INFLUENCE OF TEACHING RESOURCES ON DEAF STUDENTS' ACADEMIC PERFORMANCE IN SCIENCES AT NGALA SCHOOL FOR THE DEAF, NAKURU COUNTY, KENYA

Geoffrey Mienda Okeng'o[1], [2]Caren Kikwai
[1]geoffreymienda@yahoo.com, [2]carenkikwai@gmail.com
[1]Department of Education, Moi University
[2]Biological Sciences Department, University of Eldoret

Abstract
The study sought to determine the influence of teaching resources on deaf students' academic performance in sciences at Ngala School for the Deaf, Nakuru County, Kenya. The study used a descriptive case study design. The target population is 472 respondents at Ngala secondary school of the deaf. Quantitative data was presented using percentages, frequency tables and charts. The study found out that the 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. Some teachers lacked essential skills in operating the computer hence could not exploit them in science learning. The study concluded that the teachers are not adequately utilizing computer or 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. The study recommended that 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.
Key Words: *Resources, Deaf, Performance, Science, Kenya*

1.0 Introduction

Teachers in schools for the Deaf around the world lack adequate resources that are needed to design classroom experiences that can help Deaf learners understand the content being taught. The teaching materials that are meant to be used in Deaf schools are also unavailable or inadequate (Karchmer & Mitchell, 2003). In developing countries, teaching and learning resources such as text books and writing materials are essential contributors to the academic achievement of Deaf learners at the secondary school level (Boissere, 2004). In developing countries the most important and cost effective input for deaf students is the textbook and other pedagogical learning materials (Fuller & Clarke, 1994). In the teaching and learning process, instructional materials such as diagrams, pictures, graphs and flow charts are very essential in the teaching and learning process. This is attributed to the visual methods of teaching and learning that creates a more lasting experience and relate most readily to other sensory experiences (Sumner, 1985).

Instructional materials accomplish 83% of what is learnt through sight activating students in the learning process. This is because they make the learning become very interesting even to dull and hyperactive students (Harrison, 1983). By seeing over and over again, the brain may be able to recall what has been learnt. The author opines that some of the concepts become more visible and self-explanatory from the diagrams. It also reduces the language demands especially for Deaf learners. Mwanyuma (2016) opines that when the pictures or charts are displayed in the classrooms the learners can look at the charts and review their own work. The learners can also connect ideas and remember other related facts.

Hallahan and Kauffman (1997) opine that other areas of instructional materials are the technological explosion in the area of hearing impairment. The explosion of micro-computer and related technology like video discs is expanding learning capabilities for people who are deaf. Nikolopoulos, Archbold, and Gregory (2005) opine that visual displays of speech patterns on a computer screens can help children who are Deaf and Hard of Hearing, learning and understanding speech. Video programs showing people sign are also available for use in teaching Kenyan Sign Language which if used by teachers they can improve their sign language skill that could be a challenge to them. Although these technological advancements are now being widely used to benefit the Deaf learners in developed countries, they are yet to be fully embraced in Kenya.

Hearing aids, closed caption television programs, telephones and computer assisted instruction assist individuals with hearing impairments to communicate and have access to information. These devices are still very costly to acquire and maintain and are not readily available to Deaf learners as well as teachers (Powers & Gregory, 1998). Most schools are still grappling with providing basic infrastructure in schools and provide basic teaching and learning materials for the Deaf learners. Therefore, they are unable to acquire such costly resources despite their usefulness in learning (Moores, 2001). The current study sought to determine the influence of teaching resources on deaf students' academic performance in sciences at Ngala School for the Deaf in Nakuru County. The remainder of this article paper is organized as follows. Section 2 covers review of past studies. Section 3 covers materials and methods. Section 4 results and discussion while section 5 conclusion and recommendations.

2.0 Literature Review

2.1 Resources used in teaching 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. The scholars found out that, there was no significant difference between Australian students and non-native Australian one. The scholars 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 (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 Ngala Secondary School for the Deaf are incorporating resources in their teaching during science learning and how this was impacting on performance.

3.0 Materials & Methods

The study used the descriptive research design to obtain data. It was suitable for this study as it provides an indepth description of data in the natural setting. Target population is also known as unit of observation and it refers to the large collection of all subjects from where a sample is drawn (Zikmund, Babin, Carr, & Griffin, 2012). The target population comprised of 1 principal, 21 teachers, and 250 students of Ngala secondary school of the deaf. The sample size for this research was obtained using Slovins (2012) sample size determination formula. The formula is: n= $N/1+Ne^2$ n =$250/1+250*0.05^2 = 153.85 \approx 153$ students at Ngala secondary school for the deaf. The researcher used purposive sampling technique when sampling Teachers and Principals to take part in research.

Stratified random sampling techniques was used to select a sample size of 153 students. 117 are deaf students while 36 are hearing students. Only Form Two to Four science students took

part in the study. The study used questionnaires, interview and lesson observation schedules as instruments for data collection. There are two sets of questionnaires meant for science teachers and students respectively, then interview schedule for principal. Before the actual study, the researcher was carried out pilot study at Murang'a Secondary School for the Deaf. The school was picked because it is among schools that is perpetually performing poor in sciences. The researcher also pre-tested observation schedules. This is quite essential as it helps the researcher in estimating reliability and validity of the researcher instruments.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 will be determined using Pearson Product Moment Correlation Formulae. 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 redefined for accuracy before the actual study. 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. SPSS Version 21.0 was used in the analysis of the quantitative data while qualitative data was analyzed based on major themes and then reported in narrative form.

4.0 Results & Discussions

4.1 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 presented in Table 1. Sixty percent of the teachers reported using charts very adequately when teaching, 20.0% used them adequately while 20.0% did not use them at all. Fourty percent of the teachers used Computer/ internet very adequately, 40% adequately while 20.0% did not use at all. Realia were adequately used by 60.0% of the teachers, 20.0% reported using them very adequately while 20.0% never used it at all. Fourty percent of the teachers reported using signed videos very adequately, 20.0% reported to have used them adequately while 20.0% were undecided.

On improvised objects; 40.0% reported to have used them adequately, 20.0% used them adequately while 20% used them inadequately while 20.0% did not use them at all. Eighty percent of the teachers reported to have used laboratory very adequately while 20.0% inadequately. Students were similarly asked to state how adequate the following resources were being used in learning sciences in class. Twenty four point eight (24.8%) percent of

students reported their teachers used charts very adequately to teach sciences, 27.6% adequately, 9.5% were undecided, 22.9% inadequately while 15.20% did not use them at all.

Table 1: Teaching/ Learning Resources Used in Science Subjects for the Deaf Learners

n = 5		**V.A**	**A**	**U**	**I**	**NAA**
Charts	F	3	1	1	0	0
	%	60.0	20.0	20.0	0.0	0.0
Computer or internet	F	2	2	0	0	1
	%	40.0	40.0	0.0	0.0	20.0
Realia objects	F	1	3	0	1	0
	%	20.0	60.0	0.0	20.0	0.0
Signed videos	F	2	1	1	0	0
	%	40.0	20.0	20.0	0.0	0.0
Improvised resources	F	1	2	0	1	1
	%	20.0	40.0	0	20.0	20.0
Laboratory	F	4	0	0	1	0
	%	80.0	0.0	0.0	20.0	0.0
n = 105						
Charts	F	26	29	10	24	16
	%	24.8	27.6	9.5	22.9	15.2
Computer or internet	F	26	48	8	15	8
	%	24.8	45.7	7.6	14.3	7.6
Realia objects	F	32	29	17	17	10
	%	30.5	27.6	16.2	16.2	9.5
Signed videos	F	22	45	14	17	5
	%	22.9	42.9	13.3	16.2	4.8
Improvised resources	F	26	36	15	17	11
	%	24.8	34.3	14.3	16.2	10.5
Laboratory	F	35	48	8	8	6
	%	33.3	45.7	7.6	7.6	5.7

On computer use, 24.8% of students reported teachers used them very adequately, 45.7% adequately, 7.6% were undecided, 14.3% inadequately while 7.6% not at all. Thirty point five percent (30.5%) of students reported teachers used realia in teaching very adequately, 27.6% adequately, 16.2% were undecided; 16.2% inadequately while 9.5% not at all. On signed videos, 22.9% reported teachers used them very adequately, 42.9% adequately, 13.3 were undecided, 16.2% inadequately while 4.8% not at all. On improvised resources, 24.8% of students reported teachers used them very adequately, 34.3% adequately, 14.3% were undecided, 16.2% inadequately while 10.5% not at all. On laboratory, 33.3% reported teachers used them very adequately, 45.7% adequately, 7.6% undecided, 7.6% inadequately and 5.7% not at all. 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/ learningequipment 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, charts, realia, improvised objects among others 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 the extent to which students were likely to understand their teaching when the following resources were used in class. Their responses were as shown in Table 2: Twenty percent (20.0%) of teachers reported that when charts were used, students were likely to understand science to a low extent, 20.0% to a great extent and 60.0% to a very great extent.When computer or internet were used, 40.0% reports students were likely to understand science to a low extent, 60.0% to a very great extent. When realia were used, 60.0% were likely to understand to a great extent, 20.0% to a very great extent and 20.0% to a very low extent. When signed videos were used 20% would understand science to a very low extent, 20.0% were undecided, 20.0% great extent while 40.0% to a very great extent.

When improvised resources were used, 20.0% were likely to understand science to a very low extent, 60.0% great extent and 20.0% to a very great extent. When laboratory was used, 20.0% would understand science to a low extent, 40.0% undecided while 40.0% to a very great extent. Students were similarly asked to state the extent to which they were likely to understand science in class when the following resources were used. 8.6% of students reported that, when charts were used, they were likely to understand science to a very low

extent, 28.6% low extent, 8.6 undecided, 23.8% great extent while 30.5% to a very great extent. When computer/ internet were used 21.9% reported they were likely to understand science to a very low extent, 24.8% to a low extent, 18.1% undecided, 16.2% to a great extent while 19.0% to a very great extent.

When realia objects were used, 12.4% reported to understand science to a very low extent, 16.2% to a low extent, 15.2% were undecided, 30.5% to a great extent while 25.7% to a very great extent. When signed videos were used, 21.0% reported to understand science to a very low extent, 16.2% to a low extent, 17.1% undecided, 24.8% great extent while 21.0% to a very great extent. When improvised resources were used, 8.6% are likely to understand science to a very low extent, 26.7% to a low extent, 7.6% undecided, 22.9% great extent and 34.3% to a very great extent.

Table 2: Understanding of science and use of different teaching methods in class

n = 5		**V.LE**	**L.E**	**U**	**G.E**	**VGE**
Charts	F	0	1	0	1	3
	%	0.0	20.0	0.0	20.0	60.0
Computer or internet	F	0	3	0	0	2
	%	0.0	60.0	0.0	0.0	40.0
Realia objects	F	1	0	0	3	1
	%	20.0	0.0	0.0	60.0	20.0
Signed videos	F	1	0	1	1	2
	%	20.0	0.0	20.0	20.0	40.0
Improvised resources	F	1	0	0	3	1
	%	20.0	0.0	0.0	60.0	20.0
Laboratory	F	0	1	2	0	2
	%	0.0	20.0	40.0	0.0	40.0
n = 105						
Charts	F	9	30	9	25	32
	%	8.6	28.6	8.6	23.8	30.5
Computer or internet	F	23	26	19	17	20
	%	21.9	24.8	18.1	16.2	19.0
Realia objects	F	13	17	16	32	27
	%	12.4	16.2	15.2	30.5	25.7
Signed videos	F	22	17	18	26	222
	%	21.0	16.2	17.1	24.8	21.0
Improvised resources	F	9	28	8	24	36
	%	8.6	26.7	7.6	22.9	34.3
Laboratory	F	29	24	10	19	23
	%	27.6	22.9	9.5	18.1	21.9

When laboratory was used, 27.6% are reported to understand science to a very low extent, 22.9% to a low exent, 9.5% undecided, 18.1% great extent while 21.9% to a very great extent.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.

5.0 Conclusions and Recommendations

The study concluded that, teachers are not adequately utilizing computer or 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. Laboratory was the most utilized resource in school. Charts and computers are underutilized in the learning of science subjects. This is attributed to high traffic use by examination section and computer teacher. The reason as to why computers are not used in science learning is lack of essential skills needed in operating the computer. The study recommended that, 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. 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.

6.0 References

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