts in class?

Yes ( ) No ( )

d) If your answer is 'Yes' specify briefly and state how this is beneficial to deaf students in class

…….……

Time on content coverage

8. a) Are you comfortable with the time allocated for science learning in class? **(Tick where appropriate)**

Yes ( ) No ( )

b) If your answer is 'No' why?

……..

9 a) what is your attitude towards science subjects in curriculum to deaf learners

Hard ( ) Normal ( ) Easy ( )

b) A part from the time allocated for science learning; do you find any other time to teach students in class?

Yes ( ) No ( )

c) If your answer is 'NO' state some of the reasons why you don't find time to teach.

……

IEP- To monitor learners' performance

10. a) Do you plan IEP for your students in class?

Yes ( ) NO ( )

(If your answer is **YES**; move to (b) if **NO**, then leave all the questions in this section)

b) How often do you discuss with your students on their progress in science class?

Timeframe of discussion	Always	Seldom	Undecided	None
After every teaching				
After every CAT				
At the end of the term				
During academic clinic				
During IEP review				

11. a) From the time you started discussing your IEP with your student, how much has this resulted in improvement in performance in your subject area?

A lot of improvement ( ) Little ( )

Nothing ( ) Don't know ( )

b) Feel free to add any other information you think is beneficial to this study but has not been noted here.

……..……..…

Thank you for your participation

APPENDIX III: PRINCIPALS QUESTIONNAIRES

My name is Fredrick Naminde kangu a Masters of education student at Kenyatta University. I am carrying out a study on ***Teaching Strategies on Performance in Science Subjects at Rev. Muhoro Secondary School for the Deaf***. You have been selected as a respondent in this study as your role as principal. Based on your experience and knowledge please provide your views pertaining to this study. I assure you that; the information you provide will be used solely for academic purposes and will be treated with utmost confidentiality. Thank you for your anticipated participation.

1. How have sciences subjects been performing in your school for the past five years?……..……

2. a) There has been generally poor performance in sciences in many secondary schools for the deaf. Does your school shares in this performance?

.....……..……

b) If 'Yes' then what do you think has been the causes of this poor performance and how can we correct this trend?..... **.....**

4. a) Does your school have IEP to monitor learners performance in sciences?

.....

b) If 'Yes' do you think this program should be encouraged in the learning of science subjects in schools for the deaf and why? ……..

6. a) Which one is the medium of instruction that is being used in learning sciences in your school? **.....**

b) There have been negative attributes on the use of KSL in curriculum for learners who are deaf; do you agree with these attributes? ……**...**…….

c) If 'Yes' briefly explain why? ……**.....**

7. a) Many researchers have recommended learner centered approach in learning sciences. In your own opinion does this also apply in deaf schools?

……..….…….

b) If 'Yes' briefly explain your opinion?

…….……..……..…..**...**……

……

8. a) There has been some assertion that the curriculum being followed by deaf learners is centrality and rigid leaving no room for enough time for learning. Do you agree with this? ……..……..……...

b) How has this affected science learning in your school?

……..……..**.....**

c) What will you recommend to be the amount of time students need per lesson on science instruction in class?

……

9. a) What are some of the resource available in your school used in learning science subjects in your school?

……

b) Do you think the use of resources in learning sciences increases understanding of science concepts in class?

……

c) Many researchers argue that there is positive correlation between the uses of resources particularly multimedia on performance. How is your school utilizing the use of computer internet and signed videos to fulfill this?

……

10. Feel free to add any other information you think is beneficial to this study but has not been noted here.

……

Thank you for your participation

APPENDIX IV: OBSERVATION SCHEDULE

1. What are the teachings approaches being used in Class?
2. How are the above approaches engaging learners in science Class?
3. What are the teaching resources being used in Class
4. How are they engaging learners in the learning process?
5. What kind of IEP is being used in Class?
6. Does it agree with the special education Policy on IEP preparation?
7. Is there any improvement noted as a result of its use in Class?
8. What are the communication methods being used in Class?
9. How do these methods facilitate the achievement of sciences goals?

APPENDIX V: THE BUDGET

A) ITEMS (Stationary)	**Quantity**	**@**	**Cost in Kshs.**
Pens	10Pcs		100
Pencils	5Pcs	40	200
Rubber	2	40	80
Flash disk	2	500	1,000
Typing papers	10	500	5,000
Sub-Total			**6,380**
B) TRAVELLING EXPENSES	**Quantity**	**@**	**Cost in Kshs.**
Transport			15,000
Administering questionnaires			10,000
Lunch @ 1000 per day(10 days)			10,000
Sub-Total			**35,000**
C) SECRETARIAL SERVICES	**Quantity**	**@**	**Cost in Kshs.**
Field survey ksh 6000			6,000
Research proposal typing, printing and binding			12,000
Researching, typing, printing, binding and final report			20,0000
Photocopying questionnaires			3,000
Sub-Total			**41,000**
D) COMMUNICATION SERVICES	**Quantity**	**@**	**Cost in Kshs.**
Telephone services			2,000
Miscellaneous expenses			5,000
GRAND TOTAL			**82,380**

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION
OF
NATIONAL GOVERNMENT

E mail: mkmulatia@yahoo.com
Telephone: 061 2030679/20
Fax: 061 2032089
When replying please quote

COUNTY COMMISSIONER
NYERI COUNTY
P.O. Box 33-10100
NYERI

Ref. No. ADM 1/57 VOL II/122 **16th October, 2014**

Fredrick N. Kangu
P.O. Box 278
MUKURWE-INI

RE: RESEARCH AUTHORIZATION
FREDRICK N. KANGU

Reference is made to your letter dated 16th October 2014.

The approval is therefore granted to carry your research in Rev. Muhoro Secondary School for the deaf in Nyeri County on ***"An analysis of teaching strategies on performance in Sciences"***

You are further advised to liaise with the institution's Management for the necessary assistance and support.

The period of research ends on 31st December, 2015.

MAWIRA L. MUNGANIA
FOR: COUNTY COMMISSIONER
NYERI COUNTY

/ew

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 254-20-2213171,
2241349,3310571,2219420
Fax +254-20-318245, 318249
Email:secretary@nacosti.go.ke
Website:www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI KENYA

Ref: No.

Date:

1st September, 2014

NACOSTI/P/14/7995/3235

Fredrick Nanninde Kangu
Kenyatta University
P.O. Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"An analysis of teaching strategies on performance in sciences: A case of Rev. Muhoro Secondary School for the deaf; Nyeri County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nyeri County** for a period ending **31st December, 2015.**

You are advised to report to **the County Commissioner and the County Director of Education, Nyeri County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

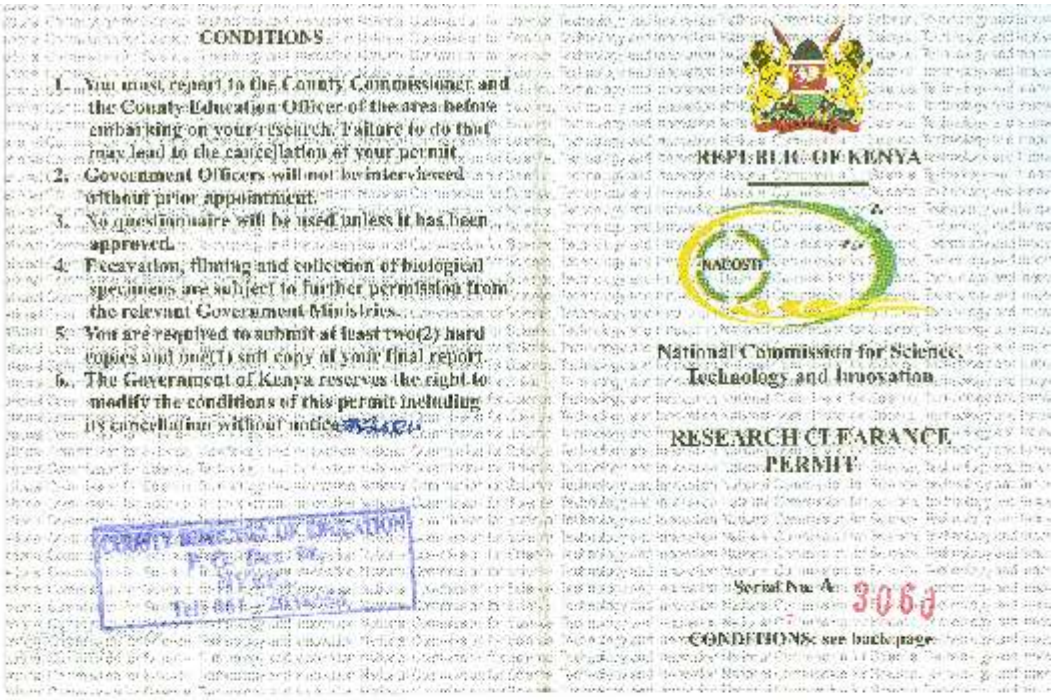
DR. S. K. LANGAT, OGW
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
The County Director of Education
Nyeri County.

Authority granted
16/10/14
COE - nyeri

COUNTY DIRECTOR OF EDUCATION
P. O. Box 30,
NYERI.
Tel: 061 - 2030658



CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 3063

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MR. FREDRICK NAMINDE KANGU
of KENYATTA UNIVERSITY, 60-50101
Butere,has been permitted to conduct
research in *Nyeri County*

on the topic: *AN ANALYSIS OF TEACHING STRATEGIES ON PERFORMANCE IN SCIENCES: A CASE OF REV. MUHORO SECONDARY SCHOOL FOR THE DEAF, NYERI COUNTY, KENYA*

for the period ending:
31st December,2015

.....
Applicant's
Signature

Permit No : NACOSTI/P/14/7995/3235
Date Of Issue : 1st September,2014
Fee Recieved :Ksh 1,000

.....
Secretary
National Commission for Science,
Technology & Innovation