EFFECTIVENESS OF THE USE OF AUDIOLOGICAL EQUIPMENT IN THE AUDIOLOGICAL REHABILITATION OF PRIMARY SCHOOL PUPILS WITH HEARING IMPAIRMENTS IN NYANZA PROVINCE, KENYA

BY

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Effectiveness of the use of

APRIL 2007
DECLARATION

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

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We confirm that the work reported in this thesis was carried out by the candidate under our supervision as university supervisors.

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DEDICATION

This thesis is dedicated with appreciation to my loving wife Catherine A. for her concern, contribution to my education and endurance of double family responsibilities, to my children Joe, who was an enthusiastic scholar but never lived to read it and Arthur whose existence was an invaluable source of my encouragement.
ACKNOWLEDGEMENT

In carrying out this study I am indebted to several people without whom this work would not have been a success.

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J.A.N 2007
ABSTRACT

Audiological assessment provides information on the extent of hearing loss leading to the provision of suitable hearing aids to pupils with hearing impairments. This will ensure effective audiological rehabilitation programmes appropriate to the pupils.

It is against this background that the study was set to investigate the effective use of audiological equipment in audiological rehabilitation for the development of speech and communication skills of pupils with hearing impairments in schools in Nyanza Province.

The research design for this study was descriptive survey. This was relevant for the study to describe, analyse and interpret the nature and extent of utilization of audiological equipment among other variables which governed this study.

Purposive sampling method was used to select 4 schools, 19 teachers and 25 standard 2 pupils. Teacher-made auditory training and speech tests were administered to 25 pupils individually to diagnose the extent to which pupils with hearing impairments use their auditory sense. Questionnaires were used to obtain information from 15 teachers and 4 headteachers. Interview schedule was used to obtain information from the selected pupils. Data collected were analyzed using descriptive statistics such as frequencies, percentages and means. A t-test was used particularly to analyze question 1 and 5 and question 2,3,4 and 6 were analyzed using descriptive method. The responses to items
were tabulated and data were organized through frequency tables and percentages based on research questions.

The findings of the study revealed major problems faced by teachers which included; lack of knowledge in basic audiology and inaccessibility to modern and suitable individual hearing aids by the pupils. All these contributed to ineffective audiological rehabilitation process in primary schools for pupils with hearing impairments.

The findings of this study will be of use to teachers and pupils, the government and other concerned stakeholders in knowing their roles as far as the use of audiological equipment in audiological rehabilitation of pupils are concerned.

The study recommended among others, emphasis to be laid on practical aspects of the use and management of audiological equipment than theory during training. It also recommended an extension on the same study to cover other provinces, post primary institutions and pupils in inclusive settings.
ABBREVIATIONS AND ACROYNMS

AR : Aural Rehabilitation
A.R.A : Academy of Rehabilitative Audiology
AVT : Auditory Verbal Therapy
B.T.E : Behind-The-Ear
BW : Body Worn
dB : Decibell
EARC : Educational Assessment and Resource Centre
ECE : Early Childhood Education
GHA : Group Hearing Aid
Hz : Hertz
IHA : Individual Hearing Aid
I.T.E : In-The-Ear
KACE : Kenya Advance Certificate of Education
KISE : Kenya Institute of Special Education
KSDC : Kenya Society for Deaf Children
L.I.S : Loop Induction System
MoEST: Ministry of Education, Science and technology
SN : Special Needs
SNE : Special Needs Education
STU : Speech Training Unit
UNDDP: United Nations Decade of Disabled Persons
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CHAPTER ONE
INTRODUCTION

1.0 Background to the Study

Working with hearing impaired pupils is one of the stiffest challenges teachers face particularly those teaching language through oral/aural communication. In the life of human beings, everyone wants and needs to communicate with other people. Inability to hear and express oneself easily and effectively is frustrating and can lead to all kinds of negative feelings. Whether one is a specialist speech therapist trying to help a child to learn the articulation of the phoneme/ʃ/ or/ð/ or a special education teacher teaching the rules of plural or signing complex and compound words, one faces obstacles in communication deficits of people who cannot learn oral language naturally (Binnie, 1991).

O’leary and O’leary (1972) define communication as, auditory and speech transactions between the teacher and hearing impaired pupils, and between or among the pupils. Communication is a basic problem which concerns a child with a hearing loss. Effectiveness of communication ensures cohesiveness of a whole school, home and the whole society. Hearing loss remains a barrier to adjustment and the hearing impaired child continues to function from the oppressive attitudes which are often seen to be reinforced by the society towards the child. Such a child needs rehabilitation in order to achieve both individual and society’s goals.

Rehabilitation in general terms implies to restore, as far as possible functions that have previously been normal (Davis and Silverman, 1970). As used in this
study rehabilitation applies to pupils who are as a result of sickness or accident lost some of their ability to hear, therefore need rehabilitation services so as to enable them to restore the skills that were lost due to inability to hear.

Audiological rehabilitation refers to a series of non-medical therapeutic techniques designed to reduce communication deficits that are secondary to hearing impairments. As a process, it refers to services and procedures employed to facilitate both receptive and expressive communication (Binnie, 1991).

The underlying principle of this study was to investigate the effectiveness of oral/aural communication and the associated problems with specific reference to effective use of hearing aids that are available in the schools. To meet the needs of hearing impaired pupils, effective audiological equipment or amplification system is required so as to help these pupils improve their auditory experience.

Audiological equipment are instruments which amplify sound to an extent that they can partially or almost completely compensate for the hearing disability of many hearing impaired persons. The equipment comprises both mechanical and technical devices. Mechanical devices are ear-mouth trumpets, cupped handshape, speaking tubes etc. while technical devices are further categorized into adaptive aids and hearing aids. Examples of adaptive aids are television adaptors, radio sets, telephones and electric bells, while examples of hearing aids are group hearing aids, loop induction systems, radio receiver systems
among others. Audiological equipment may also include sound making and assessment tools such as drums, jingles and rattles (Davis and Silverman, 1970).

According to the Ministry of Education (1981) draft policy for special education, detection and assessment of pupils with special needs has been inadequate. As such, chances for the best remediation services have not been seriously reduced. Inefficient assessment has resulted into improper placement of pupils into special schools. A report on the Task Force by the Ministry of Education (2003) also notes that there are 72 assessment centres throughout the country. Out of this number, 52 have physical facilities and assessment tools while 20 have neither physical facilities from which to carry out their assessment activities nor assessment tools. In the districts where these facilities are lacking, the assessment services are offered in the district education offices or in the Educational Assessment and Resource Centres (EARCs) which are in the neighbouring districts.

Prior to introduction of 8.4.4 system, schools for pupils with hearing impairments were offering rehabilitation services like auditory skills, language development, communication training (which involved the teaching of specialist subjects such as speech reading or lip reading, articulation readiness, individual speech, auditory training etc) with the use of audiological equipment. The system brought a syllabus that was too overloaded to allow the teachers to teach specialist subjects which are prerequisite for speech and language development. The essential components of auditory skills that
emphasized the use of audiological equipment were neglected hence denied the pupils their auditory experience which is a very important survival skill. It is for this reason that the researcher needed to investigate the effective use of audiological equipment in audiological rehabilitation of primary school pupils with hearing impairments in the schools.

1.1 Statement of the Problem

As stated in the background, our sense of hearing is one of the gateways through which we acquire knowledge. It is natural for the ear to be the channel through which we learn to talk and therefore any impairment in hearing will hinder normal development of speech. Hearing impairment closes the door through which one would normally acquire both knowledge of speech and the control of speech organs.

Audiological assessment is the basis through which proper audiological rehabilitation services are programmed. Proper audiological assessment will provide information on the degree of hearing loss as well as enabling the assessor to prescribe a suitable hearing aid. The assessor will also know the kind of rehabilitation programme to administer to the child with hearing impairment.

The task force (2003:60) established that most EARCs are situated at the district headquarters and are far removed from the communities they are meant to serve. It was also observed that once assessed and placed, the majority of Special Needs Education (SNE) pupils are neither followed up nor provided with further evaluation or remediation services. These omissions imply that in
most of the districts EARCs are no longer functioning as resource centres for early intervention but instead have been reduced to disability identification centres (Ministry of Education Task force 2003:60).

The general state of audiological rehabilitation process is that, there has been neglect of the use of audiological equipment occasioned by lack of dedication and addition of more teaching burdens. Lack of emphasis on communication training that are necessary for communication skills were also assigned the lowest status and therefore audiological rehabilitation services have declined in the schools. This prompted researcher to investigate the effective use of the equipment and the associated problems thereafter, come up with suggestions for solving such problems.

1.2 The Purpose of the Study

The purpose of this study was to investigate the effectiveness of the use of audiological equipment in the development of speech and communication skills and to establish the teachers’ and pupils’ attitudes towards the use of the equipment.

1.3 Objectives of the Study

The objectives of the study were:

1. To determine relationship between teachers’ training on the use and management of audiological equipment and pupils’ performance in communication skills.
2. To evaluate the usefulness of audiological equipment to pupils with hearing impairments.

3. To determine the types of audiological equipment in the schools and their functional status.

4. To determine factors that might hinder effective use of audiological equipment.

5. To identify the difference in speech perception of the pupils with and without the use of hearing aids.

6. To determine the teachers’ and pupils’ attitudes towards the use of audiological equipment.

1.4 Research Questions

To achieve the purpose and objectives stated, the study sought to answer the following questions:

1. What influence do teachers’ training on the use and management of audiological equipment have on pupils’ performance in communication skills?

2. What are the usefulness of audiological equipment to pupils with hearing impairments?

3. What are the types and functional status of audiological equipment in the schools?

4. What factors are likely to hinder effective use of audiological equipment in the schools?
5. Is there significant difference in speech perception of the pupils with and without hearing aids?

6. What are the teachers’ and pupils’ attitudes towards the use of audiological equipment?

1.5 Null Hypothesis

HO1: There is no significant difference in speech perception of the pupils with and without the use of hearing aids.

1.6 Assumptions

This study assumed that problems of effective use of audiological equipment existed in the schools for pupils with hearing impairments. Poor techniques and skills of using audiological equipment existed among pupils and teachers in the schools. Inefficient audiological assessment and ineffective use of audiological equipment affected the teaching-learning process. Ineffective use of audiological equipment was due to lack of technical training on the part of teachers, poor attitudes towards the equipment on the part of pupils, lack of adequate and sufficient audiological equipment in schools and technical problems of the equipment.

1.7 Limitations and Delimitations of the Study

The study was limited to primary schools for children with hearing impairments in Nyanza Province due to the short time available. It left out special units and post primary institutions with the same category of pupils.
Limited time also compelled the researcher to only effective use of the equipment leaving out other factors like mode of communication, academic performance and the provision of suitable training facilities to the concerned teachers.

There were only five primary schools offering education for children with hearing impairment in Nyanza province. Therefore, the study was delimited within these schools. Of the five schools, four were involved in the actual study while one was used for piloting.

1.8 Significance of the Study

The findings of this study will be of use to both teachers and pupils with hearing impairments about their roles in ensuring effective use and management of hearing devices to enhance audiological rehabilitation. The study findings will be of use to the government, Non-Governmental Organizations (NGOs) as well as other stakeholders in preparing or formulating in-service course programmes for teachers in the use of audiological equipment. The study findings will help the government as well as other concerned bodies to ensure that audiological rehabilitation process receive appropriate facilities, equipment and qualified staff to facilitate effective rehabilitation.

The study findings will also serve as a springboard and create a growing interest for future researchers in other areas related to audiology and not covered in this study.
1.9 Conceptual Framework

This study was based on audiological rehabilitation model advanced by Goldstein and Stephens. The model asserts that audiological rehabilitation process may be arbitrarily divided into the evaluation and remediation components which have to be provided within the context of a unified service for the learner with hearing impairment being helped continuously even after any intensive rehabilitation programmes have been completed (Lutman, 1983:299).

Evaluation component involves audiological assessment and language assessment which are further subdivided into four components that will reveal degree of hearing loss and methods of communication suitable for the pupils. On the other hand, remediation component involves audiological equipment and communication training. These will give various types of hearing aids suitable for the pupils. Specialist subjects that are concerned with speech and communication.

According to this model, the inhibiting variables are; audiological assessment which gives the extent of hearing loss and language assessment which shows the ability to communicate orally or manually. These will show the types of hearing aids appropriate for the pupils and the mode of communication to be used for effective development of speech and communication. The contributing variables are hearing aids and specialist subjects. These will show the extent of
hearing aid use and the teaching of specialist subjects which are concerned with the development of speech and communication skills.

The study adopted this model to evaluate the effective use of hearing aids in order to ascertain the development of speech and communication skills. The model is summarized in the figure on page 11.
CONCEPTUAL FRAMEWORK

Figure 1.1: AUDIOLOGICAL REHABILITATION MODEL

AUDIOLOGICAL REHABILITATION PROCESS

EVALUATION COMPONENTS

AUDILOGICAL ASSESSMENT

HARD OF HEARING
SEVERE AND PROFOUND

MANUAL

PROPER EVALUATION

EFFECTIVE USE

DEVELOPMENT OF SPEECH AND COMMUNICATION SKILLS

REMEDICATION COMPONENTS

AUDILOGICAL ASSESSMENT

LANGUAGE ASSESSMENT

MANUAL

ORAL

EFFECTIVE TRAINING

COMMUNICATION TRAINING

AUDILOGICAL EQUIPMENT

I.H.A
G.H.A

AUD. Training
A.V.T

INDI. Speech
A. Visual Training

LEGEND

I.H.A - Individual Hearing Aids
G.H.A- Group Hearing Aids
A.V.T - Auditory Verbal Therapy
1.10 Operational Definition of Terms

- **Special Needs Education** refers to education which provides appropriate modification in curricular, teaching methods, educational resources, medium of communication or the learning environment in order to cater for individual differences in learning.

- **Hearing impairment** is a genetic term used to describe any level of hearing loss ranging from mild to profound.

- **Deafness**: This term describes individuals who have a hearing loss that is so profound that the auditory channel cannot function as the primary mode for perceiving and monitoring speech or acquired language.

- **Assessment**: This is a systematic process used to determine information about an individual’s acquired knowledge, skills and general level of functioning.

- **Disability**: This means a functional restriction due to impairment.

- **Audiological Rehabilitation**: This means a series of non-medical therapeutic techniques and services designed to reduce communication deficit secondary to hearing impairments.

- **Communication**: This is a process of establishing commonness with someone through sharing ideas and feelings; as used in this study, it involves gaining and controlling the attention of the learners and stimulates the learners to recall previously learnt capabilities.

- **Hearing Aid**: This is an electronic equipment or device that enables a subject to hear what otherwise would not be audible without the help of the device.
- **Audiology** refers to the science of hearing. As used in this study, it focuses on the social functions of hearing and upon increasing the ability of hearing impaired individuals to cope with the communication demands of everyday life.

- **Auditory-verbal-therapy (AVT)** refers to a specialized type of therapy designed to teach a child to use the hearing provided by a hearing aid or a cochlea implant for understanding speech and learning to talk.

- **Sensori-neural hearing loss** refers to hearing impairment due to abnormality of the sense organ of hearing, the auditory nerve or both.

- **Special Needs (SN)** refers to conditions, barriers or factors that hinder normal learning and development of individuals. These conditions may include disabilities, social, emotional, health or political difficulties.

- **Special Needs Education** refers to education that provides appropriate rehabilitation process, special teaching methods and medium of communication in order to meet the needs of the child.

- **Audiogram** refers to a graph that shows hearing threshold level as a function of frequency.

Note: The terminology "Hearing Impaired" has been used in this study to refer to all children with hearing impairments ranging from mild to profound.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter presents the review of literature related to the following areas: historical background of audiological rehabilitation and teaching, importance of audiological equipment and evaluation components. It also covers remediation components which include types of hearing aids, effective use and management of hearing aids and communication training and finally it gives a summary of the literature review.

2.1 Historical Background of Audiological Rehabilitation and Teaching

On the international scene, Ross (1987) gives background information to audiological rehabilitation by stating that by all accounts, the audiology profession had its genesis in the Second World War, as an outgrowth of Aural Rehabilitation (AR) programmes provided for servicemen who lost their hearing in the war. What the government did was to bring together a variety of specialists and told them to organise an aural rehabilitation programme. In fact, it was a feeling that audiologists were neglecting this very important function that led to the formation of Academy of Rehabilitation which tried to encourage the feeling of many audiologists. The feeling of lack of interest and inadequate training in audiology was supported by many professionals.

In the United States of America (USA), Binnie (1991) states that, several military hospitals participated in aural rehabilitation programmes for instance, Walter Reed, Deshon and Borden hospitals for the army and the United States
as well as Navy hospital in Philadelphia. All participants lived in the hospitals for the entire course of the full-time programme, each receiving a comprehensive evaluation, followed by individual and group therapy, classroom instructions and ongoing hearing aid evaluation. He goes further to say that, among the programmes offered, patients were also learning how to lip-read, and some of them undoubtedly were learning how to accept their hearing loss and also accept themselves.

In Britain, Turker and Nolan (1984:314) state that the main system of communication in the rehabilitation of pupils with hearing impairment is oral language - the language of the society at large. This seems eminently logical to the present writers when a major tenet of rehabilitation is to help the hearing handicapped pupils to achieve a level of functioning which is as nearly as possible restored to normal.

Bamford and Sounders (1985:166) examines the oral communicative interaction of mothers of children with normal hearing and those with hearing impairments and noticed that the former used more questions and asked for more opinions and suggestions, than did the latter who communicated mainly to direct the activities of their children and that the mother-child communication was limited to events and ideas related to immediate environment. One point worth mentioning here is the degree of hearing impairment. Communication deficits become more marked with severe hearing loss. All this notwithstanding, Bamford and Sounders (1985:170) further
suggest that proper intervention in the form of evaluation and effective use of hearing instruments with these pupils can alter the situation in communication deficits.

Bamford and Sounders (1985) further point out that effective rehabilitation process for a child with typical hearing impairment requires reading and writing ability, auditory memory span, and intelligibility of uttered speech. All these can be achieved through early identification and early fitting of suitable amplification systems. Suitable amplification is the cornerstone of effective audiological rehabilitation.

In China, Pufang (1992), also gives an account of their active participation in the international events under the theme of ‘United Nations Decade of Disabled Persons’ (UNDDP). In over four years of existence of China Disabled Persons Federation, they had managed to train 23,000 deaf pupils to speak. Infrastructure of rehabilitation facilities and community based rehabilitation facilities were also developed.

On the African scene, Ramson (1992) at the 17th World Congress of Rehabilitation International (RI) held in Nairobi, Kenya states that compared to regions of the world, the state of general rehabilitation programmes, facilities, services and opportunities for the disabled persons in the African continent is inferior, inadequate and unacceptable. He goes further to say that everywhere in Africa disabled persons continue to be among the least educated, the poorest, and the most marginalized members of the population. However, many African
countries such as Angola, Kenya, Uganda, Zambia and Zimbabwe are trying to provide greater assistance to disabled persons especially in the rural areas through the establishment of community based rehabilitation programmes. All these are vocational rehabilitation programmes.

In Kenya, the Ministry of Education Taskforce Report on Special Education (2003) mentions in general that learners with special needs may receive rehabilitation services in rehabilitation centres, rehabilitation schools and community-based rehabilitation programmes. The rehabilitation services mentioned are vocational type. Nothing was addressed about audiological rehabilitation for pupils with hearing impairment. The Ministry of Education policy for Special Education (1981:7,25) generally points out that disabled pupils have the right to social rehabilitation, counseling and other services that will enable them develop their capabilities and skills to the maximum, and will hasten the process of their social integration or re-integration into the society. There is no specific mention about audiological rehabilitation of pupils with hearing impairments. However, the policy supports audiological rehabilitation by pointing out that education of pupils with hearing impairments is at a great danger with the increasing noises from traffic and aeroplanes particularly with those using hearing aids. For effective audiological rehabilitation, the policy recommends acoustic treatment of classrooms and corridors.

According to Kenya Society for Deaf Children (KSDC) report on the study of technical and adaptive aids (1995), rehabilitation of pupils with hearing
impairments started after the Second World War in 1958, when Elizabeth Couldrey, a speech therapist resident in Kenya was asked to start a free clinic in what was then King George VI Hospital (now Kenyatta National Hospital). This was to help the deaf and speech handicapped pupils. Besides activities performed at the clinic were assessment of pupils with hearing impairments, prescription and fitting of hearing devices and speech therapy.

Education of the "deaf" as it was known commenced in Kenya in 1961 was mainly under the auspicious of various religious bodies. The education offered attempted to cover all ages and severity of hearing impairments in the same school and to some extent in the classrooms. This education started with emphasis on specialist subjects and effective use of audiological equipment (Ministry of Education – Policy for Special Education, 1981:52).

The Kenya government through the Ministry of Education (1975, 1976 and 1981), emphasizes various trends in the following education reports: Mackay report of 1981 introduced the 8-4-4 system of education and endorsed the teaching of practical subjects aiming at enabling school leavers become self-reliant after their formal education. This report followed Gachathi report of 1976 whose intention as far as special education was concerned was to make education play a major role in enabling persons with hearing impairments communicate and become useful citizens, capable of and motivated to contribute towards the improvement of the nation as well as their welfare. Effective oral communication would raise the level of social and moral
understanding of pupils with hearing impairments and enable them to compete favourably within the existing educational and employment opportunities.

The introduction of 8-4-4 system of education prompted schools for pupils with hearing impairments to prepare their pupils for the national examination - the Kenya Certificate of Primary Examination (K.C.P.E). The new 8-4-4 syllabus was too demanding to allow teachers to teach specialist subjects which are prerequisite to speech and language development among pupils with hearing impairments. Teachers then stopped using the provisional curriculum and guidelines formerly designed for pupils with hearing impairments. Since then, specialized methods for facilitating oral (both receptive and expressive) communication among the hearing impaired pupils in schools have never been successful. There has been neglect of audiology occasioned by lack of dedication, addition of more teaching/learning burdens and lack of emphasis on communication training. This has contributed to defective oral language structure as well as difficulties with abstract language and concept formation. The researcher therefore intended to investigate the problems associated with effective use of audiological equipment and suggest possible solutions.

2.2 Teacher Training and qualification.

This review focused on teacher training and qualification on the use and management of audiological equipment. Bamford and Sounders (1985) state that involvement of a wider range of professionals in the identification, diagnosis, assessment and remediation of pupils’ hearing impairments and
language disabilities is providing a new impetus to the existing audiological rehabilitation problems. Teachers, therefore, need to understand the auditory perceptual processes of pupils with hearing impairments, how their impairments affect speech perception, communication and language development. Bamford and Sounders (1985) further say that, in United Kingdom (UK), there is more interest and greater efforts being put into the field of audiology. The training courses for professionals involving pupils with hearing impairments remain however, less than optimum. These courses aimed at producing audiologists, speech pathologists, teachers and other concerned people with a greater degree of expertise and professionalism which would undoubtedly improve the prospects for future generations of pupils with hearing impairments further.

Historically, education of pupils with hearing impairments was among the earliest to receive attention from both governmental and non-governmental organisations in Kenya. Kenya Society for Deaf Children (KSDC) was such non-governmental organisation which first initiated education for pupils with hearing impairments. Soon after independence, the government became active and development of the hearing impaired education has been rapid (Yego, 1992).

Teacher training programmes for special education was started in order to meet the manpower needs for the established programmes for pupils with hearing impairments, as well as other areas of handicaps. The first local course for teachers of the hearing impaired pupils was started in 1964 at Central Teachers
College (the present Kenya Institute of Education) as a unit attached to the college. The unit was later moved to three different colleges between 1982 to 1986. In 1986, Kenya Institute of Special Education (KISE) was established (Yego, 1992).

The Kenya Institute of Special Education admits students annually for diploma courses in various areas of handicap including hearing impairment. Besides diploma course, three months in-service courses are also conducted concurrently. Short in-service courses and seminars are also offered to personnel who are directly or indirectly involved with special needs education in the schools and other areas. Since 1986 KISE has successfully organized and hosted a variety of local and international courses and seminars for all cadre of teachers in special schools, regular schools and other related areas. The main objective of these programmes was to offer skills that could be lacking such as assessment skills, ear-mould production, audiology including the use and management of audiological equipment and etc (Yego 1992).

In addition to KISE programmes, other special education teachers are being trained at Kenyatta and Maseno universities and are being awarded Bachelors degree in special education. Special education degree curriculum at Kenyatta University covers nine areas of specialization including the area of hearing impaired (Karugu, 1999). Teacher training and qualification is reviewed here because it enables a teacher to acquire the skills of handling pupils with Special Needs including those with hearing impairments.
Despite all these efforts, teachers still lack practical skills of using and managing the audiological equipment. This has resulted to poor audiological rehabilitation process in the schools. The researcher therefore intended to investigate the kind of skills and suggest possible ways of training on the use and management of these equipment so as to enhance effective rehabilitation process among pupils with hearing impairments.

2.3 Importance of Audiological Equipment

Encyclopedia Britanica (1964:218), gives a brief background of hearing aid by first defining it as a sound amplifier, a device that increases the loudness of sound in the ear trumpet. Ear trumpets have taken many forms, but they all have a large mouth at one end so as to collect the sound energy from a large area and direct them to the ear. The main objective of a hearing aid is to amplify speech without undue distortion but at the same time protect the user against discomfort from too loud an output. Bamford and Sounders (1985:87), say that the aim of amplification with hearing device is to increase selectively the sound pressure level of the speech at the eardrum such that it is at least detectable in the important frequencies. It is not the aim of amplification to restore normal threshold of hearing, rather to improve auditory perception and communication.

Bench (1974) in Conrad (1979:129), notes a severely environmentally and acoustically deprived child who only began hearing language in early adolescence, and who in less than two years after sound discovery with effective use of hearing aids showed considerable and ongoing advances in
receptive and expressive language skills. He further argues that the boy’s case points to the reversible nature of linguistic deprivation when given adequate rehabilitation procedures, and he therefore points an accusing finger to those responsible for the inadequacy of the rehabilitation procedures used with pupils with hearing impairments.

From the above-cited studies which have attempted to review the state of knowledge about auditory perception, language and communication skills in pupils with hearing impairment, it can be summarized that auditory perception is important in the life of human beings. Audiological equipment for those who cannot hear naturally play a very important role as far as auditory perception is concerned. Suitable amplification is the cornerstone of auditory rehabilitation. Bamford and Sounders (1985:174) further stress that early identification, early issue of appropriate amplification device, good counseling and support services as well as early involvement of teachers would do much to reduce the appalling communication handicaps faced by pupils with hearing impairments.

It should be noted that a hearing aid is an aid to hearing. Unlike spectacles which will, in most cases, restore defective vision to normal, the hearing aid cannot do this because majority of pupils with hearing impairment suffer from sensori-neural deafness (or nerve deafness). It is therefore not possible to stimulate the damaged nerve cells sufficiently to restore hearing back to normal (Jackson 1981:81). In this regard, other means of communication like sign language and total communication must be developed through systematic and in many instances, laborious procedures (Travis, 1971:400).
From the above background, it can be said that pupils once given an opportunity to use hearing aids can derive maximum benefit thus effective audiological rehabilitation.

2.4 Evaluation Components

The review here focuses on audiological and language assessment. It focuses on the associated variables such as the degree of hearing impairment and mode of communication which when properly evaluated would facilitate effective audiological rehabilitation process.

2.4.1 Audiological Assessment

Bench (1979), defines audiological assessment as a process of assessing hearing performance of an individual in terms of nature and the degree of hearing impairment. The results are used not only to determine the hearing level and to aid differential diagnosis but also to suggest possible methods of treatment, monitoring the rehabilitation and to guide correct educational placement of the pupils to schools. Audiological assessment at diagnostic level uses an electronic machine called audiometer. This is referred to as pure tone audiometry.

Turker and Nolan (1984:45), suggest that, for effective use of audiological equipment, early diagnosis is required. Pure tone audiometry may be administered to pupils from three years of age to adult. The child is required in audiometric test to listen to pure tone signals usually at frequency stations in the range of 125Hz to 8000Hz and respond accordingly. The test will provide
an audiologist with detailed information on the child’s ability to hear in each ear separately across the speech frequency range and at various intensities from -10dB to 120dB. The test results will be plotted on an audiogram (a graphic representation of responses across all frequencies from 125Hz to 8000Hz). A careful interpretation of this audiogram will enable the audiologist to know the extent of hearing loss, type of hearing loss (if diagnostic audiometer is used) and type of hearing aid to be given to the child.

In the UK, Bamford and Sounders (1985:172) further say that all babies are screened for hearing at the age of nine months or so; such screening utilizes noisemakers and distracting techniques and is performed in the homes or at the clinics. They go on to say that various strategies have been tried recently to improve the screening. For example, screening the neonate using brainstem electric response audiometry. Other machines for early screening are auditory response cradle which present sounds to a neonate and monitor the heart rate respiration and movement responses.

In Kenya, such modern screening techniques are not available, though audiological assessment is done at the Educational Assessment and Resource Centres (EARCs) established almost in every district throughout the country. These centres are provided with assessment tools including audiometers.

Among the services provided at the centres are: assessment of all kinds of handicapped children between age 0-16 years, counseling for parents of handicapped children, provision of equipment for handicapped pupils at pre-
school age and school age etc. The assessment of children with hearing impairments is done using equipment provided by the government.

Assessment reveals various kinds and categories of hearing losses. Some children have been handicapped from birth or became deaf shortly after birth while others lost their hearing later in life. The problem of the latter differs from those who lose stem from infancy for by the time they lost their hearing they had already developed language. Their needs also differ depending on the severity of hearing loss. Both children who lose their hearing from and after birth need audiological rehabilitation such as evaluation and remediation programmes for example, auditory assessment, language development and communication training - all with the use of audiological equipment.

2.4.2 Language assessment

Silverman (1984:92) defines a language as a code used for communicating ideas about the world and information about our emotional state. It consists of symbols, gestures, sounds and lines that are ordered in a customary sequence for the purpose of conveying information. The two senses through which these symbols are usually perceived are vision and hearing. Anything that can be perceived through either of these senses can serve as a symbol. Persons with hearing impairments perceive these symbols through vision alone.

Language assessment involves articulation tests to reveal the production of speech, tests on language comprehension to know the ability of a child to understand speech, tests on motor functioning to detect the functions of speech musculature and test of attitude to detect a child’s attitude towards
communication difficulty. After proper language assessment services are offered as intervention strategies to produce the desired outcome (Silverman, 1984:207).

Travis (1971:399), notes that most of the children with hearing impairments are either born deaf or lose their hearing before patterns of language and speech have been established. They still suffer more deterioration of communication than do hard of hearing pupils. He further explains that even a congenitally deaf child may not be dumb. His/her mechanism for speech is normal, but has simply never been taught to speak.

Tucker and Nolan (1984), note that failure to detect hearing loss earlier may result to massive language deficit and damage to the child's development of personality. The child fails to hear and therefore fails to develop understanding and ultimately fails to learn to talk naturally. Consequently, all audiologists and/or medical practitioners should treat hearing impairment seriously and take steps to resolve the situation by applying appropriate audiological steps. Lotter (2001) in his study on "enhancing the hearing of pupils" explains that delay in diagnostic and early use of hearing aids should have deleterious effect on the ability of the child with hearing impairment to learn to use hearing aids and develop adequate speech and communication. He further says that early identification and early fitting of appropriate hearing aids are essential for optimum auditory performance. Ministry of Education, Special Education Policy (1981:1) supports this idea by stressing on identification and assessment of pupils with special needs at the earliest possible age.
2.5 Remediation Components

The review here focuses on audiological equipment and communication training. It focuses on the associated variables such as hearing aids and specialist subjects which when effectively administered would facilitate speech and communication skills.

2.5.1 Hearing Aid Types and Factors that Hinder Effective Use

The history of hearing aid dates back to non-electronic era when there were mechanical hearing devices to aid hearing (Davis and Silverman 1970). Such devices include ear-mouth trumpet, speaking tubes, cupped hands behind the ear and etc. During electronic era, there emerged hearing devices with energy of an electrical battery, which was used to boost the original sound (Encyclopedia Britanica 1964:218). Recent development has created more sophisticated hearing devices that are small yet capable of producing sound more effectively to the listener's ears.

The recently manufactured hearing devices are electric hearing aids which resembles a miniature telephone. They differ from the mechanical aids in that they use batteries and not the human voice to supply the energy of sound that the listener finally hears. The voice of the speaker merely serves to control the flow of electric current in the wires to the earpiece and gives it the pattern of voice sound. The receiver in the listener's ear, like the telephone receiver at the end of the line, converts the electric current back into sound (Davis and Silverman, 1970).
Turkington (1997), clarifies a hearing aid as a machine that can never duplicate the true sound that people with normal hearing experience. Hearing aid will help the person take advantage of the residuum of hearing. He explains that electric hearing aids can either be “monaural” (a hearing aid to one ear) or “binaural” (two hearing aids to two ears). Some of the common types of hearing aids in Kenyan schools are Group Hearing Aids, Body Worn Hearing Aids and Behind-the-Ear hearing aids.

Davis and Silverman (1970:305), state that no hearing aid can ever compensate completely for a hearing loss. There are some factors that hinder effective use of these aids, for example, type and extent of hearing loss, environmental factors, functional status of the equipment etc.

Survey done by KSDC in 1995 on technical and adaptive aids in the schools for children with hearing impairments countrywide revealed factors like lack of spare parts, lack of skilled manpower, non-repair of faulty aids and insufficient hearing aids.

**Group Hearing Aid**

Ballantyne (1977) defines Group Hearing Aid (GHA) as a system that connects the teacher directly to all twelve pupils in the class. It has a central amplifier controlled by the teacher. The pupils also have their smaller amplifiers connected with the microphone – all mounted on the pupils’ tables. The pupils hear the teacher through their headphones which are worn by every child. Pupils are able to communicate with the teacher and other pupils through their individual microphones. One major disadvantage of Group Hearing Aid is that
it limits the freedom of movement in the class since all the units are mounted on the table. The Group Hearing Aid is not suitable for young pupils whose learning activities involve frequent movements.

**Body-Worn Hearing Aid**

According to Tucker and Nolan (1984:170), Body worn hearing aids are the conventional hearing aids, box-like type worn by the child on the chest or attached to the user’s shirt pocket. The body worn aids have the microphone, battery, amplifier, on-off switch and volume control all incorporated in one case. It has a receiver and the ear-mould which are worn in the ear and are attached to the case with a cord or lead. Advantage of the body worn aid is that it is most appropriate for young pupils.

**Behind-The-Ear**

Behind-The-Ear is also called post aural hearing aid. It is a hearing device with all its components incorporated in a small curved case which comfortably fits behind the ear as the name suggests. The aid is attached to the ear with an ear mould (or ear piece) and a tube (Tucker and Nolan 1984:170). This type of hearing aid is available in some schools for the hearing impaired pupils in Kenya according to KSDC survey of 1995.

**Digital Hearing Aids**

In recent years the challenge among hearing instrument manufactures has been to create a hearing aid system that operates in a manner similar to human ear, offering natural sound quality in a multitude of listening situations, functioning automatically and adapting instantaneously to every change of sound in the environment. The Digital hearing aid provides listening comfort, feedback
control, elimination of occlusion and is flexible to adjust to the needs of the user. This type of hearing aid can be used in a noisy environment and it will screen out all unwanted background noise, while tuning in one-to-one conversation. The aid is programmed by the dealer to conform to the user’s specific hearing loss. Some models are programmed to allow the user to choose different settings depending on the noise in the environment.

This is a new technology and though very expensive, could be the best hearing aid for any person with hearing loss of any degree. It is not available in the Kenyan schools. Other modern hearing devices that are in existence though not available for use in Kenyan schools are eyeglass hearing aids, Contra lateral Routing of Signs (CROS), Electro-Acoustic Stimulation (EAS) etc (Carmen, 1997).

2.5.2 Effective Use and Management of Audiological Equipment

Effectiveness of the use of hearing aids can be achieved through the knowledge of teachers and the users about essential hearing aid requirements as cited by Ballantyne (1977:64). Hearing aid requirements include: provision of high amplification, high fidelity, small in size with less weight, low power consumption, low cost etc. All these should enable the hearing aid user to derive maximum benefit from the aid.

According to Davis and Silverman (1970:301), the major objective of a hearing aid is to amplify speech without undue distortion and at the same time protect the user against discomfort from too loud an output. Turker and Nolan (1984),
explain that effective use and management of audiological equipment require the skills of using the devices which involve steps like checking the functioning status of hearing aids and giving clear instructions to the hearing aid users before, during and after use. It also involves caring for the instruments. Modern hearing aids are durable, easy to use and reliable. A few simple precautions however will ensure that the instruments continue to give many years of trouble free service.

Over the years, Kenya Society for Deaf Children (KSDC) has been involved in supplementing the government efforts by providing facilities and equipment for the education of pupils with hearing impairments. The society has been constantly donating to schools and units various audiological equipment. It is also the duty of the society to ensure that the equipment donated are effectively utilized and maintained. A survey done by the KSDC in 1995 revealed that 53% of the pupils were not using audiological equipment effectively. As a result, the society in collaboration with the Ministry of Education, Science and Technology (MoEST) organized in-service course programmes on the use and management of audiological equipment for all teachers in the schools and units in 1989, 1991 and 1993 respectively (KSDC, 1995). The courses covered among others; audiological assessment, hearing aid fitting and simple repair and maintenance of hearing aids. After the in-service courses, the participating schools were each issued with a toolkit with a hope that they would do simple repair (if there were) of faulty hearing aids. Despite the fact that teachers in schools and units were trained on how to use, manage and do simple repair of
audiological equipment, majority of them did not acquire adequate skills. The results were more serious damage to the equipment than before. This led to more hearing aids being kept in the stores hence ineffective audiological rehabilitation process (KSDC, 1995).

Provision of amplification is an important requirement in the education of pupils with hearing impairments. According to KSDC (1995), there were 2,690 hearing impaired pupils in schools and units and there were only 2,044 (76%) functional individual hearing aids available. This compared with findings of a survey conducted in Leceistershire in UK in which it was established that about 90% of all pupils with hearing impairments in the country used individual hearing aids. The Kenyan situation is markedly different as school pupils use individual hearing aids during class hours only. The table below shows amplification equipment for learners with hearing impairment available in Kenyan schools but the provision and utilization is to a very limited extent hence ineffective audiological rehabilitation process in the schools.
Table 2.1 Amplification Equipment

<table>
<thead>
<tr>
<th>Category</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening/Assessment Equipment</td>
<td>Audiometer – diagnostic and screening</td>
</tr>
<tr>
<td></td>
<td>Tymptometer</td>
</tr>
<tr>
<td></td>
<td>Otoscopes</td>
</tr>
<tr>
<td></td>
<td>Sound level meter</td>
</tr>
<tr>
<td></td>
<td>Hearing assessment materials (tuning fork, shakers, drum, a cup and spoon etc).</td>
</tr>
<tr>
<td>Auditory training equipment</td>
<td>Hearing aid tester</td>
</tr>
<tr>
<td></td>
<td>Analyser system</td>
</tr>
<tr>
<td></td>
<td>Group hearing aids</td>
</tr>
<tr>
<td></td>
<td>Individual hearing aids</td>
</tr>
<tr>
<td></td>
<td>Auditory training units</td>
</tr>
<tr>
<td></td>
<td>Hearing aid accessories (batteries, earmoulds, cords).</td>
</tr>
<tr>
<td>Communication training equipment</td>
<td>Speech kit (containing feathers, flash cards, paper balls etc)</td>
</tr>
<tr>
<td></td>
<td>Mirror</td>
</tr>
</tbody>
</table>


2.5.3 Communication Training

The greatest problem of pupils with hearing impairments is lack of or inability to communicate through auditory system. As Conrad (1979) states, communication deficits can be alleviated by devising acceptable training methods. Communication training is the crux of the remedial process (Lutman 1983:306). Communication training may be repeated in many forms and may take place in different circumstances. However, all should take into account components of information provision, skill building, instrumental modification and counseling. Communication training involves the teaching of specialist subjects such as auditory training, individual speech and audio-visual training or speech reading etc (Lutman 1983:206).
Effectiveness of audiological rehabilitation process was evaluated through evaluating the outcome of pupils’ performance after communication training while using the hearing instruments.

2.5.3.1 Auditory Training

Auditory training is also called acoustic training. Travis (1971:8), defines auditory training as:

Any method applied to a hearing impaired child or adult which has the purpose of teaching him/her to use more effectively his/her residuum of hearing with or without a hearing aid.

According to Travis (1971) acoustic training is a systematic use of residual hearing to improve communication in people with hearing loss. Acoustic training almost faded with the advent of manual communication. Its revival was attached to the great advancement in electro-acoustic instrumentation around 1927. In acoustic training, pupils with hearing impairments of all levels of hearing loss are considered. That is, even those whose auditory area is as restricted as it can be - sometimes as little as 10dB in the frequencies below 1000Hz but still with some residuum of hearing sensitivity. Davis and Silverman (1970:347), also say that a child’s hearing cannot be evaluated reliably until after several testing sessions which have been separated by periods of training.

Travis (1971), lists some of the indicators of effectiveness of audiological rehabilitation programme after teaching auditory training effectively as: develop awareness of sound, improvement of sound perception, discrimination
of sound, appreciation of speech patterns, improvement of phrasing and stress patterns, improvement of language skills, enriching vocabulary, improvement of psycho-social nature, build self-confidence and also encourage full participation with a wider community.

As mentioned in the statement of the problem, the onset of 8-4-4 system created failure of teachers to teach specialist subjects including auditory training. Neglect of teaching specialist subjects contributed to poor development of oral communication skills. Even children with severe or profound hearing loss need auditory training using hearing aids in order to be aware of environmental sounds (Travis, 1971).

2.5.3.2 Individual Speech

Individual speech is an important remediation component of audiological rehabilitation. Ewing and Ewing (1967), define individual speech as a method of training a child with hearing impairment to articulate sounds distinctly. It is a method of combining training in listening and speaking with reading. This method may be used with profoundly hearing-impaired pupils aged six to eight years old. It has also proved helpful to pupils of age 5 years and below.

Individual speech involves speech assessment which is done to determine the missing sounds, attempted sounds and malarticulated sounds. Individual speech used to be taught very effectively in schools for pupils with hearing impairment in Kenya with the use of hearing aids and it proved very helpful to pupils with hearing losses ranging from mild to severe. The outcome which characterizes
effective audiological rehabilitation process through individual speech includes a child’s ability to hear, comprehend and to say words (Ewing and Ewing, 1967).

2.5.3.3 Speech Reading

Speech reading can also be termed as Audio-Visual Training (AVT) or lip reading. It is also an important remediation component of audiological rehabilitation process, and it holds its integral part of a total hearing rehabilitation programme (Davis and Silverman 1970).

Lutman (1983:132), defines audio-visual training as the art of comprehending the speech of another through the visual interpretation of gestures, facial movement and especially lip movement. In audio-visual training, vision is the principle modality and the perceiver is observing the face of the speaker. It is the skill that enables a person regardless of whether his/her hearing is normal or impaired to understand language by attentively observing the speaker.

Maxon and Bracket (1992:4), point out that pupils with congenital or early onset of hearing impairments will have difficulty developing auditory feedback mechanism unless appropriate early amplification and training are implemented. Early amplification is therefore necessary for speech-reading as a rehabilitation for the hearing loss. The outcomes or results that will ensure effective audiological rehabilitation process include self-monitoring of speech production, good articulation and good voice quality.
2.5.3.4 Auditory Verbal Therapy

Chermak and Museik (1997) explains a new communication training called Auditory Verbal Therapy (AVT) as a specialized type of therapy used for teaching a child to use hearing provided by a hearing aid or a cochlea implant for understanding speech as well as learning to talk. Mwereria (2002:36) describes speech as an ordered combination of sounds which are expressed orally and received by the ears. It is also a medium through which language can be expressed. He goes further to say that young children develop speech and language through listening. The sense of hearing is involved in enabling children to understand both immediate and far away sounds. A child with hearing defect is unable to benefit from speech, unable to develop speech and language in a natural way and communication through spoken language may be difficult. AVT is an effective way of enhancing audiological rehabilitation process as the child is taught to develop his/her hearing as an active sense so that listening becomes automatic as the child seeks out sounds in life. Hearing and active listening become an integral part of communication, recreation, socialization, education and work.

From the background of remediation process, it is noted that there are modern and powerful hearing devices in the market that could help the hearing impaired pupils, but these are not available in Kenyan schools. The study was set to investigate the factors that led to ineffective use of audiological equipment while teaching specialist subjects and how these problems could be solved.
2.6 Summary of Literature Review

All that has been said in the literature review was intended to give a general outlook to the reader into other people's views on evaluation and remediation process on audiological rehabilitation of pupils with hearing impairments with regard to effective use of hearing devices.

In the review, contributions of various authorities in the education of pupils with hearing impairments, psychologists as well as other scholars were noted. Literature was reviewed according to objectives of the study. Gaps were identified such as limited research and lack of interest which led to audiological rehabilitation remaining a dominant component in the United States as stated by Ross (1987), and Northern and Sanders (1972:694). Rosen (1967) and Williams (1968) also supported lack of interest and inadequate training in audiology among teachers. Review was also done in Britain and UK. Comparison was made to some countries in Africa and the current rehabilitation situation in Kenya. It was identified that reports by KSDC of 1984-1986 cited in its survey of 1995 revealed lack of effective use of audiological equipment hence ineffective audiological rehabilitation process. The Ministry of Education Taskforce report on Special Education (2003) did not address audiological rehabilitation for pupils with hearing impairments.

What was of most importance in aiming at effective audiological rehabilitation process was to identify factors that contributed to lack of effectiveness of the use of audiological equipment and to address evaluation and remediation
components so as to assist the pupils with hearing impairment to achieve effective audiological rehabilitation.
CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this section, various procedures and methods used in the study are described. It focuses on the research design and location, target population, sampling procedure, sample size, research instruments, data collection techniques and data analysis.

3.1 Research Design

Kothari (2005:120) describes descriptive survey design as a method concerned with describing, recording, analyzing and interpreting conditions that exist or that existed, opinions that are held, processes that are going on, effects that are evident or trends that are developing. In this regard, audiological rehabilitation has been an ongoing phenomenon in schools for children with hearing impairment. I determined that its effectiveness has associated problems which I intended to investigate. Therefore, descriptive survey design was found relevant to determine the nature and extent of the variables that governed this study such as hearing aids and their effective use, specialist subjects, mode of communication and severity of hearing impairments.

3.2 Location of the Study

The study was conducted in Kisumu, Homa Bay, Migori and Bondo districts of Nyanza Province. The districts were chosen because they were the only districts with one primary school each for children with hearing impairments in
the Province. Moreover, audiological rehabilitation pupils in the schools has been a problem in that it has been done to a very limited extent. There was need to investigate its effectiveness and suggest possible solutions to such problems.

3.3 Target Population

The population comprised all the 5 schools for the hearing impaired pupils in Nyanza Province. There are 5 districts each with a primary school for the hearing impaired pupils. The total population of pupils was 741 as shown on table 3.1(a).

<table>
<thead>
<tr>
<th>District</th>
<th>Schools</th>
<th>Number of teachers</th>
<th>Number of pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>Total</td>
</tr>
<tr>
<td>Bondo</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Kisumu</td>
<td>6</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Homa Bay</td>
<td>7</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Migori</td>
<td>11</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Suba</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>35</td>
<td>74</td>
</tr>
</tbody>
</table>

Data obtained from MOEST –2004

Table 3.1(b) shows a further breakdown of target population of the study. It shows pupil enrolment per class.

<table>
<thead>
<tr>
<th>District</th>
<th>School</th>
<th>Nursery</th>
<th>Infant</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bondo</td>
<td>Nyangoma</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>27</td>
<td>19</td>
<td>18</td>
<td>19</td>
<td>25</td>
<td>14</td>
<td>23</td>
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</tr>
<tr>
<td>Kisumu</td>
<td>Maseno</td>
<td>19</td>
<td>11</td>
<td>25</td>
<td>18</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td>159</td>
</tr>
<tr>
<td>Homa Bay</td>
<td>Nyangweso</td>
<td>20</td>
<td>12</td>
<td>21</td>
<td>25</td>
<td>24</td>
<td>22</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>172</td>
</tr>
<tr>
<td>Migori</td>
<td>Kuja</td>
<td>17</td>
<td>19</td>
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<td>18</td>
<td>11</td>
<td>18</td>
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<td>15</td>
<td>15</td>
<td>23</td>
<td>163</td>
</tr>
<tr>
<td>Suba</td>
<td>Lambwe</td>
<td>10</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>86</td>
<td>68</td>
<td>80</td>
<td>94</td>
<td>79</td>
<td>79</td>
<td>64</td>
<td>69</td>
<td>57</td>
<td>65</td>
<td>741</td>
</tr>
</tbody>
</table>

Data obtained from MOEST 2004
3.4 Sample size and Sampling procedure

Table 3.2 summarises the study sample. There are five districts each with a school for pupils with hearing impairments in the province. Out of five, four were purposively selected to take part in the study. These are Kisumu, Homa Bay, Migori and Bondo. The sample also involved four primary schools for the hearing impaired pupils purposively selected among the five schools in the Province. The four schools were purposively sampled because they are the only special schools for pupils with hearing impairments. The schools are Maseno, Nyangweso, Kuja and Nyangoma as shown in table 3.2. The remaining school, Lambwe in Suba District which comprised of 7 teachers and 6 standard two pupils was used for piloting. The researcher purposely selected standard two from each school to take part in the study. The classes selected comprised pupils as follows: Maseno 18, Nyangweso 25, Kuja 18 and Nyangoma 27, giving a total of 88 to be used for observation.

<table>
<thead>
<tr>
<th>Schools</th>
<th>Classes</th>
<th>Number of pupils observed</th>
<th>Number of pupils for speech test</th>
<th>No. of teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
<td>Total</td>
</tr>
<tr>
<td>Maseno</td>
<td>Std. 2</td>
<td>9</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Nyangweso</td>
<td>Std. 2</td>
<td>13</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Kuja</td>
<td>Std. 2</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Nyangoma</td>
<td>Std. 2</td>
<td>14</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>42</td>
<td>46</td>
<td>88</td>
</tr>
</tbody>
</table>

Since this study used descriptive survey design, the size of the sample was 30% of the population (Ministry of Education 2003). This was applicable to 88 standard two pupils from all the schools purposively selected as follows:
Maseno 5, Nyangweso 7, Kuja 5, and Nyangoma 8 which gave a total of 25 out of 88 pupils to take part in auditory training test, speech reading test, speech test and interview. Selection of these pupils was also based on the age between 7-10 years old. This age range was considered because first, hearing loss has a more pronounced effect on speech perception from younger pupils but little effect from older pupils. Second, a child’s language and communication development proceeds most rapidly in the early years of life (Bench 1979:418).

The sample size of 30% also applied to 67 teachers from all four the schools purposively selected as follows: Maseno7, Nyangweso 4, Kuja 4, and Nyangoma 4 which gave a total of nineteen teachers including the 4 headteachers to take part in the study. A total of nineteen teachers were purposively selected because 15 of them are teachers of standard 2 and the other 4 are headteachers who are concerned with the provision of required resources. Out of nineteen, eight (two from each school) were further purposively selected to teach specialist subjects and administer the tests. This selection was based on the teachers teaching specialist subjects that are related to speech and communication while other teachers were teaching subjects like mathematics, social studies etc which are not related to speech hence they did not have the characteristics I wanted for my study. This allowed the findings to be generalized on the whole population hence gave a fair representativeness of the whole province.

The headteachers were involved in the study because the success of any school activity depends on them in terms of the provision of the required resources as...
well as administrative means of attaining the stated objectives. The specialist subject teachers were involved in the study because they were directly concerned with speech and communication training with the use of audiological equipment during classroom instructions. In addition, it was through these teachers that the headteachers were informed about matters concerning audiological equipment. Standard two was selected because for most pupils with hearing impairments, this period marks the beginning of their formal education. At this age, such pupils accept hearing aids and once fitted, they are worn quite unselfconsciously even throughout adolescent period (Dale 1962: 113).

3.5 Research Instruments

Borg and Gall (1983), define research instruments as the tools for collecting data. In order to answer research questions, data were collected by use of observation (for auditory training and speech reading test), questionnaires, speech test and interviews.

3.5.1 The Observation Schedule

Philips (1985:292) defines observation as a method of collecting data during which a researcher notes things or events with a variety of senses: seeing, hearing, touching, tasting and smelling.

The classroom observation in this study was based on O’leary’s (1972) method of observation and Cooper (1984) speech communication. This was adapted to record performance in communication (auditory training and speech reading) among 25 pupils from all the schools.
The researcher visited each school for a period of one week. He observed standard two pupils during normal teaching period of 35 minutes daily for a period of one week per school making a total observation period of four weeks in all the four schools.

Twenty-five pupils were divided into two groups; Kuja and Nyangweso forming one group, while Maseno and Nyangoma forming another group respectively. The first group was taught and tested by two specially trained teachers and the second group was taught and tested by two non-specially trained teachers. After teaching, tests on communication (auditory training and speech reading) were administered to selected pupils individually in all the two groups. Comparison on pupils' performance was done.

Speech reading test was constructed in three sections. Section A consisted of five words to be said to pupils individually. Pupils were expected to repeat the same words correctly, each word awarded 2 marks, total 10 marks. Section B consisted of months of the year (five months) said to pupils individually following the same procedure employed above. Section C consisted of six sentences said to pupils individually. Pupils were expected to repeat the same sentence correctly, each awarded 5 marks, total 30 marks (Appendix F and Appendix G).

Auditory training was constructed in two sections. Section A consisted of auditory perception, tested by producing sound from different sound making instruments (e.g. drum, bell, shakers, bottle and whistle) one after the other.
without pupils watching and they were expected to respond to the sound by performing an activity, for example moving a step forward. Each activity correctly performed in response to a sound was awarded 2 marks, total 10 marks. Section B consisted of auditory discrimination where various sound making instruments were provided (e.g. drum, bell, tin, rattle, sticks, paper, hand clap, bottle, whistle, cup and spoon). Sound was produced from 8 instruments one after the other without pupils watching and they were expected to determine which instrument produced what sound. Each instrument determined correctly was awarded 5 marks, total 40 marks (Appendix D and Appendix E).

3.5.2 The Questionnaire

Questionnaire is a method of collecting data which enables the researcher to explain the purpose of the study and the meaning of items that may not be clear (Best and Khan 1992:181). The study was conducted using the questionnaire, which was administered to the teachers and headteachers.

3.5.2.1 Teachers’ Questionnaire

Questionnaire was administered to teachers because the teachers are directly involved with the pupils in terms of teaching and using electroacoustic systems. They were in a position to give relevant information concerning the inquiry.

Teachers’ questionnaire was divided into three sections: Section one involved personal details of teachers and was answered by either putting a tick √ or X,
section two involved communication training and was answered by giving statements, answering Yes or No and also by giving reasons or explanations. Section three involved mode of communication and audiological equipment in use. This was answered by putting a tick √ or X, Yes or No, and also by giving reasons/statements and explanations to clarify points (Appendix A).

3.5.2.2 Headteachers’ Questionnaire

Questionnaire was administered to headteachers because the success of any school lies on the headteachers in terms of provision of the required resources, accountability and ensuring effective use.

Headteachers’ questionnaire was divided into three sections. Section one involved personal details of the headteacher. Section two involved staff profile, pupil enrolment per class and categories of their hearing loss. This section was answered by completing the tables provided. Section three involved audiological equipment in the schools and details about their use. This section was answered by putting a tick √ or X, Yes or No, giving explanations and suggestions and also by completing the tables provided (Appendix B).

3.5.2.3 Pupils’ Interview

This was divided into three sections. Section one involved personal details of the child. Section two involved the use of audiological equipment while section three involved the mode of communication preferred and used in the school. Pupils’ interview was conducted to individual child by the class teacher with the researcher posing a few questions for more information (Appendix C).
3.5.3 Speech Test

"Teacher made speech test" was used in this study to elicit pupils’ ability to hear auditory message and interpret it. The purpose of speech test in this study was to diagnose the effectiveness of listening plus lip reading with or without the use of hearing aids. The items of the test were constructed on the basis of lower primary English language vocabulary.

The administration of this test involved a total of 25 out of 88 hearing impaired pupils purposively selected from standard two from all the schools sampled. The number was limited to 25 because of the limited language of hearing impaired pupils who require a lot of time and repetition of questions to be able to obtain information. The pupils selected varied in age between 7 and 10 years. This early age is important because it is easier to give and evaluate pupils with hearing impairments below 11 years old (Maxon and Bracket, 1992). Each child was presented with twenty monosyllabic words under two conditions: first, unamplified auditory plus lip reading. Second, amplified auditory plus lip reading. The words were dictated once at a reasonable interval in a clear deliberate voice while a child listened and watched the speaker. The investigator also observed at close range without interview to avoid influencing the responses of the respondents while recording the responses. The data obtained were related to what was currently happening and were not to be complicated by either past behaviour or future intentions or attitudes of the respondents. The child was expected to repeat the same words correctly after the speaker – first without using the hearing aids and second
while using the hearing aids. This also tested both receptive and expressive communication (Appendix H).

The researcher recorded the responses using the checklist and each word repeated correctly was awarded 5 marks, totaling to 100% scores for all the 20 words (Appendix I). A child who scored 30% and below was considered fail. Effectiveness of hearing aids in rehabilitation process was determined by observing the pupils’ scores in speech test.

3.6 Piloting

Piloting was carried out at Lambwe Primary School for the hearing impaired pupils in Suba District. The school was among the five schools for the hearing impaired in the province and it did not take part in the actual study.

Piloting involved 7 teachers including the headteacher of the school. It also involved 6 standard two pupils. The procedures employed in piloting was similar to those that were used during the actual data collection.

Piloting was done to help identify misunderstandings, ambiguities and unnecessary or inadequate items in the instruments. It was also used to check the suitability and level of language and to gain basic administrative experience in conducting the research in preparation for the survey group (Cohen et al, 2001:260). Results obtained from piloting were factored into reconstruction of the instruments and objectives.
3.6.1 Validity

Validity is a critical criterion and indicates the degree to which an instrument measures what it is supposed to measure (Kothari, 2005:73). Being a non-statistical method to show the degree to which the empirical measure accurately measures the concept, it was used in validating the items employed in the instruments (Orodho, 2004).

The validity of the instruments was determined through expert judgment through which the instruments were assessed in order to ensure whether the set of items accurately represented the variables under study. In this process, a panel of three experts well conversant with the area under study were used to determine the validity of items in the instruments. Their recommendations were incorporated in the final questionnaires, tests and interviews.

3.6.2 Reliability

Reliability is essentially the extent of agreement between repeated measures of the same test materials (Everitt, 1996:286). That is the ability of a test to consistently yield the same results when repeated measurements are taken of the same subjects under the same conditions (Sovel and Lawson, 1970). In piloting, the teachers, headteachers and pupils responded to all the questions. Time taken for observation was between 30-40 minutes per class and 20 -30 minutes for interviews and speech tests per child.

A test-retest technique was employed in this study to assess the reliability of the instruments. This approach required the administration of the research
instruments to the pilot group twice within the interval of two weeks. Using Pearson Product Moment formular:

\[ r = \frac{\sum xy}{\sqrt{(\sum x)^2 (\sum y)^2}} \]

a correlation of 0.05 confidence interval was used to judge the items in the questionnaires for teachers and headteachers, interview, speech test, speech reading and auditory training tests for pupils.

A reliability of 0.97 was established for teachers’ questionnaire, 0.91 for headteachers’ questionnaire, 0.89 for pupils’ interview, 0.98 for speech test, 0.75 for auditory training and 0.93 for speech reading. These were found to be good enough as they showed that the instruments were reliable.

3.7 Data Collection Procedure

Before data collection exercise, the researcher visited the District Commissioner to get ready to carry out the study. Logistic procedures were followed downwards to the District Education Officer and to the schools. The researcher visited the schools under study to familiarize himself, after having obtained permission from the Ministry of Education, Science and Technology. The headteachers were briefed on the purpose and objectives of the study. The researcher applied participant observation technique to observe lessons in each class for all the schools and subsequent tests in specialist subjects. Teacher made speech test of hearing was administered by the regular teacher while the researcher observed, and recorded the responses using speech test observation checklist (Appendix I). After speech test, the researcher arranged
with the classteacher for the administration of pupils interviews. This was done by the researcher with the help of the classteacher.

3.8 Data Analysis

According to Kerlinger (1973:134) data analysis means categorizing, ordering, manipulating and summarizing data to obtain answers to research questions.

The data collected for this study were quantitative and qualitative in nature.

The quantitative data collected through observation, questionnaire and interview were prepared in stages for analysis of frequencies, mean separation and by using a t-test. These were based on the actual data collected from headteachers, teachers and pupils. First, the researcher personally collected questionnaires from the respondents and sorted out non-response problems by holding further consultations with the respondents in an effort to ensure that all the sections and items in the questionnaires were answered.

A data codebook was prepared by the researcher for data coding. This reference book facilitated the entry of data into computer data entry sheets. In the descriptive statistics, the actual data collected was used to calculate percentages, frequencies and means to determine the extent of the use of audiological equipment.

Qualitative data on the other hand were first converted into a write-up using pre determined coding category sets such as audiological equipment and their use and communication training. This process was followed by summarizing the data in order to capture the teachers’ ideas, attitudes, views, motives and
perceptions on the use of audiological equipment. Research questions 1 for teachers and 5 for pupils were analysed using ‘t’ test. The level of significance was set at 0.05 level of confidence while questions 2,3,4 and 6 were analysed using descriptive analysis. Data collected were presented by using tables, frequencies, percentages, means and standard deviation. This enabled the researcher to discuss the views and perception of teachers on the use of audiological equipment and the associated problems.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

The purpose of this study was to investigate the effectiveness of the use of audiological equipment in the development of speech and communication skills of pupils and to establish teachers' and pupils' attitudes towards the use of audiological equipment.

Section one of this chapter deals with teachers' training on the use and management of audiological equipment. Section two deals with the usefulness of audiological equipment to pupils. Section three deals with the types of audiological equipment that are available in the schools and their functional status. Section four deals with factors that hinder effective use of the equipment. Section five presents the analysis of the extent to which pupils use their auditory sense. This section analyses the difference in speech perception with and without amplification. Finally, section six analyses the teachers' and pupils' attitudes towards the use of audiological equipment.

The data were analysed according to objectives of the study using microcomputer to establish the frequencies, percentages and means. A t-test technique was used to test pupils' performance in communication skills (auditory training and speech reading) and speech perception. Correlation coefficient was used to establish performance in auditory training, speech reading tests and speech test of hearing.
4.1 Relationship between teachers' training in the use and management of audiological equipment and pupils' performance in communication skills

The first research question developed from the above objective is: What influence do teachers' training in the use and management of audiological equipment have on pupils' performance in communication skills?

This question focused on the following two themes;

- Teachers' specialized training in basic audiology
- Pupils' performance in communication skills (auditory training and speech reading)

The findings for the above objective and research question are as follows:

Table 4.1 Teachers' training on use and management of the equipment (N=15)

<table>
<thead>
<tr>
<th>School</th>
<th>Teachers trained</th>
<th>Type of training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maseno</td>
<td>4</td>
<td>Seminar (2) Certificate (2)</td>
</tr>
<tr>
<td>Nyangoma</td>
<td>3</td>
<td>Seminar (2) Diploma (1)</td>
</tr>
<tr>
<td>Kuja</td>
<td>2</td>
<td>Seminar</td>
</tr>
<tr>
<td>Nyangweso</td>
<td>1</td>
<td>Seminar</td>
</tr>
</tbody>
</table>

Table 4.1 shows teachers' training on use and management of audiological equipment. The results of this investigation indicated that ten (66.7%) of 15 teachers sampled had undergone various in-service training on use and management of the equipment. Maseno School was in a better position in terms of teachers' training on use and management of the equipment. Four teachers out of five had gone for training. Two of them had attended certificate course while two had attended seminars. Nyangoma had three teachers out of eight
two of whom had attended seminars and one had a diploma. Kuja School had two out of five who had attended seminar, while Nyangweso had one out of seven who attended seminar.

In response to item 4 about teachers’ training on use and management of audiological equipment in the teachers’ questionnaire, 10 out of 15 (66%) teachers who have been in-serviced on the use and management of audiological equipment indicated that the courses were useful but inadequate. Five teachers did not respond. Reasons given for rating the courses as inadequate included; short duration of courses, less frequency and the courses focused more on theory than practicals.

The quality management of the audiological equipment in the schools under study was far from what was expected in view of the tremendous efforts made by the government and concerned NGOs to train teachers through in-service courses on the use and management of the equipment (KSDC, 1995).

4.1.1 Pupils’ Performance in Speech Reading
Having determined the teachers’ training on the use and management of audiological equipment, it was necessary to find out pupils’ performance in communication skills. Two specialist subjects (speech reading and auditory training) were taught and tested.
Table 4.2 Pupils’ performance in speech reading (N=12)

<table>
<thead>
<tr>
<th>Pupils</th>
<th>Taught and tested by specially trained teachers</th>
<th>Taught and tested by non specially trained teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>32</td>
</tr>
<tr>
<td>3</td>
<td>48</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>58</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>8</td>
<td>38</td>
<td>44</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>24</td>
</tr>
<tr>
<td>10</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>56</td>
<td>28</td>
</tr>
<tr>
<td>12</td>
<td>56</td>
<td>36</td>
</tr>
<tr>
<td>Mean %age</td>
<td>47.00</td>
<td>32.00</td>
</tr>
</tbody>
</table>

Table 4.2 shows pupils’ performance in speech reading. The pupils were divided into two groups. Group one was taught and tested by specially trained teachers while group two was taught and tested by non-specially trained teachers. The two groups were compared to each other to determine whether they differed in performance. The findings revealed that pupils taught and tested by specially trained teachers had a mean score of 47.00% while those taught and tested by non-specially trained teachers had a mean score of 32.00%. The ‘t’ ratio was calculated and found to be \( t = 4.369, \text{df} = 11, P > 0.05 \). That is, there was a significant difference in performance of the two groups at 95% confidence interval. The pupils taught and tested by specially trained teachers had a better performance than those taught and tested by non-specially trained teachers.
A review and analysis of these findings indicated that speech reading test result lends support to the generalization that teachers’ qualification had a bearing on pupils’ performance. The ‘t’ ratio of 4.369 in favour of pupils taught by specially trained teachers is based on the teachers’ skills in speaking to a hearing impaired child. Literature also points out that for effective audio-visual training, the speaker (teacher) must observe the receiver (the child) at face level and this skill enables a person regardless of whether his/her hearing is normal or impaired to understand what is being said (Davis and Silverman, 1970).

4.1.2 Pupils’ Performance in Auditory Training

Table 4.3 Pupils’ performance in auditory training (N=12)

<table>
<thead>
<tr>
<th>Pupils</th>
<th>Taught and tested by specially trained teachers</th>
<th>Taught and tested by non specially trained teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>58</td>
</tr>
<tr>
<td>2</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>74</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>84</td>
<td>54</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>68</td>
</tr>
<tr>
<td>7</td>
<td>60</td>
<td>72</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>78</td>
</tr>
<tr>
<td>9</td>
<td>74</td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>74</td>
<td>56</td>
</tr>
<tr>
<td>11</td>
<td>70</td>
<td>66</td>
</tr>
<tr>
<td>12</td>
<td>80</td>
<td>86</td>
</tr>
<tr>
<td>Mean %age</td>
<td>67.00</td>
<td>64.16</td>
</tr>
</tbody>
</table>

Table 4.3 shows pupils’ performance in auditory training. The procedure for teaching and testing was similar to that employed in section 4.1.1 above. The
two groups were compared to each other to determine whether they differed in performance. Although the findings revealed that there was a mean score of 67.00% for pupils taught and tested by specially trained teachers and 64.16% for those taught and tested by non-specially trained teachers respectively a ‘t' ratio of 0.685, df = 11, P<0.05 proved that there was no significant difference in performance of the two groups at 95% confidence interval. The pupils taught by specially trained teachers performed almost equally as those taught by non-specially trained teachers.

The findings in auditory training results of 67.00% and 64.16% for the two groups respectively did not suggest that their auditory perception was equally good despite teachers' professional qualification. Various issues concerning auditory training need to be considered. For example, period of training and frequency of testing as well as testing sessions. Silverman (1984:204) in his study on hearing evaluation, stated that a child’s hearing cannot be evaluated reliably until after several testing sessions which have been separated by periods of training.

4.2 Usefulness of Audiological Equipment to Pupils with Hearing Impairments

Literature on education and performance in communication training and other subjects of pupils with hearing impairments points out the necessity of audiological equipment as stated by Bamford and Sounders (1985), Conrad (1980) and Bench (1974). To this effect, usefulness of audiological equipment to pupils with hearing impairments was determined.
The second research question developed from the above objective is: What are the usefulness of audiological equipment to pupils with hearing impairments?

This question focused on the following themes:

- Usefulness of hearing aids
- Utilization of individual hearing aids by standard two pupils

The findings for the above objective and research question are as presented:

4.2.1 **Usefulness of Hearing Aids**

In response to item 5 in the teachers' questionnaire, all teachers (15) sampled agreed that it is important for hearing impaired pupils to use hearing aids as it enables them to improve their oral communication, receptive and expressive language, listening and also create awareness of sound. However, they went further to explain that when the child is profoundly deaf, it is necessary to use alternative methods of communication like total communication.

The investigation on the usefulness of audiological equipment to pupils with hearing impairment adds its measure of evidence in support of the necessity of audiological equipment to enable these pupils to develop speech and communication as pointed out by Bamford and Sounders (1985), Conrad (1980) and Bench (1974).

All the teachers sampled (15) stated that hearing aids are useful particularly to pupils suffering from conductive hearing impairments. This is in agreement with studies done in Britain where a child who was deprived of his auditory inputs from early years of life and in less than two years after exposure to
sound showed advances in receptive and expressive language skills (Conrad 1979). That means the hearing opened to the child a broad vista of enriched social experience which every person (hard of hearing or profoundly deaf) needs for a happy adjustment to this acoustically complex world. The provision of amplification is an important requirement in the education of pupils with hearing impairment.

4.2.2 Utilization of Individual Hearing Aids by Standard Two Pupils.

For pupils to obtain the benefits of hearing aids, the frequency of hearing aid use is essential. To this effect, utilization of hearing aids by standard two pupils was determined.

This section sought to establish the extent of utilization of audiological equipment among the standard two pupils in all the 4 schools. Twenty-five pupils sampled for interview (100%) from the 4 schools stated that they were not using the equipment. In response to item 21 in the headteachers’ questionnaire on the degree of hearing loss among standard two pupils, two headteachers out of four (50%) stated that they had 16 pupils with mild to moderate hearing loss and 24 with severe hearing loss who could benefit from the equipment. The other two headteachers (50%) did not have any record of pupils’ degree of hearing loss. In response to item 18 on the utilization of hearing aids by pupils, all the four headteachers sampled stated that they were not using hearing aids. Three of the headteachers gave reasons why pupils were not using hearing aids as faults and lack of accessories among others. They went further to explain that all the available equipment are old models which
most pupils (particularly the older ones) do not like. All the four headteachers indicated that there is need for modern types of hearing aids.

When the 25 pupils were questioned about their interest in the use of hearing aids, 24 out of 25 (96%) said that they would prefer to use the equipment in the school, at home and at all times if available. But one profoundly hearing impaired child did not like to use the aid. All the 24 (96%) pupils who expressed their liking for hearing aids would prefer to use the body worn type if available.

From the above findings, it can be summarized that utilization of hearing aids is of a very limited extent or not being utilized at all. This is quite a surprising revelation, a situation most likely to result into ineffective audiological rehabilitation in the schools. This finding concurs with studies done by Bench (1974) cited in Conrad (1979) about an auditorily deprived child who showed a great improvement in both receptive and expressive language after exposure to environmental sounds with the use of hearing aids.

Oral communication with effective use of audiological equipment should not be forgotten particularly by pupils with some residuum of hearing. Even the very severe cases can benefit from the equipment through proper training as highlighted by Travis (1971:400) in his survey on speech perception among children with hearing impairment. He emphasized that:

A congenitally deaf child is not dumb. His mechanism for speech is normal but he has simply never been taught to speak.
4.3 Types and Functional Status of Audiological Equipment in the Schools

Having determined the usefulness of audiological equipment to pupils with hearing impairments, it was necessary to find out the types and functional status of the equipment in the schools under study.

The third research question generated from the above objective is: What are the types and functional status of audiological equipment in the schools?

To get a clear picture of the types and functional status of individual hearing aids available in the schools, this question focused on the following areas:

- Types and number of hearing aids available in the schools
- Functional status, testing and repair of the equipment
- Other sound equipment used in the schools

The findings for the above question and objective are presented in Table 4.4

### 4.3.1 Types and Number of Individual Hearing Aids available in the Schools

<table>
<thead>
<tr>
<th>Name of school</th>
<th>Body worn</th>
<th>B.T.E</th>
<th>I.T.E</th>
<th>G.H.A (in sets)</th>
<th>L.I.S. (in sets)</th>
<th>Speech trainer</th>
<th>Radio receiver</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maseno</td>
<td>167</td>
<td>31</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td>Nyangoma</td>
<td>184</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>184</td>
</tr>
<tr>
<td>Nyangweso</td>
<td>120</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>120</td>
</tr>
<tr>
<td>Kuja</td>
<td>85</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>110</td>
</tr>
<tr>
<td>TOTAL</td>
<td>556</td>
<td>56</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>614</td>
</tr>
</tbody>
</table>
Table 4.4 shows types and number of hearing aids available in the schools. The findings based on the headteachers’ questionnaires revealed that there were 614 hearing aids altogether in the four schools distributed as follows: Kuja 110, Nyangweso 120, Nyangoma 184 and Maseno 200. The gaps indicated by – show that the schools did not have the equipment.

The findings further revealed that there were 556 body-worn types in the four schools distributed as follows: Kuja 85, Nyangweso 120, Nyangoma 184 and Maseno 167. There were 56 Behind-The-Ear of which Kuja had 25 and Maseno had 31. Maseno was the only school with the In-the-Ear hearing aids.

From the results, it can be said that the most commonly available type of individual hearing aid is the body-worn. Every school had a reasonable number of body-worn hearing aids totaling to 556. Surprisingly, only 134 (24.1%) were functional. Reasons given for non-functional hearing aids included lack of ear moulds, lack of spare parts, faulty hearing aids etc. This situation contributed to ineffective audiological rehabilitation in the schools.

As stated by Carmen (1997), there are various modern types of hearing aids like Digital hearing aids, Contra lateral Routing of Signs (CROS) etc which are best for any person with hearing loss of any degree. However, the findings of
this study revealed that no school owns any of these modern types of hearing aids.

4.3.2 Functional Status, Testing and Repair of the Equipment

For hearing aids to do what they are intended to do, they must be functional. To this effect, their functional status, testing and repair was determined.

Table 4.5 Functional status of hearing aids

<table>
<thead>
<tr>
<th>Types of hearing aids</th>
<th>Total No.</th>
<th>No. functioning</th>
<th>No. not functioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body worn</td>
<td>556</td>
<td>134 (24.1%)</td>
<td>422 (75.9%)</td>
</tr>
<tr>
<td>Behind-the-Ear</td>
<td>56</td>
<td>3 (3.4%)</td>
<td>53 (96.6%)</td>
</tr>
<tr>
<td>In-the-Ear</td>
<td>2</td>
<td>-</td>
<td>2 (100%)</td>
</tr>
<tr>
<td>Group hearing aid</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Loop induction system</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Speech trainer</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Radio receiver</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>614</strong></td>
<td><strong>137</strong></td>
<td><strong>477</strong></td>
</tr>
</tbody>
</table>

Table 4.5 shows functional status of hearing aids. This section analyses functional status of hearing aids available in the schools, their testing and repair. The findings revealed that out of 556 body-worn hearing aids, only 134 (24.1%) were functional whereas 422 (75.9%) were not. Out of 56 behind-the-ear, only 3 (3.4%) were functional whereas 53 (96.6%) were not. The findings further revealed that all the two in-the-ear hearing aids were not functional. In the final analysis, out of 614 hearing aids only 137 (22.3%) were functional whereas 477 (77.7%) were not functional. The gaps indicated by – show that hearing aids were not available.

In response to item 16 of headteachers’ questionnaire about hearing aid repair, the findings revealed that none of the schools had hearing aid tester or repair
All the headteachers (4) indicated that there was lack of spare parts and ear moulds. Further findings revealed that all the schools (4) formerly depended on the assistance from KISE to test and repair their audiological equipment. Unfortunately, this assistance is no longer forthcoming and the schools do not have the capacity to diagnose the particular problems with hearing aids. Moreover, the equipment cannot work without electricity or alternative power supply and one school, Nyangweso indicated that it could not use its equipment effectively due to lack of electricity.

Findings in this section lend support to the report cited by KSDC (1995) that a lot of hearing aids were not in use due to various faults such as lack of spare parts, lack of ear moulds among others. All the schools (4) sampled reported availability of faulty hearing aids which need repair. This factor enormously contributed to ineffectiveness of audiological rehabilitation in the schools.

### 4.3.3 Sound Equipment Used in the Schools

Where conventional hearing aids are not available for use by the pupils, other alternative equipment are essential. To this effect, availability of other sound equipment used in the schools was determined.

#### Table 4.6 Sound equipment used in the schools

<table>
<thead>
<tr>
<th>x</th>
<th>Bell</th>
<th>Drums</th>
<th>Jingles</th>
<th>Whistles</th>
<th>Rattles</th>
<th>Speech</th>
<th>Tins</th>
<th>Shakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuja</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Nyangweso</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nyangoma</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maseno</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

x - Sound equipment used in the schools.
Table 4.6 shows other sound equipment that are used in the schools. The study findings revealed that teachers improvised and used different sound equipment for teaching specialist subjects and other subjects in the schools. The findings further revealed that teachers from Kuja preferred to use five different sound equipment (bells, drums, jingles, whistles and rattles) and other schools used the same equipment and three different assorted equipment for example, speech kit, tins and shakers. The spaces left blank below the equipment shows that the schools did not have those equipment.

In the event of unavailability of conventional hearing aids, improvised sound equipment were used for teaching. This is a commendable effort by the teachers. Nonetheless, the sound equipment improvised were only useful in sound perception and discrimination but not for training speech, receptive and expressive communication. In this regard, problems of audiological rehabilitation process were not lessened.

4.4 Factors that might Hinder Effective Use of the Equipment

For effective use and management of audiological equipment, teachers need to know the factors that might hinder effective use of the equipment. This study went further to determine such factors.

The fourth research question developed from the above objective is: What factors are likely to hinder effective use of the equipment in the schools?

This question focused on the following areas:

- Factors hindering effective use of the equipment
• Suggestions for solving the indicated problems

The findings for the above objective and research question are as presented:

4.4.1 Factors Hindering Effective Use of the Equipment

This section sought to determine factors that are likely to hinder effective use of audiological equipment in the schools. The findings revealed that the most cited factors hindering effective use of the equipment in order of preference were faulty aids, lack of spare parts, lack of skilled manpower, lack of ear moulds, lack of proper assessment, insufficient hearing aids while the least cited factor was lack of electricity.

The findings in this section present some evidence to support the idea that hearing aids can fail to function due to variety of factors. Moreover, there are other factors like the extent and type of hearing loss. This is an important factor because even the ears that are entirely free of disease differ significantly in sensitivity. Other factors are additional handicap to hearing impairment and noisy environment. The findings of this section revealed lack of electricity as the least factor that hindered affective use of the equipment. This idea was overlooked based on the fact that some audiological equipment can never function without electricity or alternative power supply. Even individual hearing aids which use rechargeable batteries will need electricity.
4.4.2 Suggestions for Solving the Problems that Hinder Effective Use of the Equipment:

In the analysis of the suggestions, the findings revealed that the most cited suggestions to solve the problems in order of importance were; provision of tool kit and a technician, provision of hearing aid accessories, organisation, and provision of more in-service courses, provision of ideal auditory assessment, appointment of a teacher to be in-charge of the equipment in every school, provision of suitable ear moulds, provision of sufficient modern hearing aids, regular inspection of the use of the equipment in the schools, orientation of pupils on the use of the equipment while the least cited suggestion was the provision of alternative power supply to the schools.

Suggestions to solve these problems prioritized the provision of tool kit and a technician whereas inspection of the equipment was cited among the least factors. This finding did not support the contribution of Carmen (1997), who stressed the provision of modern hearing aids which operate in a manner similar to human ear. Such modern hearing aids also offer natural sound quality in a multitude of listening situations, functioning automatically and adapting instantaneously to every change of sound to minor faults as a result of hangs and bangs. For a continuous effective use of the equipment, regular inspection is necessary whether the aids are old or modern models. It is evident, therefore, that the identified factors contribute to ineffective use of audiological rehabilitation process in the schools.
4.5 Difference in Speech Perception with and Without the Use of Hearing Aids

Hearing impairment causes speech handicap and therefore it is necessary to ascertain the extent to which pupils with hearing impairment use their auditory sense to develop speech. To this effect, speech perception with and without the use of hearing aids was determined.

The fifth research question developed from the above objective is: Is there significant difference in speech perception of the pupils with and without the use of hearing aids? This objective was also related to the null hypothesis which states that: There is no significant difference in speech perception of the pupils with and without the use of hearing aids.

This question focused on one area: Speech test of hearing.

The findings for the above question, objective and hypothesis are as presented:
Table 4.7 Pupils performance in speech test of hearing with and without amplification (N=25)

<table>
<thead>
<tr>
<th>Pupils</th>
<th>With amplification</th>
<th>Without amplification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>71</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>83</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
<td>63</td>
</tr>
<tr>
<td>5</td>
<td>95</td>
<td>88</td>
</tr>
<tr>
<td>6</td>
<td>74</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>82</td>
<td>63</td>
</tr>
<tr>
<td>8</td>
<td>63</td>
<td>45</td>
</tr>
<tr>
<td>9</td>
<td>79</td>
<td>69</td>
</tr>
<tr>
<td>10</td>
<td>76</td>
<td>69</td>
</tr>
<tr>
<td>11</td>
<td>89</td>
<td>74</td>
</tr>
<tr>
<td>12</td>
<td>46</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>85</td>
<td>52</td>
</tr>
<tr>
<td>14</td>
<td>42</td>
<td>27</td>
</tr>
<tr>
<td>15</td>
<td>43</td>
<td>31</td>
</tr>
<tr>
<td>16</td>
<td>79</td>
<td>56</td>
</tr>
<tr>
<td>17</td>
<td>21</td>
<td>03</td>
</tr>
<tr>
<td>18</td>
<td>55</td>
<td>26</td>
</tr>
<tr>
<td>19</td>
<td>65</td>
<td>43</td>
</tr>
<tr>
<td>20</td>
<td>55</td>
<td>22</td>
</tr>
<tr>
<td>21</td>
<td>43</td>
<td>23</td>
</tr>
<tr>
<td>22</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td>23</td>
<td>64</td>
<td>30</td>
</tr>
<tr>
<td>24</td>
<td>58</td>
<td>23</td>
</tr>
<tr>
<td>25</td>
<td>52</td>
<td>30</td>
</tr>
<tr>
<td>Mean %age</td>
<td>67.20</td>
<td>45.68</td>
</tr>
</tbody>
</table>

Table 4.7 shows pupils’ performance in speech test of hearing with and without the use of amplification. This section sought to diagnose the effectiveness of listening plus lip reading with and without the use of hearing aids.

To identify the difference in speech perception of pupils with and without the use of hearing aids, a “teacher-made speech test” which focused on the
difference in speech perception of 25 pupils with and without the use of hearing aids was administered. This was aimed at determining pupils’ ability to hear and interpret auditory message. The purpose was to diagnose the effective listening plus lip-reading with and without the use of hearing aids. The two conditions were compared to determine how they differed in performance. The findings revealed that performance in speech test with amplification had a mean percentage score of 67.20% while without the use of amplification dropped to a mean of 45.68%.

In the analysis using a 't' test, a 't' ratio was calculated and found to be $t = 11.508$ at df =24 ($P>0.05$). There was a significant difference in speech perception of the pupils with and without amplification at 95% confidence interval. These findings indicate the tenability of the notion that amplification improves speech perception and thus results in effective audiological rehabilitation. Therefore, the null hypothesis stating that: there is no significant difference in speech perception of the pupils with and without the use of hearing aids was rejected at 95% confidence interval.

The findings further revealed that subjects who combined amplified sound and lip reading received the words much more distinctly than those who listened without amplified sound. The results of this finding conform with the explanations made by Travis (1971:435) that speech training through amplified sound improve speech and perception when combined with lip reading.
4.6 Teachers’ and Pupils’ Attitudes Towards the Use of Audiological Equipment

Amplification is an important component in the education of hearing impaired pupils and for its effective utilization, willingness to use it by both teachers and pupils is essential. To this effect, the attitudes of teachers and pupils towards the use of the equipment was determined.

The sixth research question developed from the above objective is: What are the teachers’ and pupils’ attitudes towards the use of audiological equipment?

This question focused on the following areas:

- Teachers’ attitudes
- Pupils’ attitudes

This section sought to investigate the attitudes of teachers and pupils towards the use of audiological equipment. The findings related to the above objective and research question are analysed and presented as follows:

4.6.1 Teachers’ Attitudes

In response to item 7 in teachers’ questionnaire and item 17 in headteachers’ questionnaire, the findings revealed that all the teachers (15) and all the headteachers (4) sampled would like to teach while their pupils use audiological equipment. That means they had positive attitudes and were eager to use the equipment.

The results of the findings show that there is considerable agreement about the use of the equipment. This is due to the fact that they use total communication
which includes oral method and therefore requires the use of amplification. This depends on the availability of the equipment as well as teachers' commitment and motivation. Davis and Silverman (1970), pointed out that teachers' motivation and commitment to using audiological equipment is crucial for the training and development of speech.

4.6.2 Pupils' Attitudes

Table 4.8 Pupils' attitudes towards the use of the equipment

<table>
<thead>
<tr>
<th>School</th>
<th>Pupils (N)</th>
<th>Positive</th>
<th>Negative</th>
<th>No idea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuja</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nyangweso</td>
<td>7</td>
<td>7</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nyangoma</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Maseno</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>20</strong></td>
<td><strong>3</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Table 4.8 shows pupils' attitudes towards the use of audiological equipment. This section sought to investigate the attitudes of pupils towards the use of the audiological equipment. In response to items 2, 3 and 4 in the pupils' interview which focused on the use of audiological equipment, the findings revealed that all five pupils from Maseno and seven pupils from Nyangweso indicated that they like using hearing aids when available. This proved their positive attitude towards the use of the equipment. One child from Nyangoma reported that he was not interested in using the equipment because he felt shy and feared being identified as having hearing impairment. Two pupils from Kuja reported that they did not want to use hearing aids because they were unable to hear and speak. Other two pupils from the same school stated that they had not seen the hearing aid and therefore had no idea.
As Davis and Silverman (1970) explain, the motivation of pupils and their commitment to use audiological equipment contribute to the development of speech. It therefore becomes necessary to encourage pupils on the continuous use of hearing aids. This notwithstanding, inaccessibility to individual hearing aids for the pupils has made audiological rehabilitation process far from being effective in the schools. This finding concurs with findings by KSDC (1995) which revealed that a few schools in the country provided hearing aids to pupils for use during class hours only.
CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents summary of the findings of the study. The summary is presented into sections according to the research objectives which the researcher aimed at achieving. The summary is followed by the conclusions based on the study findings that are also made in connection with the objectives of the study. After the summary and conclusion, the study has gone further to suggest some recommendations on solving problems of effective use of audiological equipment in the audiological rehabilitation process of pupils in the schools. The final section outlines recommendations of areas for further research.

The findings of this study were based on the responses of 15 teachers, 4 headteachers and 25 standard two pupils from Maseno, Nyangweso, Kuja and Nyangoma schools.

5.1 Summary of Research Findings

The study intended to find out effectiveness of the use of audiological equipment in audiological rehabilitation in the schools in Nyanza Province. In this section, a summary of the results of the study are presented in accordance with the objectives of the study which were:
1. To determine the relationship between teachers' training on the use and management of audiological equipment and pupils' performance in communication skills.

2. To evaluate the usefulness of audiological equipment to pupils with hearing impairment.

3. To determine the types of audiological equipment in the schools and their functional status.

4. To determine factors that might hinder effective use of audiological equipment.

5. To identify the difference in speech perception of the pupils with and without the use of hearing aids.

6. To determine the teachers' and pupils' attitudes towards the use of audiological equipment.

The study also had a null hypothesis which stated that: there is no significant difference in speech perception of pupils with and without the use of hearing aids.

On the basis of the above objectives, the study found that:

Teachers' qualification on the use and management of audiological equipment had effect on pupils' performance in communication skills. To this effect, teachers' lack of knowledge and skills in basic audiology led to poor audiological rehabilitation process in the schools.
Amplification was found to be useful and also a very important requirement in audiological rehabilitation process for pupils. Their use was quite limited hence hinder development of speech and communication.

There is lack of modern and suitable hearing aids which has made effective audiological rehabilitation process for pupils a real difficult task.

The use of audiological equipment has associated problems and various factors have adversely affected audiological rehabilitation process in the schools.

Speech perception and communication skills are effective with amplification and the null hypotheses (Ho₁) was rejected.

Teachers and pupils had positive attitudes towards the use of audiological equipment. However, teachers had a view that pupils with mild to severe hearing impairment can derive more benefit from the equipment than those with profound hearing impairments. This concurs with views of Ballantyne (1977) on the usefulness of audiological equipments to pupils suffering from hard of hearing to severe hearing impairments.

5.2 Conclusion

In conclusion, the study findings revealed problems associated with the use of audiological equipment in audiological rehabilitation process such as:

- Lack of trained teachers in basic audiology.
- As regards sound perception, discrimination and interpretation, a particular area for emphasis is that of auditory training.
• There is lack of effective use of hearing aids which is the cornerstone of audiological rehabilitation process.

• Schools lack modern and suitable types of audiological equipment in order to enhance audiological rehabilitation process.

• The use of audiological equipment is hindered by various factors hence pupils are denied their auditory experience.

• Speech training with amplification increases pupils' abilities to use their auditory sense.

• There is a considerable agreement among the teachers and pupils about the use of audiological equipment. What is lacking is motivation, commitment, knowledge and suitable equipment.

Recommendations

5.3 Recommendations from the Findings of the Study

Based on the findings of the study, the researcher wishes to make the following recommendations:

5.3.1 There is need for more in-service courses for the serving teachers to enable them to update their knowledge and skills in the use and management of audiological equipment. During the course, more emphasis should be laid on the practical aspects of the use and management of the equipment than theory.

5.3.2 The government through the Ministry of Education, Science and Technology should provide scholarships for upgrading of personnel to M.Sc and Ph.D in audiological studies.
5.3.3 Concerned colleges and universities to provide training facilities to train speech therapists.

5.3.4 Each Educational Assessment and Resource Centre, educational zone and/or district hospital should have a speech therapist and an audiologist.

5.3.5 There is need to provide suitable and powerful hearing aids such as digital hearing aids, contralateral routing of signs, cochlear implant etc.

5.3.6 There is need to orientate and encourage the pupils to use hearing aids at all times.

5.3.7 There is need for headteachers, after acquiring the equipment, to make sure that the equipment are in working condition whenever they are required for use. This is possible with the provision of repair kit and a hearing aid technician to do regular checkups and do repair in order to reduce problems that could hinder effective use of the equipment. Technicians should also be trained and posted to central places such as assessment centers.

5.3.8 In-service courses should be regularly organised for teachers to learn how to teach communication skills with the use of audiological equipment thereby assist pupils to develop speech and communication.
5.4 Areas for Further Research

The researcher proposed the following areas related to audiology to be considered for further research.

- This study covered one Province and focused on primary schools only. An extension on the same should be done to cover other Provinces, units and post-primary institutions.
- Ascertaining the extent of audiological rehabilitation in an inclusive setting
- Ascertaining the extent of auditory assessment and its effect on education of pupils with hearing impairment.
- A comparative study on academic performance of pupils who regularly use hearing aids and those who do not.
REFERENCES


Somerset Education Authority.


Kenya Institute of Special Education (2002). Distance learning. Introduction to inclusive education. Nairobi, KISE.


**Ministry Publications**


APPENDIX A
TEACHERS QUESTIONNAIRE

Instructions to the respondents
Please complete this form by putting a tick (\checkmark) or response in the spaces provided.

Part I
1. What is your rank? Headteacher ( )
    D/Headteacher( )
    Senior teacher ( )
    Asst. teacher ( )

2. What is your highest professional qualification as a teacher of the hearing impaired?
   (i) Trained ( ) Untrained ( )
   (ii) Seminar/Course less than 3months( ) Place/College ______
   (iii) Three months in-service course ( ) Place/College ______
   (iv) S1/Diploma ( ) Place/ College ______
   (v) B. Ed (Special Education) ( ) Place/College ______
   (vi) Any other (specify) ________________________________

Part II
3. (a) List sound equipment that are used for teaching auditory training.
    ____________________________  ____________________________  ____________________________
    (b) List some of the sound equipment that you have improvised for teaching auditory training.
    ____________________________  ____________________________  ____________________________

Part III
4.(a) Have you attended any in-service course, seminar or workshop on the use of audiological equipment? Yes( ) No ( )
State type of training, (i.e. seminar, in-service or workshop), duration, and place of training.

<table>
<thead>
<tr>
<th>Type</th>
<th>Duration</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) To what level of usefulness was the training course, seminars or workshops in improving your knowledge and skills on the use and management of audiological equipment?

Very useful ( )
Useful ( )
Not useful ( )

(c) State the adequacy of such training

Adequate ( )
Inadequate ( )
Not sure ( )

Please state reasons to justify your answer __________________________

______________________________

______________________________

(d) Suggest how you would prefer to be best trained on the use and management of the equipment. __________________________

______________________________

5. Indicate by putting a tick what you feel are the usefulness of hearing aids by pupils with hearing impairments?

<table>
<thead>
<tr>
<th>Enquiry</th>
<th>Agreed</th>
<th>Disagreed</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve both receptive and expressive language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create awareness of sound</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. State by putting a tick the adequacy of hearing aids for pupils during classroom teaching.

<table>
<thead>
<tr>
<th>Status of hearing aid</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate</td>
<td></td>
</tr>
<tr>
<td>Inadequate</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>Not sure</td>
<td></td>
</tr>
</tbody>
</table>

Please state reasons to justify your answer

7. (a) Do you like teaching while pupils use hearing aids?
   - Yes( )
   - No( )

(b) Please give reasons for your answer

8. Do pupils like using hearing aids? Yes( )
   - No( )

Please give reasons for your answer

9. What type of hearing aids do you prefer for your pupils?
   - Body worn ( )
   - Behind-the-Ear ( )
   - In-the-Ear ( )
   - Group hearing aid ( )
   - Loop induction system( )
   - Radio receiver ( )
   - Any other (specify)
10. State by putting a tick against factors that might hinder effective use of audiological equipment?

<table>
<thead>
<tr>
<th>Factors</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ear moulds</td>
<td></td>
</tr>
<tr>
<td>Lack of spare parts</td>
<td></td>
</tr>
<tr>
<td>Lack of skilled manpower</td>
<td></td>
</tr>
<tr>
<td>Faulty aids</td>
<td></td>
</tr>
<tr>
<td>Insufficient hearing aids</td>
<td></td>
</tr>
<tr>
<td>Lack of electricity</td>
<td></td>
</tr>
<tr>
<td>Pupils not willing to use</td>
<td></td>
</tr>
<tr>
<td>Lack of proper assessment and prescription</td>
<td></td>
</tr>
<tr>
<td>Any other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

11. State by putting a tick against possible solutions to these problems.

<table>
<thead>
<tr>
<th>Suggestions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>More in-service causes to be provided</td>
<td></td>
</tr>
<tr>
<td>Suitable ear moulds to be provided</td>
<td></td>
</tr>
<tr>
<td>Hearing aid accessories to be provided</td>
<td></td>
</tr>
<tr>
<td>Tool kit and a technician to be provided</td>
<td></td>
</tr>
<tr>
<td>Provision of auditory assessment</td>
<td></td>
</tr>
<tr>
<td>Pupils to be oriented on use of hearing aids</td>
<td></td>
</tr>
<tr>
<td>Use of the equipment to be inspected regularly</td>
<td></td>
</tr>
<tr>
<td>Teacher in-charge of the equipment to be appointed in every school and given more training</td>
<td></td>
</tr>
<tr>
<td>Sufficient and modern hearing aids to be provided</td>
<td></td>
</tr>
<tr>
<td>Any other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

12. Which method of communication do you use in classroom?

| Total communication ( )                         |
| Sign language ( )                               |
| Oral/Aural communication ( )                    |
| Any other (specify)                              |
13. To what level of difficulty do you find the use of oral communication among pupils with hearing impairment?

- Very difficult ( )
- Difficult ( )
- Not difficult ( )

Give reasons for your answer

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________
APPENDIX B
HEADTEACHERS'/ PRINCIPALS' QUESTIONNAIRE

Instructions
a) The purpose of this study is to investigate the effective use of audiological equipment in audiological rehabilitation of pupils with hearing impairments in Nyanza Province.
b) You can greatly contribute towards the attainment of this goal by giving your honest responses. Any additional information will be highly appreciated and you may write them behind the questionnaire or use additional paper.
c) The information so obtained shall be exclusively confidential. You do not have to write your name anywhere in this questionnaire.

Please answer all questions by putting a tick in the brackets and/or giving explanations where necessary.

Part 1
1. Name of your school?

2. No. of pupils: Boys _________ Girls _________ Total ______

3. State your highest professional qualification:
   
P.I ( )
   S.I/Diploma ( )
   B.Ed. ( )
   M.Ed. ( )
   Others (specify) ____________________________________________

4. State your special training area:
   
   H.I ( )
   M.H ( )
   V.I ( )
   P.H ( )
   Any other (specify) ____________________________________________
Part II

**Pupil enrolment and staff profile**

5. State enrolment of pupils in class two: Boys (  ) Girls (  ) Total (  )

6. State professional level of your staff in the table below.

<table>
<thead>
<tr>
<th>Professional level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

7. State the number of trained teachers in the area of hearing impairment

<table>
<thead>
<tr>
<th>Specialist training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

8. State number of teachers who have been trained/in-service on the use and management of audiological equipment.

- Seminar ________________
- Certificate ________________
- Diploma ________________
- Any other (specify) ________________________________________________

Part III

**Audiological equipment and communication training**

9. State the number of teachers in-charge of audiological equipment in your school? ____________________________

Of the teachers referred above, state their qualification/training on the use and management of the audiological equipment.

- Seminar (  )
- Certificate(  )
- Diploma (  )
Degree ( )
Any other (specify) __________________________________________

10. How often do you check and/or recalibrate functional status of audiological equipment?
   Daily ( )
   Weekly ( )
   Monthly ( )
   Yearly ( )
   Not at all ( )
   Any other (specify) __________________________________________

   If no checking is done at all, please give reasons. ____________________________
   ________________________________________________________________

11. Put a tick against response(s) you think is/are the usefulness of audiological equipment to pupils with hearing impairment.

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve receptive and expressive language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve listening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create awareness of sound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   What are your general comments about the use of audiological equipment by pupils with hearing impairment? ____________________________
   ________________________________________________________________

12. How many of the following types of audiological equipment are available, working or not working in your school?

<table>
<thead>
<tr>
<th>Type</th>
<th>Working</th>
<th>Not working</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual hearing aids:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body worn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behind-the-Ear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-the-Ear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group hearing aid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loop induction system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio receiver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech trainer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others specify</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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13. State by putting a tick against factors that might hinder effective use of audiological equipment.

<table>
<thead>
<tr>
<th>Factors</th>
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<td>Lack of skilled manpower</td>
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<tr>
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<td></td>
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<tr>
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<td></td>
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14. State by putting a tick against possible solutions to these problems.

<table>
<thead>
<tr>
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<th>Responses</th>
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<tbody>
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<td>Provision of auditory assessment</td>
<td></td>
</tr>
<tr>
<td>Pupils to be oriented on use of hearing aids</td>
<td></td>
</tr>
<tr>
<td>Use of the equipment to be inspected regularly</td>
<td></td>
</tr>
<tr>
<td>Teacher in-charge of the equipment to be appointed in every</td>
<td></td>
</tr>
<tr>
<td>school and given more training</td>
<td></td>
</tr>
<tr>
<td>Sufficient and modern hearing aids to be provided</td>
<td></td>
</tr>
<tr>
<td>Any other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

15. What is the source of power for your audiological equipment?

- Electricity ( )
- Solar power ( )
- Battery (dry cells) ( )
- Any other (specify) ( )

16. Does your school have a hearing aid repair kit? Yes ( ) No ( )

Who does repair of audiological equipment in your school?

- School technician ( )
- Private technician ( )
- Assistance from donors ( )
17. Do you like teaching while pupils use audiological equipment?
   Yes (   ) No (   )
   Please give reasons for your answer ________________________________

18. Do pupils like using audiological equipment? Yes (   ) No (   )
   Please give reasons for your answer ________________________________

19. (a) What communication model do you use in your school?
   Sign language (   )
   Total communication (   )
   Oral method (   )

   (b) What communication model is most preferred by your pupils’?
   Sign language (   )
   Total communication (   )
   Oral method (   )
   Any other (specify) ________________________________

20. (a) State the degree of hearing loss for standard two pupils

<table>
<thead>
<tr>
<th>Hearing loss</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard of hearing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild hearing loss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe hearing loss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profound hearing loss</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   (b) How often do you take pupils’ audiogram?
   1 month (   )
   6 months (   )
   1 year (   )
   2 years (   )
   Not at all (   )
APPENDIX C
PUPILS INTERVIEW

Instruction to the respondents:
I am going to ask you some questions. Look and listen carefully and tell me the answers in either sign language, total communication or by speaking.

Part I
1. State your class

Part II
2. Do you use hearing aids in the school/class? Yes ( ) No ( )
3. Do you like using hearing aids? Yes ( ) No ( )
4. If No, why?
5. At what times do you like using hearing aids?
6. What type of hearing aid do you like?
   * Is it body worn? ( )
   * Behind-the-Ear? ( )
   * Group hearing aid? ( )
7. What difficulties do you find while using hearing aids?

Part III
8. Which communication method do you prefer?
   * Is it total communication? ( )
   * Sign language? ( )
   * Oral/aural method? ( )
9. Why do you like the method?
10. (a) How do you find oral communication?
    * Is it very difficult? ( )
    * Difficult? ( )
    * Not difficult? ( )
(b) Why do you find it so?
Teacher gives instructions in a clear deliberate voice while pupils watch and listen carefully with their hearing aids.

Section A: Auditory perception (10 Marks)
Teacher provides various sound making instruments (drum, bell, shaker, bottle and a whistle). He explains and demonstrates the activity while pupils watch and listen.

1. Teacher produces sound from one instrument and respond to it by doing an activity e.g. moving one step forward while pupils watch and listen.
2. He repeats the same activity with the pupils using different instruments.
3. Teacher repeats the activity without pupils watching and they respond accordingly.
4. Teacher then tests individual pupils by hitting 5 different instruments. Each correct response two marks, total 10 marks.

Section B: Auditory Discrimination (40mks)
Instructions / Demonstration

i). Teacher provides various sounds making instruments (drum, bell, tin, rattle, sticks, paper, hand clap, spoon and whistle etc) and together with the pupils determine which instrument produce what type of sound when hit.

ii). He then makes the sound without pupils watching and asks them to determine which instrument produce sound.

iii). Teacher tests individual pupils in turn by making sounds from different instruments, each 5 marks, total 40 marks.
# APPENDIX E
## SCORING: AUDITORY TRAINING (CHECKLIST)

### Section A: Auditory Perception (10 marks)

<table>
<thead>
<tr>
<th>Sounds</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performs the activity correctly (2 marks)</td>
</tr>
<tr>
<td></td>
<td>No attempt at all (0 mark)</td>
</tr>
<tr>
<td>• Drum</td>
<td></td>
</tr>
<tr>
<td>• Bell</td>
<td></td>
</tr>
<tr>
<td>• Shaker</td>
<td></td>
</tr>
<tr>
<td>• Hitting a bottle</td>
<td></td>
</tr>
<tr>
<td>• Whistle</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

### Section B: Auditory Discrimination (40 marks)

<table>
<thead>
<tr>
<th>Sounds</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Determine the correct instrument (5 marks)</td>
</tr>
<tr>
<td></td>
<td>Misses the correct instrument (2 marks)</td>
</tr>
<tr>
<td></td>
<td>No attempt all (0 mark)</td>
</tr>
<tr>
<td>• Drum</td>
<td></td>
</tr>
<tr>
<td>• Bell</td>
<td></td>
</tr>
<tr>
<td>• Tin</td>
<td></td>
</tr>
<tr>
<td>• Sticks</td>
<td></td>
</tr>
<tr>
<td>• Bottle</td>
<td></td>
</tr>
<tr>
<td>• Paper</td>
<td></td>
</tr>
<tr>
<td>• Cap and spoon</td>
<td></td>
</tr>
<tr>
<td>• Whistle</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**
APPENDIX F

SPEECH READING OBSERVATION/ TEST

Teacher gives instructions in a clear deliberate voice while pupils watch and listen carefully.

Section A: Numbers (10 marks)
(i) Teacher says numbers 1 to 10 first in sequence while the pupils watch and listen carefully.
(ii) Teacher says five numbers, one after the other in any sequence to individual pupil in turns and the pupil repeats the same number.
   - Two   - Four   - Nine   - One   - Ten

Section B: Months of the year (10 marks)
(i) Teacher says months of the year in sequence from January to December while the pupils watch and listen carefully.
(ii) Teacher says five months one after the other in any sequence to individual pupil in turns and the pupil repeats the same month after the teacher.
   - February   - March   - December   - October   - April

Section C: Sentences (30 marks)
(i) Teacher says six sentences while the pupils watches and listens carefully.
(ii) Teacher says six sentences one after the other to individual pupils.
(iii) Pupil repeats the same sentence one after the other.
   - A blue book   - Stand up
   - Boys are running   - This is a pencil
   - The teacher is walking   - Give me a book
# APPENDIX G

## SCORING: SPEECH READING OBSERVATION (CHECKLIST)

### Section A: Numbers (10 marks)

<table>
<thead>
<tr>
<th>Numbers</th>
<th>Say numbers correctly (2 marks per number)</th>
<th>Attempt to say (1 mark per number)</th>
<th>No attempt (0 mark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ten</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section B: Months of the year (10 marks)

<table>
<thead>
<tr>
<th>Months</th>
<th>Say months correctly (2 marks per number)</th>
<th>Attempt to say (1 mark per number)</th>
<th>No attempt at all (0 mark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section C: Sentences (30 marks)

<table>
<thead>
<tr>
<th>Sentences</th>
<th>Say correctly (5 marks each)</th>
<th>Misarticulates consonants (3 marks each)</th>
<th>Attempt to say (1 mark each)</th>
<th>No attempt at all (0 mark each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A blue book</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys are running</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The teacher is walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This is pencil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Give me a book</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX H

SPEECH TEST OF HEARING

The respondents' test on speech will cover the following two sets of ten monosyllabic words. The regular teacher will dictate the words to the selected pupils individually while the researcher observes and records the responses.

2. Cup 7. Cat 2. Peg 7. Soap

Condition 1

(i) Words will be dictated to the selected standard 2 pupils individually unamplified and using auditory plus lip reading only.
(ii) The results will be recorded.

Condition 2

(i) The same words will be dictated to the same standard 2 pupils individually amplified and using auditory plus lip reading only.
(ii) The results will be recorded.
APPENDIX I

SCORING FROM SPEECH TEST OBSERVATION (CHECKLIST)

Name: ______________________  Age: __________  Hearing loss __________

<table>
<thead>
<tr>
<th>Words</th>
<th>Articulates all consonants and vowels in each word</th>
<th>Malarticulates 1 consonant in each word but correct vowels</th>
<th>Malarticulates 2 consonants in each word but correct vowels</th>
<th>Misses all consonants in each word but correct vowels</th>
<th>Tries to speak but no voice/ sound</th>
<th>No. attempt at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball</td>
<td>(5 marks per word)</td>
<td>(4 marks per word)</td>
<td>(3 marks per word)</td>
<td>(2 marks per word)</td>
<td>(1 mark per word)</td>
<td>(0 mark per word)</td>
</tr>
<tr>
<td>Cup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dig</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dog</td>
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Adapted from O’leary (1972) and Cooper (1984)

With/ without hearing aid.

Total score __________ %
APPENDIX J

John Abuor Nyakado,
Kenyatta University,
Special Education Department,
P.O. Box 43844,
NAIROBI.
Date: 20\textsuperscript{th} February 2005

Dear Headteacher/ Classteacher,

I am carrying out a research on effective use of audiological equipment in audiological rehabilitation of the hearing impaired pupils in Nyanza Province. This study is important as the government, Kenya Society for Deaf Pupils (KSDC), parents and other concerned stakeholders have invested heavily in the education of pupils with hearing impairments. The failure of these pupils to communicate is not a loss to them alone but to the community and to the society as a whole.

It is with this understanding that I have decided to carry out an investigation and find out the effectiveness of the use of the equipment in the audiological rehabilitation process in our schools. Thereafter, a report and recommendations will be made so that necessary action can be taken to enable the pupils develop language and communication skills.

Please answer all the questions which follow as honestly as possible. You are assured that the information you will give will be treated with the utmost confidentiality they deserve and will not be used for any other purpose other than this research.

Thanking you in advance for your cooperation.

Yours sincerely,

John A. Nyakado
Our Ref: E55/5954/03
Your Ref: The Permanent Secretary, Ministry of Education, Science & Technology, P.O.Box 30040, NAIROBI.

Date: 15th April, 2005

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION:

I write to introduce Mr. John Abouor Nyakado who is a Postgraduate Student of this University. He is registered for a M.Ed. degree programme in the Department of Special Education of this University.

Mr. Nyakado intends to conduct research for a project entitled, "An Investigation into Effectiveness of Audiological Rehabilitation of Hearing Impaired Primary School Children in Nyanza Province."

Any assistance given to him will be highly appreciated.

Yours faithfully,

P.K. MUCHEMI
FOR: AG. DEAN, GRADUATE SCHOOL

C.C. Registrar (Academic)
Dean, Graduate School - to see on file
Dean, School of Education
Chairman, Special Education Department

PKM/eww
John Abur Nyakado  
Kenyatta University  
P.O. BOX 43844  
NAIROBI

Dear Sir

RE: RESEARCH AUTHORISATION

Following your application for authority to carry out research on “An investigation into effectiveness of Audio logical rehabilitation of the hearing impaired children”. I am pleased to inform you that you have been authorised to carry out research in Migori, Suba, Bondo, HomaBay and Kisumu Districts for a period ending 31st December, 2005.

You are advised to report to the District Commissioners and the District Education Officers of the respective Districts of your research before embarking on your research project.

Upon completion of your research project, you are expected to submit two copies of your research report to this Office.

It is noted that the research is a requirement in part fulfillment for the award of M.Ed (Special Education) of Kenyatta University.

Yours faithfully

M. O. ONDIEKI
FOR: PERMANENT SECRETARY