ADEQUACY AND EFFECTIVENESS OF ASSISTIVE DEVICES USED TO INSTRUCT LEARNERS WITH PHYSICAL DISABILITIES: A CASE OF APDK MASAKU SCHOOL, MACHAKOS, KENYA

BY

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OCTOBER 2012
DECLARATION

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

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DEDICATION

This Thesis is dedicated to the Almighty God through his son Jesus Christ. Without his help and guidance, this thesis would not have been possible.
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I am grateful to Kenyatta University for according me an opportunity to pursue my master’s degree programme. My sincere gratitude goes to my supervisors, Dr. Nelly Otube and Dr. Rosana Ondigi who devoted a lot of their time, patience and guidance towards the completion of my study. My thanks go to the headteacher, deputy, teachers and pupils of APDK Masaku special school for their support during data collection. My deep appreciation goes to my husband Ambrose Simon Nyaga and son Lewis mutugi for their unfailing support. Special thanks go to my parents Bernard and Sarah for taking me to school as well as to my parents in law Josphat and Miriam and brother in law Fredrick Mbae for encouraging me to go back to school. Special thanks go to Patrick Amara for typing my work. I also thank all my brothers and sisters who kept on wanting to know the progress I was making and for encouraging me to move on. My special thanks go to Sister Doris who edited this work and Jenifer who produced the research documents whenever I needed to take them to my supervisors and other authorities. May the Almighty God bless you.
ABSTRACT

Availability of devices to some learners with physical disabilities makes them function as active members both in school and society. Of interest in this study was adequacy and effectiveness of assistive devices used to instruct learners with physical disabilities at APDK Masaku School. The study was carried out at APDK Masaku School for the physically handicapped in Machakos district, Eastern province of Kenya to: find out different categories of physical disabilities at APDK Masaku, establish the types of assistive devices used in the school, investigate the views of teachers and learners on the adequacy and effectiveness of assistive devices and establish the challenges they faced respectively when using these devices. The study also adopted miller’s learning theory for instruction which assumes the notion that learning is influenced by four basic factors. These are motivation, cue, response and reward. The study adopted descriptive research design which helped uncover the nature of factors involved with each research question. The school had a total population of 175 learners, 21 teachers and the headteacher. Target population was 197. The study population was 40, comprising of 32 learners 7 teachers and the headteacher. Data was collected by use of questionnaires, interviews and observation checklists. In the choice of the correspondents, purposive sampling was employed for the selection of the headteacher, teachers and learners The Pilot study was conducted at Joy Town Primary School for physically handicapped Thika, Central province of Kenya since it had similar characteristic as the school of study. The pilot study population was the headteacher, 4 teachers (in charge of academic and social welfare of the learners) and a total of 17 learners from the classes with the highest number of disabilities (8 learners from class 4 and 9 from class 7) were involved. Statistical package for social sciences (SPSS) and Microsoft Excel (Ms Excel) was used to analyse data. Both qualitative and quantitative ways of data analysis were used. Quantitative data from the questionnaires was entered to the computer using data entry programmes and descriptive analyses used to discuss the findings. Qualitative analysis involved description of body of materials studied, coding and tabulating each characteristic and describing the patterns the data reflected. Results revealed that there were learners with varied physical disabilities. It was however found out that only the assistive devices for mobility were adequate but they also lacked an aspect of quality. This is because these devices were big or small in size. Some like the wheelchairs and clutches missed some of their essential parts. This affected their effectiveness. There were challenges faced by teachers such as inability to interpret what learners said as well as being unable to effectively position and seat learners. Learners also faced challenges such as falling off from the devices, breakage of the devices and inability to move independently.
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<td>Augmentative and Alternative Communication</td>
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<tr>
<td>AD</td>
<td>Assistive Devices</td>
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<td>ALS</td>
<td>Amyotrophic Lateral Sclerosis</td>
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<td>APDK</td>
<td>Association of the Physically Disabled in Kenya</td>
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<tr>
<td>CP</td>
<td>Cerebral Palsy</td>
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<td>CPH</td>
<td>Children with Physical Handicap</td>
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<td>IDEA</td>
<td>Individuals with Disabilities Education Act</td>
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<td>IEP</td>
<td>Individualized Education Programme</td>
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<td>MoEST</td>
<td>Ministry of Education, Science and Technology</td>
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<td>SNE</td>
<td>Special Needs in Education</td>
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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According to Georgia Project for Assistive Technology (2007), devices are identified by IDEA 2004 as: Any piece of equipment, product system, whether acquired commercially off the shelf, modified, customized, that is used to increase, maintain or improve the functional capabilities of children with disabilities. The devices include hardware and software as well as standalone devices. Any tool can be considered to be an assistive technology except for those assistive technology devices that are surgically implanted but have been excluded from the definition of assistive technology according to IDEA.

Wisconsin assistive technology checklist of 2004 as cited in Best, Bigge and Heller (2005), Assistive Devices are categorized as those for writing, communication, reading/studying and math, recreation and leisure, activities of the daily living, mobility, environmental control, positioning and seating, vision and hearing. For centuries, individuals with physical disabilities have relied on assistive technology devices to help them surmount environmental demands.

In America, laws have been passed by congress since 1970s, to protect civil and educational rights of individuals with disabilities. Section 504 of the Rehabilitation Act of 1973 which was fully adopted in 1977 was one of the laws that were passed in America to prohibit discrimination against people with disabilities. It states that no otherwise qualified handicapped individual shall solely by reason of handicap be
excluded from participation in, be denied the benefits of, or be subjected to
discrimination in any programme or activity receiving federal financial assistance.

Another law is the landmark piece of registration referred to as Education for All
Handicapped Children Act of 1975 to ensure Free, Appropriate, and Public Education for
Individuals with Disabilities. This mandated Individualized Education Plan (IEP) for
anyone found eligible for special education. The IEP involves giving personalized
instructions that are reasonably calculated to bring out educational benefits to children
with disabilities. Assistive Devices can be written into IEP to help aid a learner with
physical disability in learning. They can be provided as part of the instruction process,
related services and as supplementary aids. Individuals with Disabilities Education Act of
1990 is a reauthorization of the public law 94-142. It states that individuals with
disabilities should have access to assistive equipment and services, including purchasing
and leasing technology devices and training in their use (Best et al., 2005).

According to Hallahan & Kauffman (1991), physical disabilities are non sensory physical
limitations or health problems that interfere with school attendance or learning to such an
extent that special services, equipment, materials and facilities are required. Since the
primary distinguishing characteristics of children with physical disabilities are medical
conditions, health problems and physical limitations, inter-disciplinary cooperation is
called for. The term “disability” is consistent with contemporary legal use. It refers to
functional effects of impairments. Bigge (1982) points out that reasonable
accommodation must be provided for individuals with physical disabilities in order to
gain access to those aspects of their lives that may be altered by disability. According to Gargiulo (2006), the term assistive technology encompasses a broad range of devices from “low tech” (for example, pencil grips, splints, paper stabilizers) to “high tech” (for example computers, voice synthesizers). These devices encompass those for reading, eating, leisure, communication, writing, mobility, positioning and seating, vision and hearing. This study deals with the assistive devices that affect a learner during instruction solely. This includes devices for positioning and seating, instruction, communication and mobility.

World over, nations have and are still grappling with the issue of physical disability. Assistive devices have and are still being used to aid children with physical disabilities. In Kenya, assistive devices, however simple are used to meet the needs of these children. MoEST Task Force (2003) on special needs found out that learners with special needs in education require resources both at individual and classroom level depending on the degree and type of disability. It was noted that most schools operated on basic learning aids as the existing devices were dilapidated due to lack of spare parts and technical know how. Since the problems experienced by these learners were related to mobility and manipulation of learning resources, there was dire need for the provision of functioning assistive devices.

Having noted that learners with physical disabilities required Assistive Devices both at individual and school level, the task force made several recommendations focusing on Assistive Devices. The recommendations by the Task force (2003) were geared towards
increasing the ability of a learner with special needs to participate effectively in instruction. They include: provision of assistive devices to learners with special needs by the government to enable them access education, establishment of a central body at the Kenya institute of special Education and MoEST branches at district level for the procurement and disbursement of Assistive Devices, in-servicing of teachers handling learners with special needs, assessment and maintenance of assistive devices and allocation of Kshs 32,000 per year to each an individual child with special needs in order to meet the his or her education cost.

If adopted, these recommendations would go a long way in promoting better learning standards for children with special needs. This is because if a well in- serviced personnel are provided with functioning Assistive Devices, they can undoubtedly manipulate a learners’ handwriting for faster completion of assignment and also cultivate efficiency in communication and mobility. Even though, this may be considered as an important milestone in the field of SNE, there has been no documented follow-up to establish if these recommendations were actually effected. It is against this background that the researcher aimed at finding out how adequate and appropriate assistive devices are in the education of learners with physical disabilities at APDK Masaku School.

1.2 Problem Statement

The role of Assistive Devices is to help learners with physical disabilities to enhance their functioning capability and participate more effectively in the learning process. To achieve this, there is need to identify barriers to their participation in learning and provide solutions through assistive devices to counter the same. With the aid of Assistive
Devices, children with physical disabilities can acquire education to make them independent. As noted by Randabough in 1988 cited in Best et al., (2005) technology makes things possible for people with disabilities but easier for those without.

People with physical disabilities can learn to do most or all things ‘able bodied’ people do, with the aid of Assistive Devices. Stephen Hawking, a Nobel Prize winner and author of ‘the Theory of the Black Hole,’ is a case in point. Despite having suffered from amyotrophic lateral sclerosis (ALS), which adversely affected his communication, Hawking successfully uses a liberator for communication (Gargulo, 2006). Education empowers children with physical disabilities by equipping them with skills geared towards making them lead independent adult lives. For these children to access school curriculum, the use of assistive devices is crucial. In Kenya, learners with physical disabilities and those without sit common national examinations which are marked and graded in the same way. These learners can only compete favorably with their “able bodied” counter parts if the Assistive Devices for them are adequate and effective.

A few studies have been carried out in the area of physical disabilities in and outside Kenya. Jen, Yee, Wen, Chau and Yiu (2007) conducted a regional survey on assessment of assistive devices use in Southern Taiwan. In Ghana, Razak, (2000) carried a study on disabled persons in Ghana on human rights and disability. Ogwang (1999) carried a study to establish provisions for special education for students with physical disabilities in Makerere, Uganda. In Kenya, Kamere (2003) carried out a research on the development of special education for learners with physical disabilities in Kenya between 1945 to the
year 2003 and Maneno (2008) aimed at identifying speech sound disorders in children with speech and language disorders. No research, known to the researcher, has been carried out focusing on adequacy and effectiveness of Assistive devices used to instruct learners with physical disabilities. There was need for such a study to establish whether Assistive Devices used by learners are adequate and effective. It is against this backdrop that the study was conducted.

1.3 Purpose of the Study

The purpose of this study was to investigate the adequacy and effectiveness of Assistive devices used to instruct learners with physical disabilities at APDK Masaku School in Machakos, Eastern Province of Kenya.

1.4 Research Objectives

The specific objectives of this study were to:

1. Find out different categories of physical disabilities at APDK Masaku.
2. Establish the types of Assistive Devices used in the school
3. Investigate the views of learners and teachers on adequacy and effectiveness of Assistive Devices
4. To establish the challenges faced by learners and teachers when using Assistive Devices.

1.5 Research Questions

1. What physical disabilities call for the use of assistive devices in the school of study?
2. What types of Assistive Devices are found in the school under study?
3. What are the views of learners and teachers on the adequacy and effectiveness of Assistive Devices?

4. What are the challenges faced by teachers and learners when using Assistive Devices?

1.6 Significance of the Study

The findings of the study:

- Highlighted various types of physical disabilities in learners.
- Provided information on the adequacy and effectiveness of Assistive Devices used in Masaku School.
- May sensitize teachers on what is expected of them as they instruct learners using Assistive Devices.
- May help curriculum planners and policy makers in choosing the right types of devices to be used in SNE schools.
- May open avenues for further research.

1.7 Delimitations and Limitations of the Study

The study focused on APDK Masaku School because it has learners with physical disabilities and the fact that it was among the first APDK schools to be established in Kenya. The pitfalls the researcher faced included: lack of adequate information and lack of enough resources like finances.

1.8 Assumptions of the Study

The study was carried out with the following assumptions:

That teachers use Assistive Devices for learners with physical disabilities.
That there are a variety of Assistive Devices used in APDK Masaku School. Assistive Devices in APDK are enough and effective and therefore lead to instruction of learners with physical disabilities.

1.9 Theoretical and Conceptual Framework

1.9.1 Theoretical Framework

This study was guided by Miller’s learning theory (1957). The theory assumes the notion that effective instruction is influenced by four basic factors: motivation, cue, response and reward. Miller asserts that a learner in a school setting is in want of something. Such a person is there because he or she has a drive. It follows then that a child with a physical disability in a school already has a drive to learn. The drive in the child can be sustained or elevated if he or she uses adequate Assistive Device when receiving instruction. This device can be used adequately and effectively to capitalize upon and add to the intellectual curiosity and desire to achieve already inherent in the learner.

Miller’s theory of learning is applicable to learners with a physical disabilities and using suitable devices. Some learners with cerebral palsy, for instance, have difficulties in grasping objects but that doesn’t mean they cannot write for they have an inner drive to scribble albeit illegibly. The teacher instructing such learners could have them use universal cuffs to help them hold pens in place. By doing this, the learner will write something more meaningful, for he or she has been motivated by a universal cuff as an assistive device.
The second principle influencing instruction is cue. It implies that the learner must notice something. If printed materials for instance, can be used in varying their type by use of different colours and organization, they can go a long way in facilitating identification of cues with the teachers’ assistance. If a learner has a communication problem, the teacher can use a communication board device where materials are developed from their basic form for the individual to comprehend. This would be of great help to a teacher instructing such a learner for he or she would tell what the learner cannot identify.

The third principle advanced by Miller that is crucial to this study is the principle of response. Response calls for the learner to do something. Responding to instructional material is an essential element in learning. If a learner responds well to instructional material, he or she is able to acquire knowledge, transform and use it effectively to achieve independent learning. Assistive devices are very effective in fostering the learners’ response to instructional materials. A learner whose mobility is restricted can use an effective Assistive Device to help him or her respond well to learning. The device will help him or her participate. If a learner with contractures is introduced to a crutch and is taught how to fix it, he or she can use it to achieve a desired position. If he or she is doing a class exercise and is tired, he/she doesn’t have to rely on the teacher to assist him/her for he/she can do it himself/herself. This helps build his/her confidence for he/she is in control.

The fourth principle in Miller’s theory states that a learner must get what he/she wants. Instruction needs to reinforce rewards learned in real life. For a learner who has been
motivated to solve problems and achieve some learning goals, finding out that he/she has done well is an important reward. This boosts the learners’ confidence. This realization improves effectiveness of instruction for the learner is elated to having achieved his or her objective.

If a learner with a physical disability undergoes the four stages advanced by Miller, he or she is able to do much without assistance at the reward stage. He/she can wheel oneself and participate in classroom activities, having benefited from the Assistive Devices that were manipulated by the teacher to make him/her learn independently.

1.9.2 Conceptual Framework

Figure 1.1 conceptualizes the principles that enhance learning for persons with physical disabilities and has access to adequate and effective assistive devices. It also states the effect inadequate and ineffective Assistive Devices. The school represents the teacher since this is the person the learner finds in school (See Figure 1.1).
**Figure 1.1:** Adequacy and effectiveness of Assistive Devices used to instruct learners with physical disabilities.

Source: Researcher, 2012
The conceptual framework suggests that if a child experiences principles of motivation and cue as asserted by Miller, the results would be response and reward. Motivation is based on an inner drive to learn inherent in a learner already in school. The other base for motivation is the availability of Assistive Device for use. If assistive devices are adequate and effective, the learner will be instructed by use of various cues until he or she responds by comprehending what is to be done. When a learner with a physical disability is instructed by use of cue to do something, she or he may then respond by doing that thing. This is the point where the learner uses for example, a device to write, move or communicate.

When a learner succeeds in using a device in writing and talking, that activity becomes a reward. This portrays independent learning of a learner leading to improved positioning and seating, improved mobility, improved instruction, improved communication and improved vision and sight. Assistive Devices are effective in promoting instruction for learners with physical disabilities as long as they are appropriately manipulated by the teacher. Miller’s learning theory asserts to this assertion which is the backbone of this study. On the contrary, if learners with physical disabilities do not access these devices and teachers are not well trained to manipulate them, very little success is likely to be achieved during the learning process. The result would be poor instruction, poor mobility, poor communication, poor positioning and seating. Independent learning would actually be a mirage.
1.10 Operational Definition of Terms

**Adequate:** Enough assistive devices in quantity and quality.

**Effective:** Suitable or correct assistive devices for the particular circumstances.

**Assistive Device:** any device that is designed, made, or adapted to assist a person perform a particular task. They include canes, clutches, walkers, wheelchairs and adapted chairs.

**Assistive technology:** Any Piece of equipment, product system, whether acquired commercially off the shelf, modified or customized, that is used to increase, maintain and improve personal capabilities of individuals with disabilities.

**Disability:** This refers to any loss or reduction of functional ability (resulting from an impairment) to perform an activity in the manner or within the range generally considered normal for human beings within a cultural context

**Handicap:** Is a disadvantaged or a restriction of activity, which may result from a disability or from societal attitudes towards disability.

**Individualized Education Plan:** This involves giving very personalized instruction and services that are reasonably calculated to bring out educational benefits to a child with disability.

**Physical disabilities:** In this study, physical disabilities include the neurological impairments and musculoskeletal conditions. Musculoskeletal are defects or diseases of muscles. They involve joints, bones limbs and associated muscles. Neurological involves central nervous system. It affects ability to move, use, feel or control parts of the body.

**Cerebral palsy:** A medical condition affecting someone’s control over his movement and speech, usually caused by damage to the brain before, during or after birth.
Special needs education: This is education which provides appropriate modifications in curricular, teaching methods, education and resources, medium of communication or the learning environment for learners with special needs.

Special education needs: These are different abilities and potentials in performing tasks that vary from one child to another in learning or education.

Liberator: An electronic communication device with voice output.
CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter, review was carried out on categories of physical disabilities, assistive devices, adequacy and effectiveness of Assistive Devices, challenges faced by learners and teachers when using Assistive Devices.

2.1 Physical Disabilities

Physically handicapped are those; “with physical, neurological and chronic health impairments. They have problems performing one or more motor activities due to muscular skeletal disorders, neurological, and/or chronic health impairments. The motor activities affected may include movement, writing and speech. Generally, these are children who require aids, wheelchairs, prosthesis, helmets, book readers, page turners, writing aids, rest equipment, special tables and desks” (Ndurumo, 1993:103).

The study is based on Assistive Devices used in performing one or more motor activities due to muscular skeletal disorders and neurological impairments. This is because learners with health impairments do not typically require special education services and assistive devices unless these conditions are severe

2.1.1 Categories of Physical Disabilities

Neurological impairments are conditions that originate in the central nervous system, that is, the brain and muscles (Best et al., 2005). Cerebral palsy and spina bifida fall under this
category. Cerebral palsy is not an ailment so to speak. It is a medical condition characterized by paralysis, in-coordination with other motor dysfunction resulting from immature damaged brain (Batshaw and Perret, cited in Hallahan and Kauffman 1991).

According to Domiano, Dan and Jacobson (2007), the most common types of cerebral palsy (CP) are spastic, athetoid, ataxia and mixed. Spastic cerebral palsy is characterized by very tight muscles occurring in one or more muscle groups. This tightness results in stiff, uncoordinated movement. When the person with spastic cerebral palsy starts to move, there is initial resistance followed by sudden release similar to the opening of a pocket pen knife (Cerebral palsy, 2002). When a person reaches for an item, the arms may start moving slowly and then jerk forward, pushing the item away. In arthetoid CP, movements are contorted, abnormal and purposeless. When a person with arthetoid cerebral palsy reaches for an item, the arm will often rotate back and forth, bend and straighten as it slowly makes its way to the intended destination. Individual with ataxia have poor balance and equilibrium in addition to un-coordinated voluntary movement. Individuals with ataxia walk as if they are drunk. Mixed cerebral palsy refers to a combination of spastic and arthetoid (Gargiulo, 2006).

Cerebral palsy is also classified by which limbs (arms and legs) are affected. This classification is also used for other types of motor disorders and paralysis. Some of the major classifications are hemiplegia in which the left or right side of the body is involved; diplegia in which the legs are more affected than the arms; paraplegia in which only the legs are involved and quadriplegia in which all the four limbs are involved (Archie, 2003).
Spina bifida is a developmental congenital disorder of the embryonic neuro tube. Some vertebrae overlying the spinal cord are not fully formed and remain unfused and open. If the opening is large enough, this allows a portion of the spinal cord to protrude through the opening in the bones (National Institute of Neurological Disorders and Stroke, 2009). There are three types of Spina bifida, that is; spina bifida Olcutta, meningocele and myelomenigocele. Myelomenigocele has an adverse effects on an individual. It is often accompanied with paralysis of the legs, anal and bladder sphincters because the nerve impulses are not able to travel past the defect. A learner having spinal bifida condition may have visual perception problems, language abnormalities and learning problems (Heller et al., cited in Gargiulo, 2006).

The second category is muscular skeletal. These are defects or diseases of muscles and bones. They involve legs, arms, joints, or spine. These disorders make it difficult or impossible for children to walk, stand, sit or use their hands (Hallahan and Kaufman 2002). Musculoskeletal conditions are caused by genetic defects, infections, accidents and developmental disorders. The most common muscular skeletal disorders are muscular dystrophy, arthritis, spinal cord injury, multiple sclerosis, scoliosis and osteogenesis imperfecta. Muscular dystrophy is a general term describing a number of genetically disorders characterized by progressive muscle weaknesses and degeneration of skeletal muscles which control movement (Dubowiz, 1989). There are nine types of muscular dystrophy. The most common is Duchene muscular dystrophy which affects the school going children. Doctors and teachers are specially trained to handle learners with muscular dystrophy. Globally the disease has no known cure; therefore, most effort in
research is concentrated upon its prevention (Ferri, 2005). Osteogenesis imperfecta is a condition in which improperly formed bones break easily. This condition affects other tissues like the skin, teeth and whites of the eyes.

Another condition is amputation which is complete loss or partial loss of the limbs and can be either acquired or congenital. With this condition limbs are greatly reduced in size, missing at birth, or limbs have been lost or severed in the course of one’s life. (Bell, 1981). According to Bleck, Donald, Eugenne and Nagel (1982), Juvenile Rheumatoid Arthritis (JRA) is a type of arthritis that affects children age 16 or younger. It involves varying degree of joint inflammation and swelling, stiffness and reduction of motion. JRA can affect any joint and is more prevalent in girls than boys. In some cases it can affect internal organs. It targets the lining of the joints known as synovial membrane causing inflammation which may cause joint damage. JRA is characterized by limping, stiffness when awakening, and reluctance to move arms, reduced activity level, persistent fever, and swelling (National Institute of Arthritis and Muscular skeletal and skin diseases (2003).

The third category is the health impairment. According to Best, et al., (2005), Individuals with Disabilities Education Act of 1998 describe people with health disorders as those individuals with limited strength, vitality or alertness, due to chronic or acute health problems such as: heart conditions, tuberculosis, rheumatic fever, asthma, single cell anemia, hemophilia, epilepsy, diabetes, and leukemia. These adversely affect education performance. Individuals who benefit from various kinds of technologies use devices such as ventilators for breathing, urinary catheters and colostomy bags for bladder and
bowel care, tracheotomy tubes for supplying oxygen enriched air to congested lungs, or suctioning equipment for the removal of mucus from airways

Students with physical and health disorders can be attended to in general education, special education, hospitals, homes or residential settings. The teacher should be informed and willing to learn about the unique needs of a child with health disorders in his/her classroom. Teachers can sensitize children in a class on their crucial role of contributing to the well being of the child with health disorders. The teacher should make sure that the contingency measures have been made and practiced in dealing with emergency situations, for example, where some children may need to be carried out of the building or room when they are not feeling well. Where the child’s condition is progressive and life threatening, the teacher should begin to discuss ramifications of death and loss with the child.

2.2 Assistive Devices

Assistive technology is classified as; low tech, mid tech and high tech. Low tech assistive technology options are usually easy to use, have a low cost and typically do not require power source. Mid tech Assistive Devices are easy to operate but typically require power source. High tech assistive devices are usually complex and programmable and include items that require computers, and/or electronics to perform a function (Xiuwen, 2002).

There are many categories of assistive devices that are used for the learners with physical disabilities because they have difficulty performing basic functions such as griping objects with their hands, moving arms or legs in a full or even limited range of motion.
These learners may have difficulties attaining and remembering skills or transferring these skills from one situation to another (Lee, 2006).

In America the Rehabilitation Act of 1977 section 504 regulations require the public school to provide students who have disabilities an educational opportunity equal to that provided to students without disabilities. Section 504 also uses “reasonable accommodations’ which means the provision of assistive devices and services. Individuals with Disabilities Education Act 1988 mention assistive technology specifically as a service which school districts in America may have to provide in order for a student with disabilities to benefit from special education (Kelker, 1997).

2.2.1 Positioning and Seating Devices

According to Alberto et al., (2002), Students with physical disabilities require well supported seating and positioning arrangement in order to obtain optimal functioning. Improper seating and positioning may cause functional limitations. The optimal seating posture is one where the trunk is supported in an upright, central position with head in the mid-line. This allows much of movement and freedom as possible and encourages interaction.

An individual’s seating position will affect the quality of movement and the ability to accomplish a given task in class. For assistive devices to be effectively used, teachers ought to understand the principles in positioning and seating. The need for positioning equipment is determined by age, disability and intended use. Physical and occupational therapists, seating specialists and rehabilitation engineers evaluate, select and adapt
positioning and seating equipment. Teachers are crucial because they observe the learners on a daily basis and are therefore in a good position to provide information on the selection of suitable positioning and seating equipment (Hoyle, 1969).

According to Ball (2006), learners with physical disabilities require different seating arrangement depending on their disability. This is meant for comfortable sitting as well as facilitation in learning. Sometimes these learners require extended time while sitting for an examination.

It is imperative that teachers of learners with physical disabilities access positioning and seating devices. This is because positioning affects the quality and precision of a person’s movement and ability to accomplish tasks (Best et al., cited in Gargiulo 2006).

According to Alberto et al., (2000), learners with cerebral palsy (CP) who cannot achieve desired independent position can use hip straps and foot boxes to keep hips bent at an angle, slant boards to place on the lap trays or tables to accommodate books, writing materials, keyboards and switches. For learners with cerebral palsy who experience contractures, standers, braces or splints (orthotics) can help maintain body alignment. Other seating and positioning devices used by learners with physical disabilities include corner seats which enhance the seating of a learner who may not be able to sit upright, adapted chairs and tables, cut out desks and bucket chairs.
Specialized equipments like auto vans and electronic wheelchairs can be used by learners with muscular dystrophy (Bleck, et al., 1982). According to Dubowiz (1989), these learners are immobilized in calipers and swivel walkers after loss of ambulation.

### 2.2.2 Instructional Devices

Some learners with physical disabilities require unique instructional strategies. Coming up with ways of helping learners with physical disabilities to learn and work independently is no mean feat. It is indeed an instructional challenge. Nearly every teacher who works with these children adapts materials designed for children without physical disability. The teachers can design their own materials for use or even obtain electronic and other commercial products. Unlike many other learners, the needs of learners with muscular dystrophy will change during their time in school as their muscle strength deteriorates. Children can be mobile when they enroll in school, but could be wheelchair users requiring assistance in manipulating teaching and writing materials by the time they leave (Alberto, et al., 2000).

According to the Department for Education and Skills (2001), using a variety of pencil grips, sloping desks and calculators will be beneficial to the students as fine motor manipulation becomes more difficult. Individuals with muscular dystrophy can use a virtual keyboard that allows the learner to enter the text or navigate the internet.

According to Gargiulo (2006), some learners with physical disabilities like cerebral palsy are unable to hold hand writing tools. They can be aided in with the following writing tools like pencils pushed through sponge, balls, rubber and other materials cut to fit a
child’s grasp. The learners with motor co-ordination problems can use head pointers and other body parts on typewriters. Widely spaced papers are very useful for those cerebral palsied learners who cannot confine writing or marking to the small customary sized spaces provided on paper. CP learners can also use paper holder devices such as papers on clipboards, under plastic and heavy weight paper and masks taped on desk top to enhance instruction. Weight can also be used on wrists to confine writing. Learners with muscular dystrophy require a teacher’s continued observation so that the special educator may monitor continuously the disease progression. Observation may indicate a need to change a device like a pencil to a keyboard and then to a smaller adapted keyboard as motor movement is lost and fatigue increases.

When instructing some learners with physical disabilities, individualized education programme (IEP) is very important. IEP is an individualized educational programme which incorporates and modifies the school curriculum to match the needs of an individual learner. According to Best et al, (2005), IEP involves giving very personalized instruction and services that are reasonably calculated to bring out educational benefits to a child with disability. To instruct a child, one should consider the following:

- A statement of a child’s present level of performance.
- Annual goals and short term objectives.
- Specific education and related services to be provided to a child and who should offer these services
- Projected dates for the initiation for their services and the anticipated duration.
• Criteria for determining at least annual progress made towards goals and objectives.

IEP can be used for learners with physical disabilities using assistive technology devices. The type of the device required is written into IEP providing it as part of instruction process. If a learner can learn using devices like adapted books or is able to match words with pictures, it means that assistive devices can be used as a means to an end. Assistive devices can also be written into IEP and used as a related service which a child needs. To benefit from a design item, assistive device can be used as a related service, that is, it can be used by a learner to benefit from educational programme. A walker, wheelchair or any positioning device can be used as a related service. Assistive device can also be written into IEP as a supplementary aid. Here it provides more independence to a learner with physical disability and requires a little instruction to use it effectively. The device can be incorporated for independent living and learning. (Jan, 2004).

2.2.3 Communication Devices

Learners with physical disabilities require a way of communicating. Those with severe speech impairment can use augmentative and alternative communication (AAC) devices for communication. There are three types of AAC systems namely: non symbolic, non aided and aided communication. The aided communication is relevant to this study. Aided communicative devices include any device that learners may use beyond their bodies in communication. Those devices could be non-electronic for example paper, pen and picture board. Learners with communication disabilities usually use a set of symbols to communicate. These symbols include: objects, parts of objects, miniatures,
photographs, Line drawings, pictures, Rebus and the alphabet (Doster and Politano, cited in Alberto et al., 2000)

Non electric and electric devices can be used by learners with a communication problem. These devices include: eye gaze board, communication boards, cards and any other item that can hold symbols. The type of the device the learner uses depends on symbols used, user’s visual and motor skills. The B-H non electric communication card is a card that uses letter and number scanning. The teacher runs his or her finger across the top of a symbol until the learner responds with motor or verbal signal. The signals can either be eye blinking or nodding. Another device used in communication is eye transfer device, which is a clear plastic board where symbols may be placed on both sides. The learner communicates by gazing at the desired symbols and gazes at the partner to signal that the symbol gazed at is the selected symbol. Electronic communication devices are in two forms; dedicated and computer based. Dedicated are portable units designed specifically for communication (Stuck, cited in Alberto et al., 2000). They usually contain all the compartments in one unit. Some of them allow more than one input option and usually include voice output. Others offer prompt output and keyboard emulations for computer use. Computer based communication systems consists of a computer with a method of input, communication soft ware and speech synthesizer. This system can be used for interaction with other individuals during academic work. Touching or pointing at symbols is preferred for learners with gross and fine motor abilities. On the other hand, it is preferable for learners without hand skills to use the following adaptations: head pointers, mouth sticks, joysticks, mice and keyboards
Learners who have severe disabilities and cannot use a keyboard or operate a mouse, can use intellikeys. This is a keyboard and an overlay combination that takes the place of a keyboard. The overlay consists of alphabet, numbers and enlarged arrows. For learners with severe physical disabilities who cannot use the above devices, a Smart Nav4 device can be used. This device allows a learner to move the mouse by moving his head slightly. Another device is the gooseneck. It is a switch that allows the learner to use the computer with the use of his/her head. The switch can be used in conjunction with a software program such as Kenox that allow the learner to type by simply hitting the switch with his or her hand (Gooseneck switch mounting, 2007).

Some children with physical disabilities particularly those with CP have problems expressing themselves and take long to say what they need to say. In many cases their speech is intelligible. Bigge & Survis cited in Ndurumo (1993) notes that investigation should be done on preferred mode of communication. These methods can range from use of communication boards, gestures, pointing and writing. Teachers should find out how functional body parts are used such as range of motion of joints, flexibility of the neck, ability to bend and use of fingers. This can help design appropriate communication systems.

2.2.4 Assistive Devices for Mobility

Mobility devices enable children with physical disabilities to interact with their social and physical world. If mobility is enhanced, it has positive outcome and gives the learner with physical disability greater independence, self confidence and self initiative (Best et al., 2005). During the instruction process, it is incumbent upon the teacher to select those
mobility devices that take into account factors such as: age, motor abilities, physical endurance, and environmental situation at home and in the community, funding of equipment, school equipment needs and educational goals. The goal of any primary mobility aid is to provide a means of movement with the greatest amount of independence and using the best quality movement patterns in the most efficient manner (Alberto et al., 2000).

According to Sudbery (2002), management of learners, for example, with muscular dystrophy can be done by use of rehabilitative devices. These are canes, calipers, wheelchairs and other rehabilitative devices that can help sufferers maintain mobility and independence. Management is mainly directed to preventing complications, weakness including decreased mobility and dexterity, contractures, scoliosis, heart and respiratory defect.

According to Bleck et al., (1982), a learner with a physical disability can be taught how to use a mobility device like a wheelchair, with very favorable results. Learners with physical disabilities require seating and positioning support or inserts in the wheelchairs. Manual wheelchairs can be used as a backup to power propelled wheelchairs. Walkers also assist in mobility. Some require weight bearing while others are designed for movement from a seated position. There are also those that are designed to be used either behind or in front of the user in order to ensure a more upright posture. Walkers may have rigid frames for stability or may be folded for portability.
Individuals with greater stability may use crutches. Crutches could either be forearm or aluminium. Crutches are effective assistive devices as they help one move about in the classroom and access learning materials, without much assistance from the teacher and peers. The mobility devices aid in movement by allowing the learner to be in class in good time. A mobile stander is another mobility device that allows the learner to stand supported in a slightly forward leaning position, freeing the arms for use. It allows eye level, face to face contact with peers and it can be used in a variety of classroom work (Bigge, 1982).

2.3 Adequacy and Effectiveness of Assistive Devices

In 1988, the American Congress enacted a technology act aimed at providing funds to all states in order to help them access assistive technology devices to be used by learners with disabilities. The Act required grants to be provided to the states within U.S.A. These grants would provide a climate in which the various states would make changes in their structures, laws and policies to provide access to Assistive Devices and services to individuals with disabilities. The technology Act of 1988 cited in Best et al., (2005), required the following to be done by schools in America:

- Schools to ensure that Assistive Devices are made available to a child with disability if required as part of a child’s special education or related services.
- Schools purchase devices and services on a case by case basis, if the child’s IEP team required a child to access these devices at home in order to receive Free and Appropriate Primary Education.

Unlike in America, there are no laws in Kenya for guiding in the provision of Assistive Devices in schools. The study by Ogwang (1999) on the provisions for special education
needs for students with physical disabilities and visual impairments in Makerere University found out that students faced various difficulties in the course of their study. The difficulties were mainly related to access to library facilities, physical structures, social and recreational facilities. The university made provisions in key areas like special admission procedures, special equipment and special consideration in the halls of residence. It also realized that there was lack of knowledge in the needs and provisions for Students with disabilities at the university. There was no service provision for this Category of students. The study aimed at finding out whether assistive devices which are part of the learners needs are known and provided for at APDK Masaku School.

According to Razak (2000) study on disabled persons in Ghana on human rights and disability for equal rights, it was noted that equalization of opportunities for persons with disabilities depended greatly on protection of human rights and the enactment of specific rights of persons with disabilities. He further noted in the study that the government had neglected the needs of the disabilities while planning for national development. Social attitudes on disabilities were not friendly. The research recommended that national laws and policies be formulated and implemented to account for the needs of persons with disabilities. Just like Ghana, national laws and policies have not been put in place in Kenya to address the provision of assistive devices for learners with physical disabilities. The America’s Individuals with disabilities Education Act of 1990 states that individuals with disabilities should have access to assistive equipment and services, including purchasing and leasing technology devices and training in their use (Best et al., 2005).
According to Jen et al., (2007) in the regional survey on assessment of Assistive Devices used in southern Taiwan, 62.10% used orthotics, 41.13% used Assistive Devices for personal mobility, 16.94% used for therapy and training 7.26 % used for play and recreation, 3.23% for communication, 3.23% for reading, 2.4% for ADL, 1.61% for environmental control, 0.81% for safety and 9.685 for other reasons. A total of 124 learners were put to this research survey that used 244 assistive devices. The study realized that a total of 103 out of 124 learners, that is, 83% had achieved postural or functional improvement using various Assistive devices. Twenty two learners out of 26, that is, 84.62% who used assistive devices for positioning achieved postural improvement. Nine out of 12 children who were rated at 81.82% and used assistive devices for communication and environmental control attained functional improvement. Nineteen out of twenty five who used assistive devices for ADL and were rated at 76% achieved functional improvement. One hundred and three out of 118 children who used assistive devices for mobility and orthotic were rated at 87.29%. They experienced functional improvement.

The study by Nyakando (2007) was on the effectiveness and the use of audiological equipment in audiological rehabilitation of primary school pupils with hearing impairments. One of the objectives for the study was to determine the types of audiological equipment in the schools. One of the findings was that the schools lacked modern and suitable types of audiological equipment in order to enhance audiological rehabilitation process. The recommendation was that there was need to provide suitable and powerful hearing aids. The study by Nyakando (2007) is in line with the current study in some of its objectives but it is based on hearing impairment.
The study by Maneno (2008) was on speech sound disorders in children with speech and language disorders. The study ultimately recommended intervention measures. The study cut across a number of disabilities and cerebral palsy was one of them which is in the area of physical disability. The study found out that facilities used by teachers in identifying and rectifying cases of children with communication disorders were inadequate. For instance, there was no tool which teachers could use to identify speech disorders. Without a tool for use to identify the speech disorders among the CP learners, this study was concerned with CP as a disability requiring assistive devices in the area of physical disability.

A Presidential Working Committee on Education and Training for this Decade and Beyond of 1988 in Kenya recommended that necessary facilities and equipment be provided to learners with special needs in education in the integrated programmes. Totally Integrated Quality Education and Training of 1999 recommended that special schools for physically handicapped be provided with facilities to make adaptive aids. The Persons with Disabilities Bill 1997 sought to establish the National Council of Persons with Disabilities which would act as the umbrella body to ensure that rights of persons with disabilities were protected. One of the council’s functions which was effected was that of making sure that learning institutions take into account the special needs of persons with disabilities. This was in respect to the use of school facilities, class schedules and physical education requirements. The Persons with Disabilities Bill (2002) was enacted and allowed the establishment of a national council of persons with
disabilities. The above commissions noted that equipment and resources for learners with disabilities were of concern and that’s why the current study aimed at finding out the adequacy and effectiveness at assistive devices at APDK Masaku primary school (KISE, 2002).

The MoEST task force (2003) established that learners with disabilities required educational resources at both individual and school levels. The task force recommended that:

- Government provides learners with special needs with Assistive Devices needed to access education.
- A central body be established at Kenya institute of special education and MOEST branches at district level for the procurement, disbursement and maintenance of Assistive Devices.
- Teachers in schools which have learners with special needs be in serviced on learners’ needs assessment and maintenance of assistive devices.

The task force observed that the government had allocated approximately Ksh 1,020 per year per child in a regular school and Ksh 2,000 had been provided to every child with special needs either in units or in special schools. The task force came up with the cost of educating a child with special needs in a day school or unit as Ksh 17,000 per year while those with severe SNE in special schools amounted to Ksh 32,000 per year. The allocation of only Ksh 2000 by the government, whether a child is in a special school or unit, falls far below its recommendations.
Daily Nation for June 23\textsuperscript{rd} 2004 pg. 31 indicated that the 2000 Kenya shillings per child per year for SNE was scaled to Ksh. 3020 per pupil in special schools and units. Each school was also set to receive Ksh. 228, 660 within the 2004/2005 financial year. Out of the grand figure, money for making the learning environment disability friendly was (Ksh.10,000 ), that for meeting specific learners needs in special schools/units (Ksh.153,000), provision of water and sanitation (Ksh 50,000 ) and provision of science kit (Ksh15,000 ). This allocation given was not clear as to whether assistive devices for the learners with physical disabilities were meant to be provided from the kit. The study will aim at finding out how far the recommendations of the task force have been met and also whether the allocation given to special schools and units during the 2004/2005 financial year have continued to be released in subsequent years. In a nut cell, the study will aim at finding out whether assistive devices are adequate and appropriate for use in educating learners with physical disabilities.

\textbf{2.4 Challenges Faced by Learners and Teachers When Using Assistive Devices}

Learners with physical disabilities using assistive devices have problems gaining teachers’ attention especially if they are unable to raise their hands. Others may need extra time to respond to a question in class because of communication difficulties using an AAC system. Some learners have to do class work by being asked to give the day after so that they can for instance programme an argumentative communication device with answers. Other learners may need assignments and texts modified because of fatigue and endurance issues. This is due to the physical effort involved in slowly completing assignments and tests (Meisels, 1979). Delayed language development is reported in
many learners with muscular dystrophy. Some learners have difficulties and struggle with retention and processing of complex information. Learners with severe facial weakness may find it hard to smile or show emotion in the visual way. Learners with specific visual weaknesses may encounter language difficulties because of lack of strength in muscles used for articulation. According to Dubowitz (1989), some learners with muscular dystrophy may develop communication difficulties due to weakness of the speech organ muscles.

According to Nestor (2009), a study carried out in Taiwan among the CP learners identified some factors that contributed to enthusiasm for the Assistive Device. These were: to overcome physical limitations, identify with the role of the “student” and need to fulfill that role better, to increase peer socialization and school participation. This research study explored factors that led to lower use of assistive devices by the learners. They included; being teased and verbal abuse by peers. Learners with disabilities viewed devices as an explicit reminder of their disabilities, and being the center of attraction in a negative way.

According to Lees (2006), people with physical disabilities who have mobility impairments sometimes use Assistive Devices such as wheelchairs, crutches, canes and artificial limbs to obtain mobility. The individual with disability has to do lots of work such as reading, writing, typing, moving quickly, climbing stairs to attend classes, and participating in examinations. This learner may not keep up with the classroom work and mostly lag behind in academics.
Students with physical disabilities performance is affected by the following: motor limitations, restricted communication, fatigue and endurance, and health factors. The teachers need to be familiar with the student’s specific disability, and its implications for academic performance (Alberto, Forney, Heller and Schwartzman 1996). Juvenile rheumatoid affects students’ mobility, strength and endurance and students may come to school with varying degrees of pain and sickness. Teachers should keep an eye on body language such as facial expressions or rubbing of joints, that may indicate that a child may be in pain or fatigued (National Institute of Arthritis and Muscular skeletal and Skin Diseases, 2003).

A study in Kenya on peer acceptance of the physically handicapped within the integrated class in Nairobi Mugambi (2003) revealed that there was no significant difference in peer acceptance of the physically handicapped children. These children fitted well in the regular classes. The study recommended that apart from creating awareness on what physical disability is, correct physical management procedures, adaptations and devices, if implemented by families and others in class would help the child participate in daily activities at home, in class and in the community. This current study is therefore handy especially on the recommendation based on the need for adaptations and devices to help a child to participate daily at school, home and community.

According to Kamere (2003) study on the development of special education for learners with physical disabilities in some selected schools, one of the issues brought out was study was on services and facilities that enhanced mobility. In that study, environmental
modification in some PH schools was studied. Some schools had ramps, canopies and cemented paths which facilitated movement of learners with physical disabilities using mobility devices like wheelchairs. Two areas of educational difficulties mainly, problems relating to sitting for examinations and those pertaining to classroom work were brought out. Learners had difficulties in writing resulting from shaking hands, slowness in writing and tiredness as result of sitting for long where they had to bend very low so as to write. The study highlighted some mobility and instructional devices which were used by these learners. Some of the problems encountered using instructional devices were based on poor gripping of pens while others had to do with wheelchairs that were too big and learners could not reach the tables with ease. The study did not deal exhaustively with mobility and instructional devices on their adequacy and effectiveness during instruction. Other devices not addressed in the study were those for positioning and sitting.

A study to investigate instructional problems constraining the teaching of physical education in Kenya primary schools for the physically handicapped Gathua (1990) elicited responses on instructional problems which adversely constrained the teaching of physical education to the physically handicapped. The study came up with problems such as illegal liability for accidents, getting tired easily and the problems of perceptual and motor coordination among others. This study agreed with that of Kamere (2003) as pertaining instructional problems faced by learners with physical disabilities, although it was centered on the area of physical education. According to Cartwright and Cowie (2005), there is a possibility of learners falling as they use Assistive Device. Teachers must be aware that some individuals with spinal cord injuries are unable to feel pressure and pain in the lower extremities, so pressure sores and skin breakdown may occur in
response to prolonged sitting. Opportunities for repositioning and movement will help prevent these problems.

Teachers further face the challenge of making sure that the physical layouts permit students to move effectively by use of clutches and wheel chairs in classrooms and other settings. Teachers have to support the children in bladder and bowel management procedures ensuring appropriate privacy in their management. A child with hydrocephaly and fitted with a chant requires the teacher to be alert of malfunctioning, including irritability, neck pain, headache, vomiting, reduced alertness and decline in school performance. Teachers have a challenge knowing how to implement specialized strategies to prevent breakdown where there can be misunderstanding or misinterpretation of what is being communicated to them by learners (Yesseldyke & Algozzine, 1995; Tumbull et. al., 1995; Bigge, 1982).

Teachers who instruct individuals with physical disabilities must possess specific competencies that encompass instruction. It is important that these teachers be competent in areas such as: physical management of learners in educational environment, health maintenance, use of assistive technology, use of augmentative and alternative communication, and curricular adaptation (Council for Exceptional Children, Heller et al., cited in Best et al., 2005)

According to Sherril (2006), the devices that help the least especially in classrooms, are those that teachers do not understand. The study noted that teachers have an amazing ability to utilize the devices, but if there isn’t a high enough level of training for staff, using the devices is a waste of time and money.
Alberto et al., (2000) gives knowledge and skills that a teacher should have in handling learners with disabilities using assistive devices. He/she should provide specialized assessment and evaluate the learners’ needs. This further means that the teacher should be able to note the difficulties experienced by children with special needs in education as far as the use of devices is concerned. He/she should be conversant with the laws and policies pertaining to learners with special needs, have knowledge of available resources in the community and address the needs of the learners, know where to find relevant personnel especially members of the multidisciplinary who are important in selection and programming for introduction and use of an assistive device and comprehend the nature of disabilities in learners. The teacher should be aware of assistive devices used in aiding learning, while in a position of sitting, standing and prone among others. Support personnel should determine whether the devices used are appropriate for each and every learner.

According to Klemz and Bell (2000), teacher competency may be expressed in the way the teachers handle learners’ positions during instruction process. Correct alignment of each body part should be known beginning with the pelvis, hips, head/trunk, arms and legs. Teachers working with learners with disabilities need to set up materials that the student requires to use while in different positions in class during instructional process. The teacher has the role to examine student using assistive devices for pressure points each time he/she is removed from a certain position or device. The teacher should assist learners in movement when they are changing from one position to another. Learners
should also be trained on how to transfer from, for instance a device which is a supplementary aid to the floor and beds among other places.

Teachers working in public institutions in Kenya including those who are working in special needs education programmes are employed by Teachers Service Commission (TSC). A serious shortage of trained SNE teachers was noted in Kenya by the MoEST task force (2003). It found out that 80% of the teachers working with children with special needs were not trained in SNE. Consequently, some special needs education programmes such as regular schools with special units, special schools, Education Assessment and Resource Centre, (EARC) and small homes were managed by persons who had no qualifications in SNE. Therefore, lack of SNE teachers was noted as a critical issue that affected the provision of special Needs education services, although, paradoxically, there were teachers who had graduated from some public universities but had not been employed by TSC. The task force observed that some special schools were headed by teachers who did not have any qualification in SNE, while within the same staff, there are teachers with a diploma or degree in SNE. One of the recommendations of the task force was that heads of special schools be holders of diploma or degree in SNE.

2.5 Summary of literature Review

This chapter has reviewed literature on physical disabilities and Assistive Devices used by learners with these disabilities. The review has reviewed that no known research has been conducted at APDK Masaku based an Assistive Devices. Without any known research on this area, it may be difficult to know about the adequacy and effectiveness of Assistive Devices. The study therefore sought out to find the physical disabilities in the
school, Assistive Devices used by learners, their adequacy and effectiveness in the school as well as challenges faced by teachers and learners when using the devices. The Assistive Devices studied were those mainly used during classroom instruction. These included: mobility, instructional, communication and those for positioning and seating. The related studies on the area of physical disabilities shows that a number of studies have been carried out in the area of physical disability. These include Jen et al., (2007) study in Taiwan which was on assessment of Assistive Devices.. In Uganda Ogwang (1999) carried out a study on provision of special education needs for students with physical disabilities while Kamare (2003) study in Kenya was based on development of special education for learners with physical disabilities in Kenya. No research known to the researcher has addressed issues on adequacy and effectiveness of Assistive Devices used for the instruction of learners with physical disabilities. This study aimed at finding out whether Assistive Devices were adequate and effective at Masaku School for the PH.
CHAPTER THREE

METHODOLOGY

3.0 Introduction

The focus in this chapter is on research design, variables, the study locale, target population, sampling techniques and sample size, research instruments, piloting, validity and reliability, data collection procedures, data analysis and logistical and ethical considerations.

3.1 Research Design

The study adopted descriptive research design. Descriptive research involves gathering data and describes events and then organizes, tabulates, depicts and describes data collection. This design seeks to uncover the nature of factors involved in a given situation. It seeks to determine the degree in which they exist and attempts to discover the link in relationships which exists between factors (Lovell & Lawson, 1970).

The study combined aspects of both qualitative and quantitative techniques. According to Mwiria & Wamahi (1995); Kombo and Tromp (2006), quantitative technique emphasizes on observable ‘facts’, not on meaning or purpose. According to Bartleah and Burton(2005), quantitative information can be tabulated in a numerical form such as scores or number of times a person chooses to use a certain feature. Quantitative technique was mainly used in the questionnaires for the teachers. It was used to find out the physical disabilities in classes, Assistive Devices used in the classes, their adequacy
and effectiveness as well as challenges faced by learners and teachers when using these devices.

Qualitative technique produces data that is holistic, contextual and descriptive in-depth data that are rich in detail. It is concerned in discovering inner meanings of social actions rather than just their outward form. The researcher established the physical disabilities found in the school, types of Assistive Devices used, their adequacy and effectiveness and challenges faced by learners and teachers when using assistive devices.

3.2 Study Variables

Independent variables included: different physical disabilities, types of assistive devices, their adequacy and effectiveness and challenges faced by teachers and the learners as they used assistive devices. Instruction of learners with physical disabilities was the dependent variable.

3.3 Location of the Study

The study was done at Association for the Physically Disabled in Kenya (APDK) Masaku School. APDK Masaku School is situated along Machakos - Kitui highway within Machakos town. Machakos district where the school is situated lies along longitude 37°E and 38°E, latitude 1°N and 2°S. Its neighbors are Kitui on the East, Mtito Andei on the South, Nairobi on the North West and Murang’a to the North. APDK Masaku is a mixed boarding which mainly caters for the PH learners but has a small separate wing for learners with mental handicarp. The school was established in 1979 to rehabilitate learners with physical disabilities. The school of study was chosen because it was among the first to be established by Association for the Physically Disabled of Kenya in 1979.
and so has a long tradition of dealing with various categories of physical disabilities. The school has also a national outlook because it admits pupils from different parts of the country.

3.4 Target Population

According to Orodho (2005), target population is a large population from which a sample population is selected. The study population is the group of participants in the study. The school had a total population of 175 learners, 21 teachers and 1 headteacher. The target population was therefore 197.

3.5 Sampling Techniques and Sample Size

Orodho (2005) defines sampling as the process of selecting a subset of cases in order to draw conclusions about the entire set.

3.5.1 Sampling Technique

Purposive sampling was used to select teachers, headteacher and learners of class 4-7 while snowballing was further used to select specific learners for the focus group interview. Sampling is handpicking the cases to be included in the sample on the basis of one’s judgment of their typicality (Orodho, 2005). In purposive sampling, the intent is to achieve an in-depth understanding of selected individual (Uwe, 2005). Teachers of class 4-7 were purposively selected by the virtue of being in-charge of the learners’ academic and social welfare in their respective classes. By being the in charge, they were more conversant with the learners than the rest of the teachers in school. They were therefore in a better position to comment on issues pertaining to their disabilities as well as the
assistive devices learners used. The headteacher was purposively selected as the head of the institution and in charge of school administration.

The researcher used learners in class 4-7 for the focus group interview. Snowball sample was used and according to Frankel & Wallen, (2009), it involves selecting one as need arises during the conduct of the study where a group of principals recommend others who also should be interviewed because they are particularly knowledgeable about the subject of research. The reason for the choice of class 4-7 learners was because at their level they could offer a fairly free interaction where the researcher could pursue the response with the individuals. This is because they could understand the questions posed during interview. The selection omitted lower primary due to their limitation in understanding the questionnaires. Class 8 was left out by virtue of being an examination class. The learners selected were used for the focus group interview.

3.5.2 Sample Size

The sample size constituted the head teacher, eight teachers, 9 learners from standard 4, 7 from 5 and 8 learners from standard 6 and 7 respectively. The total number of respondents was 41. This is shown in table 3.1 below.

Table 3.1 The study sample size.

<table>
<thead>
<tr>
<th>Class</th>
<th>Enrollment</th>
<th>Sample</th>
<th>Teachers</th>
<th>Headteacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>23</td>
<td>9</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>8</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>82</td>
<td>32</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>
3.6 Research Instruments

The study used three research instruments to collect data. These were questionnaires for the teachers, interview (interview guide for the headteacher and focus group interview for the learners and observation checklists which were used by the researcher. These instruments were developed by the researcher.

3.6.1 Questionnaires

According to Mugenda & Mugenda (1999), questionnaires are commonly used to obtain important information about the population. They allow the researcher to collect information from many respondents within a short time. Questionnaires for the teachers contained questions which were based on the background information of the respondents which included teachers’ professional qualifications, the years of teaching experience and any in service attended by teachers on the area of physical disability. The items in the questionnaire were developed to address specific research questions. These questions were based on physical disabilities in their respective classes assistive devices used in their classes, their adequacy and effectiveness as well as challenges faced by learners and teachers. The questions were based mostly on a four point likert scale where the respondents strongly agreed, agreed, disagreed or strongly disagreed by ticking any of the choices.

3.6.2 Interview

Interview makes it possible to obtain the data required to meet the specific objectives of the study (Orodho, 2005). In this study, semi-structured interview was used to collect data from the headteacher. According to Uwe (1996), semi-structured interviews involves
asking a series of questions and then probing more deeply using open form questions to obtain additional information that is vital to the study.

The interview involved the researcher and the informant in a face to face interaction. The instrument enabled the researcher to elicit in-depth information based on research questions. Kerlinger (1973) indicates that people are willing to communicate orally more than writing and therefore provide data more readily.

Focus group interview was used for the learners. According to Krugger et al., (2000), focus group interview is carefully planned discussion designed to obtain perception in a defined area of interest in a permissive, non threatening environment. It is conducted with approximately 7-10 people by a skilled interviewer. The key issue gathered was based on the adequacy and effectiveness of assistive devices used by learners at APDK Masaku special primary school.

3.6.3 Observation Checklist

Philips (1985) defines observation as a method of collecting data and the researcher note things or events with a variety of senses namely; seeing, hearing, touching, tasting and smelling. An observation checklist is a tool that provides data through direct observation.

The checklists were used by the researcher to record the number of learners with particular devices and those in need of the devices. The researcher also observed the devices recording the number of learners with fitting devices. Observation was done during class sessions because the researcher wanted to get the state of the devices required for use by learners, those available and whether they were fitting to the learners.
3.7 Pilot Study

The pilot study was conducted at Joy town primary School for the physically handicapped, Thika, Central province of Kenya since it had similar characteristics as the target school. These were learners with physical disabilities. Piloting involved 4 teachers and the headteacher. The teachers involved were those in charge of the academic and social welfare of the learners. The teachers came from the classes with the highest number of learners with physical disabilities, that is, standard 4 and 7.

Learners selected for piloting in the focus group interview were those from classes with the highest number of disabilities. These were class 4 and 7. The teachers in charge of the academic and social welfare in these classes helped select 8 pupils from standard 4 and 9 from standard 7. The researcher carried out observation of assistive devices in the 2 classes with the highest number of learners with physical disabilities. These were standard 4 and 7. Piloting helped identify ambiguities and unnecessary items in the instruments. It checked suitability and the level of language and helped the researcher to gain basic administrative experience in conducting research.

3.7.1 Validity

Content validity was applied to determine the validity of the adequacy and effectiveness of Assistive devices. Mugenda and Mugenda, (1999) defines content validity as a measure of the degree to which data collected using a particular instrument represents a specific domain of indicators or content of a particular concept. In this study, professionals were used to evaluate the items in the instruments against the relevant domains in the Adequacy and effectiveness of assistive devices which included: types of
physical disabilities and devices used for them, views of both teachers and learners on adequacy and effectiveness plus challenges faced by both learners and teachers when using devices.

3.7.2 Reliability

Reliability is the measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda and Mugenda, 2003). Test retest technique was used to determine the consistency in measurement. The test retest was administered to a selected sample of the headteacher, 4 teachers, 8 learners from class 4 and 9 from class 7 of Joy town school for the PH. Interview was carried out with the headteacher, focus group interview with the learners and questionnaires were given to the teachers. Data was analyzed using correlation coefficient. and Pearson correlation coefficient was used to come up with the nature of the relationship among different variables. There was a positive correlation coefficient of 0.8 between the two tests scores.

3.8 Data Collection Procedures

Before proceeding to the field to embark on the study, the researcher obtained research permit from the permanent secretary in the Ministry of Education. The researcher then piloted the instruments to make corrections and adjustments. The researcher made orientation visit to the school of study and notified the headteacher of the selection of the school of study. The purpose of the study was explained to the headteacher and the teachers. The teachers introduced the researcher to the learners who were explained to the purpose of the study. Convenient dates were set for administering the instruments. Questionnaires for the teachers were administered by the researcher.
The teachers were given questionnaires to fill which were collected after a one week’s period. The questionnaires were serialized for confidentiality. This data was recorded in the questionnaire Appendix A.

A quiet place within the school was selected where interview was carried out with the headteacher. This was in order to avoid distraction of attention. The researcher guided the interview by probing more deeply using open form questions to obtain additional information which was vital. The researcher recorded this data by note taking. The interview guide helped establish; physical disabilities at APDK Masaku special school, assistive devices used in school, their adequacy and effectiveness and challenges faced when using the devices. This data was recorded in the interview guide Appendix B.

According to Krugger et. al., (2000), one characteristic of a focus group interview is that it is conducted by a skilled interviewer. The researcher had a trained research assistant to help in data collection. Each group had 8 members from each of the 4 classes, 4-7. Focus group interviews were conducted in between 4.00 - 6.00 after mid day for a period of two days. While leading the discussions, the researcher referred to each speaker using the allocated numbers. The researcher probed participants for further clarification using probing questions. Both the researcher and research assistant recorded information through note taking. These focus group interviews helped establish; the assistive devices used at APDK Masaku special school, their adequacy and effectiveness as well as challenges faced when using these devices. Data for focus group was recorded in focus group interview Appendix C.
A checklist was designed to observe assistive devices used in class 4-7. All the devices were visible information gotten from what could be seen and heard. Each observation session took about 35 minutes and was done when the classroom teaching was in progress. This was done for a period of 2 days. During day 1, the researcher observed class 4 and 5 while during the second day; classes 5-7 were observed. Data was recorded in observation checklist Appendix D.

3.9 Data Analysis

The researcher used descriptive analysis. According to Mugenda & Mugenda (1999), descriptive analysis involves both quantitative and qualitative methods of data analysis. Data analysis was done based on the objectives of the study. With quantitative data, closed ended questions were coded and data entered in the computer. With qualitative data, categories were formed, themes established, coded and data entered in the computer. This data was analyzed using statistical package for social sciences (SPSS) and Microsoft Excel. Both qualitative and quantitative research involved descriptive analysis which included frequencies and percentages. After analysis the findings were presented in form of tables and charts.

3.10 Ethical Consideration

Participation in the research was voluntary. Direct consent was sought from the headteacher and teachers. Consent of the pupils’ participation in the study was sought from the headteacher and the learners themselves. The participants were reassured that
the information provided was to be used for the purpose of the study as indicated in the research instruments and not for any other reason whatsoever.
CHAPTER FOUR

PRESENTATION, DATA ANALYSIS, RESULTS AND DISCUSSION.

4.0 Introduction

This chapter deals with data presentation, analysis, results and discussion of a case study carried out at APDK Masaku Primary School for the PH. Teachers demographic attributes are discussed followed by study questions. The description of data by use of frequencies and percentages is presented. The findings are presented by use of tables and figures accompanied by interpretations. The responses were received from the headteacher, 7 teachers and a total of 32 learners in standard 4, 5, 6, and 7. The researcher also observed assistive devices in class 4-7 by using an observation checklist. This chapter is organized in four major themes derived from the research questions but demographic information of teachers is presented first. The research questions that guided the study were:

1. What different physical disabilities call for use of assistive devices by learners at APDK Masaku?
2. What types of assistive devices are found in the school under study?
3. What are the views of teachers and learners on the adequacy and effectiveness of assistive devices?
4. What challenges are faced by teachers and learners when using assistive devices?
4.1 Demographic Information of Teachers.

Information pertaining to the following demographic attributes was collected: sex, professional qualifications, in service training in the area of physical disability and the number of years of teaching experience.

4.1.1 Sex of the Respondents

The study sought to find out the sex of the respondents. This is shown in figure 4.1 below.

Figure 4.1: Sex of the Respondents.

![Sex of the Respondents](image)

Figure 4.1 reveals that majority of the teachers who responded to the questionnaires were female 75% while 25% were male. This reflected to the total number of teachers in the school which was 22, 5 males and 17 females.

4.1.2 The Professional Qualification of Teachers

The teachers’ professional qualification is indicated in table 4.1 below.
Seventy five percent of teachers were diploma holders in SNE while 25% had a bachelor in education. The professional qualification in SNE was good for teachers to provide data required. All the teachers had acquired necessary knowledge and skills to instruct learners with special needs in education. This is contrary to the MoEST task force (2003) which found out that 80% of teachers working with children with special needs were not trained in SNE. APDK Masaku School had all teachers trained in SNE.

### 4.1.3 Teachers Teaching Experience

Eight teachers inclusive of the headteacher were asked their teaching experience, they responded as shown in figure 4.2 below.

**Figure 4.1: Teaching experience**

<table>
<thead>
<tr>
<th>Qualification</th>
<th>No. of teachers (frequency)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diploma</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>Bachelor in education</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>100</td>
</tr>
</tbody>
</table>
In relation to teaching experience, figure 4.2 show teachers and how long they had been in the teaching profession. Majority of the teachers 75% had a teaching experience of between 11-20 years and only 25% had taught for 30 years and above. All teachers sampled had taught for over 10 years. The teachers were competent and experienced to handle learners with physical disabilities.

4.1.4 In-service Training for Teachers

The respondents were asked whether they had attended any in service training. Their response is shown in table 4.2 below.

Table 4.2: In-service Training

<table>
<thead>
<tr>
<th>Teachers</th>
<th>No. of teachers trained</th>
<th>No. of teachers not trained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>25%</td>
</tr>
</tbody>
</table>

According to the table 4.2 above 75% of teachers had not attended any in-service training in the area of physical disabilities since they were employed as teachers while 25% had. The headteacher stated that regular in-service training was necessary considering the diversified disabilities teachers handled in the area of physical disability. He also noted that these teachers further handled these learners who used different assistive devices. According to Sherril (2006), teachers have an amazing ability to utilize the devices but if there isn’t high level of training for staff, many devices are a waste of time and money.
4.2 Physical Disabilities at APDK Masaku

This section points out the physical disabilities at APDK Masaku. This was done through interview with the headteacher and questionnaires for the teachers.

4.2.1 Response of the Headteacher on School population and Physical Disabilities at APDK Masaku

The school had a total population of 175 learners. Out of this, 113 were boys and 62 were girls. Figure 4.3 below indicate the disabilities in the school of study based on Sex.

**Figure 4.3: Disabilities Based on Sex**

As presented in figure 4.3, majority of learners were boys 65% while girls were 35%. A physical disability like Duchene Muscular dystrophy affects boys more but can also affect girls in rare cases. It is most common among school going children (Walton, 1998). The headteacher reported that the learners in Masaku were in school due to the disabilities they had. This is shown in table 4.3 on page.
The result from table 4.3 above shows data collected through interview where the headteacher cited disabilities in school from class 1-8. Data showed that 45.14% of the learners had cerebral palsy, 15.43% had muscular dystrophy, 10.29% Spina bifida, 5.14% brittle bone and another 5.14% had scoliosis. Juvenile rheumatoid arthritis was rated at 3.43%. The rest of the disabilities were at 15.4% included anthrogryphosis, kyphosis, amputee, hydrocephaly and other health impairments. The disabilities with the majority of learners were cerebral palsy, muscular dystrophy and spina bifida. According to Durumo (1999), Disabilities are divided into 3 groups namely neurological, orthopedic and other health impairments. Neurological include CP, spina bifida while Orthopedic include; poliomyelitis amputees, anthrogryphosis and Osteogenesis imperfecta. The health impaired includes asthma, burns, HIV-AIDS and heart diseases. Cerebral palsy which had many learners manifests itself on the basis of posture and movement patterns displayed. CP is also manifested in limb involvement where the degree of the severity of the limbs affected differs.
According to Domiano et al., (2007), CP is in the following types; spastic, arthetoid, ataxia and mixed while muscular dystrophy according to Ferri (2005), is in nine types with the most common being Duchene muscular dystrophy which affects the school going children. The above data showing physical disabilities show that APDK Masaku had learners with varied physical disabilities which warranted the researcher to find out whether they used assistive devices and if yes, whether they were effective.

4.2.2 Teachers’ Response on Disabilities Found in Classes.

The researcher sought to establish physical disabilities in different classes by use of questionnaires which were answered by the teachers in charge of academic and social welfare of learners in class 4-7. The information is tabulated in table 4.4.

<table>
<thead>
<tr>
<th>Class</th>
<th>No of learners</th>
<th>Cerebral palsy</th>
<th>Spina bifida</th>
<th>Muscular dystrophy</th>
<th>Brittle bone</th>
<th>Scoliosis</th>
<th>Juvenile rheumatoid arthritis</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>23</td>
<td>14</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>40</td>
<td>8</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

The result from table 4.4 above shows data collected from 4 classes where 48.78% percent of the learners had cerebral palsy, 14.63% had muscular dystrophy, 9.76% Spina bifida, 3.66% brittle bone and another 3.66% had scoliosis. Juvenile rheumatoid arthritis was rated at 34.88%. The rest of the disabilities were at 14.63% and these included anthroprathy, kyphosis, amputee, spinal cord injury, hydrocephaly and other health impairments. The disabilities with the majority of learners were cerebral palsy, muscular
dystrophy and spina bifida. The percentage of learners with physical disabilities concurred with that given by the headteacher on disabilities. In both, CP, muscular dystrophy and spina bifida had the majority of learners.

4.3 Types of Assistive Devices at APDK Masaku.

The study also established the assistive device used in school and this was cited by the headteacher, teachers and the learners.

4.3.1 Headteacher’s Response on Assistive Devices Used in school

The headteacher was interviewed about the assistive devices used in school. The devices included wheelchairs, walking frames, clutches, adapted chairs, canes, pencil grip holders, boots and calipers. The devices mentioned by the headteacher were mainly those for mobility. This is in line with the regional survey on assessment of assistive devices in Taiwan by Jen et al., (2007) which found out that majority of the learners used orthotics and mobility devices. The study noted that these learners experienced functional improvements when they used these devices. The headteacher noted that the joining instructions for learners’ during admission were that a learner with a physical disability report to school with a mobility device fitting his or her need. As a result of this mandatory instruction, parents/guardians strived to get these devices so that they could secure the admission. The headteacher cited that parents/guardians were needy and complained of not having funds to purchase assistive devices and that most of those they got such as wheelchairs were quite big for their sizes. This therefore affected their effectiveness while in use by learners. According to Helander (1993), Poverty has a strong link with disability in developing countries. Poverty can create disability and
disability facilitates poverty. Money is needed to participate in education and students with disability need some supportive aids for use in education activities.

The headteacher cited that learning for learners with physical disabilities was to a large extent based on assistive devices because the disabilities affected the gross motor, spinal cord, bones and muscles and they called for use of pieces of equipment. With inadequate instructional devices, the headteacher expressed that learners could not easily manipulate the available resource materials well.

The headteacher further noted that there were inadequate devices for communication. Due to this, some learners, for instance those with CP could not express themselves in a way that they could be understood. He noted that if these devices were available, learners could be taught how to master some certain concepts in academics with ease. Positioning and seating devices were inadequate and he noted that without adequate positioning and seating devices, the concentration span of learners was affected since they got tired easily and this affected learning. The lack of adequate assistive devices meant that learners were not prepared adequately by the teachers to be able to maximize their potential. The headteacher noted that assistive devices motivated learners to take part in different activities like performing classroom activities such as writing and drawing. The devices he noted were however not provided by the government to the school. This is unlike in America where the Technology Act of 1998 according to Best et al., 2005) cited that schools were to ensure that assistive devices were made available to a child with disability if required as part of a child’s special education and related service
4.3.2 Teachers’ Response on Assistive Devices Used during Instruction.

Teachers were asked about the devices used in their respective classes. Their response is shown in table 4.5 below.

**Table 4.5: Devices in Classes**

<table>
<thead>
<tr>
<th>Devices</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N.</td>
<td>%</td>
<td>N.</td>
<td>%</td>
</tr>
<tr>
<td>Mobility</td>
<td>2</td>
<td>29</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>Positioning and seating</td>
<td>Nil</td>
<td>-</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Instructional Communication</td>
<td>Nil</td>
<td>-</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Communication</td>
<td>Nil</td>
<td>-</td>
<td>Nil</td>
<td>14</td>
</tr>
</tbody>
</table>

The results from table 4.5 above show that mobility devices were the most commonly used by learners. Fifty seven percent of the teachers agreed on their adequacy while 29% strongly agreed and only 14% disagreed. As pertains to positioning and seating devices, 71% disagreed on their adequacy and 14% agreed that they were adequate while another 14% strongly agreed. Fifty seven percent disagreed on the adequacy of instructional devices while 86% disagreed on the adequacy of communication devices. From this data, it was noted that learners lacked adequate positioning and seating devices, instructional as well as those for communication. This revealed that learners could not effectively get involved in the learning process though they had adequate devices mainly for mobility. Learners had mobility devices mainly because according to table 4.3 on disabilities found in school, the headteacher noted that majority of the learners had CP and muscular
dystrophy. According to Batstaw and Perret cited in Hallahan and Kauffman (1991), CP is characterized by paralysis and in-coordination resulting from immature damaged brain. According to Hallahan and Kauffman (2002), muscular skeletal defects involve legs, arms, joints and spine and make it difficult for children to walk, stand, sit and use their hands.

4.3.3 Learners Response on Assistive Devices Used in School

A total of 32 Learners through focus group interview said that there were some assistive devices used in school. Their response is shown in table 4.6 below
Table 4.6: Devices in School According to Learners

<table>
<thead>
<tr>
<th>Category</th>
<th>Devices</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility Devices</td>
<td>Wheelchairs</td>
<td>28</td>
<td>87.5</td>
</tr>
<tr>
<td></td>
<td>Canes</td>
<td>25</td>
<td>78.15</td>
</tr>
<tr>
<td></td>
<td>Clutches</td>
<td>30</td>
<td>93.8</td>
</tr>
<tr>
<td></td>
<td>Boots and calipers</td>
<td>29</td>
<td>90.6</td>
</tr>
<tr>
<td>Positioning and Seating Devices</td>
<td>Adapted chairs</td>
<td>7</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>Cut out desks</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Wheelchairs with shoulder straps</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Adapted tables</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td>Instructional devices</td>
<td>Head pointers</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Book holders</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Page turners</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>/pencil grip holders</td>
<td>7</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>Paper holders</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Big ruled notebooks</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Paper masked tape</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td>Communication Devices</td>
<td>Bliss symbols</td>
<td>Nil</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Communication boards</td>
<td>7</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>Photographs/pictures</td>
<td>27</td>
<td>84.4</td>
</tr>
</tbody>
</table>

Learners on table 4.6 mostly cited the availability of mobility devices compared to the rest of the assistive devices categories. Largest population (98.3%) indicated the
availability of clutches at 93.8%, boots and calipers at 90.6%, wheelchairs 87.5%, canes 78.15%, and walking frames 78.1%.

For communication devices, learners noted that there used to be communication boards but they were not in use anymore. Those that were available were broken down and were not in use. Photographs/pictures were rated at 84.4%. Sixty two point five percent noted that the teachers used set of symbols of alphabet and objects while teaching. Learners cited that they would have loved to use computers but they were not available. Learners further noted that some wrote slowly and generally took much time while doing classroom work. According to Gargiulo (2006), learners with motor coordination problems can use head pointers and other body parts on typewriters.

Some positioning and seating devices were available where 25% mentioned wheelchairs with straps. It was probable that those learners who did not mention the wheelchair with straps may not have seen it since there was only one available in school. Adapted chairs were at 21.9%. Learners claimed that these chairs were in some classes but none was in use.

Instructional devices were inadequate because only the adapted pens with grip holders were mentioned by the learners. Twenty one point nine percent cited the use of these pencils. However, one learner with muscular dystrophy claimed; “I may not be in a position to use an adapted pen or pencil even if it was available because I get tired easily and stop to write when the teacher is teaching”. Learners cited that devices like page
turners, paper holder devices and big ruled exercise books were not available for those learners with problems in writing. The learners noted that these instructional devices were not provided by their parents since they lacked adequate funds. Those devices which at any moment were given by the school may have been those donated by well wishers and were not many such that not every learner with a need got one. The headteacher and teachers decided on whom to give depending on the need. They further expressed that any learner who joined the school with a motor disability had to be brought by the parent/guardian with the required mobility device. One learner with muscular dystrophy cited that; “my parents struggled much to get money to purchase a wheelchair for me because it was a requirement before joining this school”. According to Helander (1993), poverty has a strong link with disability in developing countries and can create disability and disability facilitates poverty.

4.4 Views of Teachers and Learners on Adequacy and Effectiveness of Assistive Devices

The study also sought to establish views of teachers and learners on adequacy and effectiveness of assistive devices. The respondents were 8 teachers, inclusive of the headteacher and 32 learners. The researcher also carried out observation through the use of observation checklists in standard 4-7 to find out the assistive devices used by learners in their respective classes.

4.4.1 Teachers Views on Adequacy and Effectiveness of Assistive Devices.

The respondents were asked whether assistive devices were adequate and effective in their classes. Results are shown in figure 4.4 below
Seventy one percent of the teachers disagreed on the adequacy and effectiveness of positioning and seating devices, 57% disagreed on those for instruction, 86% disagreed on those for communication devices while 71% agreed that mobility devices were adequate. The 29% that agreed on adequacy of positioning and seating devices may have been because of the mobility devices which the researcher noted played a double role, that is, of positioning and seating as well as mobility. The wheelchair with chest and shoulder straps qualified to be referred to as positioning and seating as well as mobility device. There were a few adapted chairs made by Kenya institute of special education through a directive of the ministry of education in the year 2008 as cited by the headteacher during the interview schedule. These were some of the chairs that the researcher found in various classes discarded because they could not meet the needs of the learners because they were not made to suit the disabilities of individual learners.
The headteacher cited that the learners using wheelchairs strained a lot because they had to bend to reach the available tables in order to carry out any classroom activity that involved writing and manipulation of the learning resources. This one is in line with Kamere (2003) where it was noted that learners had problems pertaining to classroom work where they had difficulties in writing due to shaking hands, slowness and getting tired. They had to bend very low so as to write.

The headteacher further noted that the school lacked cut out desks which would have been quite useful in positioning learners considering that most of them had cerebral palsy and spina bifida. The desks would have contributed to their stability while seated and when doing classroom activities. The headteacher cited that shoulder and chest straps on wheelchairs were not available and these would have helped position learners and make them comfortable even during times when they were not involved in classroom activities.

The headteacher further noted that teachers mainly relied on the devices which the learners had for instruction. He also cited that even the basic instructional devices like communication boards required money input to make. Provision of assistive devices was hampered by the government’s policy of having grants given, spent according to the vote heads stated. Specific needs of the individuals which involved acquisition of assistive devices were not addressed within the vote heads specifications. By having a common curriculum for all learners where success is based on academic achievement in Kenya means that learners with physical disabilities can not compare in academic performance with those without disabilities and yet they are rated together in the Kenya Certificate of Primary Education (KCPE). The MoEST Kenya Task force (2003) recommended 32000
Kenya shillings for educating a learner with SNE per year but unfortunately it has never been implemented up to date. The headteacher also noted that the delay of the grants by the government affected learning where the school did not purchase resources on time.

4.4.2 Views of Learners on Adequacy and Effectiveness of Assistive Devices.

In the category of mobility devices, learners noted that they had enough devices like wheelchairs, clutches, canes and walking frames but they were not of good quality. Wheelchairs are an invaluable means of providing mobility for those who otherwise have a difficult time getting around, as well as those who are sorely dependent upon them. Some of the wheelchairs seats were torn and so could not offer comfort and stability. Arms were not cushioned and so their arms were not placed on comfortable positions. Most wheelchairs missed the foot plates and learners stepped on the ground while being wheeled. The learners further claimed that some had wheelchairs that never suited their sizes. This was probably because some wheelchairs were donated to their parents or to school by well wishers and they were not fitted before provision. Some learners who used wheelchairs lacked shoulder and chest straps to hold them firm in proper positioning and others used wheelchairs which were small sized. This they claimed was due to lack of replacement even after many had outgrown these devices. They indicated that some learners still had wheelchairs which they had at their time of admission in the school. This is because their parents/guardians could not afford to purchase others for them, despite physical growth on the learners.

One hundred percent of learners claimed that clutches were available for them while 53% claimed that the clutches they used were small for use. They were forced to bend to the
level of the size of the clutches as they walked. The rubber stoppers in some clutches which come into contact with the ground had peeled off and exposed the aluminium material which produced some noise as they moved. Ninety three percent of the learners claimed that the walking frames were effective for most learners because they suited them. These devices had been donated to the school by the Paralympics group and they were relatively new and suited them well. A hundred percent of learners cited that Learners used boots and calipers but out of that, 87% claimed that they required a regular replacement because as they grew, the devices became tight and others failed to fit them. One learner cited “just as children without disabilities keep on changing their shoes to have bigger numbers, that’s how we also out grow the boots and calipers we wear to require bigger ones”.

4.4.3 The Researcher’s Observation on Adequacy and Effectiveness of Assistive Devices Used in Classes

This observation carried out by the researcher was based on different categories of assistive devices. The key areas of observation were: number of learners expected to use a specific device, no of learners with the devices and devices fitting. Observation checklists were used. The general observation done on instructional devices is shown in table 4.7 below.
Table 4.7: Observed Instructional Devices

<table>
<thead>
<tr>
<th>Instructional devices</th>
<th>Number of learners who needed the devices</th>
<th>No. of learners with the devices</th>
<th>Devices fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N.</td>
<td>%</td>
<td>N.</td>
</tr>
<tr>
<td>Head pointers</td>
<td>3</td>
<td>100</td>
<td>Nil</td>
</tr>
<tr>
<td>Book holders</td>
<td>10</td>
<td>100</td>
<td>Nil</td>
</tr>
<tr>
<td>Pager turners</td>
<td>11</td>
<td>100</td>
<td>Nil</td>
</tr>
<tr>
<td>Pencil grip holders</td>
<td>10</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>Paper holders</td>
<td>9</td>
<td>100</td>
<td>Nil</td>
</tr>
<tr>
<td>Big ruled note books</td>
<td>11</td>
<td>100</td>
<td>Nil</td>
</tr>
<tr>
<td>Paper masked tape</td>
<td>11</td>
<td>100</td>
<td>Nil</td>
</tr>
</tbody>
</table>

The researcher observed learners in class 4-7 to verify the instructional devices needed for use by the learners, number of learners with the expected devices and those with fitting devices. Table 4.7 shows observation done on instructional devices. According to the table, 65 learners out of the total 82 in the 4 classes were in need of the devices. All were found to be in need of page turners, paper holder devices, book holder devices, Paper masked tape devices. The number of learners with pencil grip holders were 60% and only 30% of these were fitting while non had head pointers yet they were required by the learners. According to Heller et al., (2000), it is preferable that learners without hand skills use adaptations such as head pointers, mouth sticks, joysticks, mice and keyboards. The researcher’s observation of mobility devices is shown on table 4.8 below.
Table 4.8: Observed Mobility Devices

<table>
<thead>
<tr>
<th>Mobility Devices</th>
<th>No. of learners expected to use the devices</th>
<th>No. of learners with the devices</th>
<th>Devices Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N.</td>
<td>%</td>
<td>N.</td>
</tr>
<tr>
<td>Wheelchairs</td>
<td>17</td>
<td>100</td>
<td>17</td>
</tr>
<tr>
<td>Clutches</td>
<td>9</td>
<td>100</td>
<td>9</td>
</tr>
<tr>
<td>Standing/walking frames</td>
<td>5</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Boots and calipers</td>
<td>5</td>
<td>100</td>
<td>5</td>
</tr>
</tbody>
</table>

The researcher observed learners in class 4-7 to verify the specific devices used by learners, those having the devices and those devices fitting. Wheelchairs were found to be the commonly used devices in the category of mobility devices. One hundred percent of the learners who needed wheelchairs had them. The wheelchairs not fitting were found to be big for them while others were small. Other wheelchairs had some parts missing, for example, the foot rests and arm rests but learners continued to use them. Such wheelchairs were used with difficulties as learners had to rely on their peers to wheel them around. Some of the learners using wheelchairs were forced to bend quite low in order to reach the main tables in class as they carried out academic activities. All learners who needed to use clutches had them. Those not fitting were small because learners had outgrown them although they continued to use them. Those fitting were rated at 47.36%. The rubber materials that make the clutches to be firm on the ground were worn out in most of the clutches. Walking frames were found to be fitting since they had been newly acquired as a donation from the Paralympics who came in as well wishers. The
researcher further observed the positioning and seating devices in class 4-7 and the results are shown in table 4.9 below.

**Table 4.9: Observed Positioning and Seating Devices**

<table>
<thead>
<tr>
<th>Specific devices</th>
<th>No. of learners needed to use the devices</th>
<th>No. of learners with the devices</th>
<th>Devices Fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. Percentage %</td>
<td>N. Percentage %</td>
<td>N. Percentage %</td>
</tr>
<tr>
<td>Adapted chairs</td>
<td>17 100</td>
<td>3 17.65</td>
<td>Nil</td>
</tr>
<tr>
<td>Adapted tables</td>
<td>7 100</td>
<td>Nil -</td>
<td>Nil -</td>
</tr>
<tr>
<td>Cut out desks</td>
<td>17 100</td>
<td>Nil -</td>
<td>Nil -</td>
</tr>
<tr>
<td>Wheelchairs with straps</td>
<td>17 100</td>
<td>1 5.88</td>
<td>1 5.88</td>
</tr>
</tbody>
</table>

The results from the table 4.9 show that positioning and seating devices were not adequate at APDK Masaku School. Out the adapted chairs needed by the learners, on 17.65% were found in classes. Those available were not in use since they were not in good working conditions. They were kept at the back of the classes. Learners were found to be in need of adapted tables. These were necessary for those using wheelchairs. The learners had to bend so as to reach the tables whenever they needed to carry out any classroom activity involving writing. Learners were also found to be in need of cut out desks. These if provided to learners would have assisted in seating and positioning them, particularly those with CP and muscular dystrophy while engaging in classroom activities.
Out of all the wheelchairs found at APDK Masaku School, only 5.88% were found with shoulder and chest straps. The straps were meant to keep the learners in comfortable positions. This indicates that all wheelchairs except 5.88% were not well for positioning and seating learners. This in return affected learners period in class since the devices must have been tiring. Data show that assistive devices for instruction were not available for the learners. Without these devices, learners must have had difficulties while learning since some learners for instance those with spastic CP, when they make a move to reach for items, the arms may start moving slowly and then jerks forward pushing items away. When an individual with arthetoid CP reaches for an item, the arm often rotates back and forth, bends and straightens as it slowly makes its way to the intended destination (Gargiulo, 2007).

The projected communication devices observed were communication boards, bliss symbols, photograph, talking books and letter word stamps objects and alphabet symbols. Out of these communication devices, only photographs/pictures were mostly found in class 4-7. The only 2 communication boards found in two of the 4 classes that is, class 4 and 5 were out of good working condition. It was noted that majority of the learners had CP and muscular dystrophy and these are the disabilities that mainly depend on use of communication boards. According to Dubowiz (1989), some learners with muscular dystrophy may have difficulty with the volume of the written work required in a class. Learners with muscular dystrophy have their language and communication are severely impaired than visual abilities and manual skills.
The communication devices found were pictures/photographs, objects and alphabet symbols and communication boards. These communication boards found in a few of the classes were however not in use since they were not in working condition. It is noted by Doster and Politano, cited in Alberto et al., (2000) that learners with communication difficulties can use symbols such as objects, parts of objects, miniatures, photographs and pictures, Line drawings, rebus and alphabet.

**4.5 Challenges Faced by Teachers and Learners When Using Assistive Devices.**

The respondents who included the headteacher, teachers and learners cited the challenges both teachers and learners faced when using assistive devices.

**4.5.1 Challenges Faced by Teachers.**

The responses of teachers are shown in table 4.10 below.

**Table 4.10: Challenges Faced by Teachers When Using Assistive Devices**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems faced</td>
<td>N.</td>
<td>%</td>
<td>N.</td>
<td>%</td>
</tr>
<tr>
<td>Inability to interpret what learners said</td>
<td>1</td>
<td>14</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>Positioning and seating learners during instruction</td>
<td>4</td>
<td>57</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Management of learners incontinence</td>
<td>3</td>
<td>43</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td>Management of learners with mobility devices during instruction</td>
<td>Nil</td>
<td>-</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Teachers having to be always there to manage learners in class</td>
<td>Nil</td>
<td>-</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>
Fifty seven percent of teachers agreed that they experienced challenges while communicating to learners while 29% disagreed. Those who agreed may have been due to the inadequate communication devices since it was noted that even the basic devices like communication boards were not available. The headteacher cited that learners with cerebral palsy were the most affected in communication and teachers had a problem interpreting what they said.

Fifty seven percent of teachers agreed on having challenges while positioning and seating learners. This may have been due to their training which was not necessarily based on a particular disability. The headteacher noted that teachers were not in-serviced regularly and even during their professional training the disabilities were taught generally. One of the recommendations in the MoEST task force (2003) was that teachers in schools which had learners with special needs be in-serviced on learners’ needs assessment and maintenance of assistive devices.

Forty percent of teachers strongly agreed that they could not manage incontinence while 57% agreed that they could. The probable reason may have been because of the assistance given by the care givers. Seventy one percent disagreed on having challenges in managing learners with mobility problems during instruction. It was noted that these were the only adequate devices. Most of the learners who had problems in this area were assisted by the peers to get to their various destinations as well as get to areas of interest in classes during instruction. Eighty six percent indicated that they didn’t have to be there to manage learners with physical disabilities. This may have been possible because of the availability of other workers in school such as care givers. Teachers’ response on challenges faced by learners when using assistive devices is shown on table 4.11 below.
4.5.2 Teachers Response on Challenges Faced By Learners Using Assistive Devices

Teachers’ response on challenges faced by learners using assistive devices is shown below on table 4.11.

Table 4.11: Response of Teachers on Challenges faced by Learners

<table>
<thead>
<tr>
<th>Challenges</th>
<th>SA No.</th>
<th>A No.</th>
<th>D No.</th>
<th>SD No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate devices for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Nil</td>
<td>-</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td>Positioning and seating</td>
<td>1</td>
<td>29</td>
<td>5</td>
<td>71</td>
</tr>
<tr>
<td>Communication</td>
<td>5</td>
<td>71</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Instructional</td>
<td>Nil</td>
<td>4</td>
<td>57</td>
<td>3</td>
</tr>
<tr>
<td>Devices being small for learners</td>
<td>Nil</td>
<td>4</td>
<td>57</td>
<td>3</td>
</tr>
<tr>
<td>Devices being big for learners</td>
<td>Nil</td>
<td>5</td>
<td>71</td>
<td>2</td>
</tr>
<tr>
<td>Devices breaking down</td>
<td>Nil</td>
<td>44</td>
<td>57</td>
<td>343</td>
</tr>
<tr>
<td>Devices tiring the learner</td>
<td>5</td>
<td>71</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Devices taking some time when out for repair</td>
<td>Nil</td>
<td>4</td>
<td>57</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4.11 above show the response of teachers on challenges experienced by learners when using assistive devices. Challenge was revealed on the inadequacy of positioning and seating devices where 71% agreed that they were inadequate and 71% strongly agreed that communication devices were inadequate while 57% agreed those for instruction were inadequate and 43% disagreed. One hundred percent disagreed that mobility devices were a challenge. Fifty seven percent agreed that devices were small for the learners while 43% disagreed. Devices were portrayed as being big and rated at 71% while 71% agreed that devices used to break down. Devices tiring learners was strongly
agreed upon and was rated at 71% while 57% agreed that they took long when they were out for repair. The data is a clear indication of challenges that learners faced and this affected instruction. Devices for mobility seem not to have been a challenge because of their availability. With these challenges learners were affected during instruction since they could not participate fully.

4.5.3 Learners Response on Challenges they faced when using Assistive Devices.

A further investigation was made to find out challenges faced by learners when using assistive devices. Learners’ were involved in a focus group interview. Their responses are presented in table 4.12 below

Table 4.12: Challenges Faced by Learners

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Number</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falling</td>
<td>32</td>
<td>12</td>
<td>38</td>
</tr>
<tr>
<td>Get tired</td>
<td>32</td>
<td>24</td>
<td>75</td>
</tr>
<tr>
<td>Devices breaking down</td>
<td>32</td>
<td>21</td>
<td>66</td>
</tr>
<tr>
<td>Unable to move independently.</td>
<td>32</td>
<td>16</td>
<td>50</td>
</tr>
<tr>
<td>Devices stayed for some time while out for repair.</td>
<td>32</td>
<td>15</td>
<td>47</td>
</tr>
</tbody>
</table>

Multiple responses’=32

Table 4.12 above show challenges faced by learners when using assistive devices. Thirty eight percent indicated that learners used to fall off when using assistive devices. Learners claimed that this challenge resulted due to use of wheelchairs on rough surfaces as well as during their transfer from wheelchairs. They also fell down as they used clutches with worn out rubber stoppers at their tips. This is in line with what was noted
by Cartwright & Cowie (2005), that there is a possibility of learners falling while using assistive devices.

A large percentage of 75% cited that learners got tired while 66% claimed that devices broke down. Fifty percent of learners claimed that learners were not able to move independently and 47% cited that devices stayed for some time while out for repair. A large number of learners claimed that they got tired using assistive devices. The reason was due to use of devices like wheelchairs which were either small or big and which also lacked some parts like arms and foot rests which assisted in positioning some body parts. They further cited that they got tired because they used devices for long periods while seated. Learners claimed that even those that kept the devices such as clutches beside while they sat, they still did not have comfortable seating and positioning devices to use.

Learners with physical disabilities require different seating arrangement depending on the disability. This is meant for comfortable sitting as well as for facilitation in learning (Ball, 2006).

According to Best et al., cited in Gargiulo (2006), positioning always affect the quality and precision of a person’s movement and ability to accomplish tasks. The devices learners’ used also broke down and had to be taken to artisans in Machakos town for repair. Learners wished repairs were done within the school. They cited that once they were out for repairs the duration depended on the magnitude of the problem. Some were repaired within a day while some took a few days especially if they required some expensive spare parts not readily available in town. There were other devices that could not be repaired at all. Parents paid for the repairs as well as the purchase those devices
which were not repairable. Learners cited that it was expensive for their parents/guardians.

Learners also faced the challenge of not being able to move independently. This was mainly among those using wheelchairs that had some parts missing. With devices out for repair, learners relied on assistance from their peers. Some of the wheelchairs were locally assembled and were quite heavy to allow for self wheeling from one place to another. According to Bleck et al., (1982), specialized equipments like auto vans and electronic wheelchairs can be used by learners especially with muscular dystrophy.

4.5.4 Headteacher’s Views on Challenges Faced by Teachers and Learners Using Assistive Devices.

The headteacher was interviewed on the challenges faced by learners while using assistive devices and concurred with the learners in that some devices were tiring, kept breaking down and learners were not independent while using some of them like the wheelchairs. The other challenge was of having to take the devices for repair to the artisans in Machakos. This involved time wasting since there had to be someone to keep checking the progress of these repairs. Lack of a workshop in school was contrary to the recommendations of the Totally Integrated Quality Education and Training of 1999 cited in KISE (2002) that special schools for the physically handicapped be provided with devices facilitate for required adaptive devices. MoEST Task Force (2003) recommended that a central body be established at Kenya Institute of Special Education and MoEST branches at district level for the procurement, disbursement and maintenance of Assistive Devices. Parents were expected to meet expenses of those repairs but most of the time
there were delays in payments and this meant that learners affected stayed for some time without using the devices.

The headteacher further cited that teachers also faced challenges. One of them was that of having to handle learners with gross motor problems using Assistive Devices such as wheelchairs. He noted that teachers had to delay starting classes most of the times to allow learners using Assistive Devices to arrive in the classrooms and settle for instruction. There was a challenge of having to position and seat learners during instruction. Another challenge was learners lacking some devices particularly those for instruction. Those without devices had limitations in the activities involving writing whereby they took too long to do so, wrote poorly or could not write at all. He indicated that some learners got tired before completion of work given because they lacked adequate and effective Assistive Devices. All these challenges affected instruction of learners with physical disabilities at APDK Masaku School.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The chapter presents summary following research objectives. The conclusions are made followed by recommendations. The final section outlines recommended areas that the researcher feels need further research. The summary is based on the responses of 8 teachers, headteacher included and 32 learners of APDK Masaku School for learners with physical disabilities. The researcher’s observation of assistive devices in school was done and is included in the summary. This was done in class 4-7.

5.1 Summary

The purpose of this study was to investigate the adequacy and effectiveness of assistive devices used to instruct learners at APDK Masaku School for the physical disabilities. The findings showed that there were learners with varied physical disabilities. These disabilities included cerebral palsy, muscular dystrophy, Spina bifida, Brittle bone, amputee, Scoliosis, Hydrocephalus and juvenile rheumatoid arthritis. Majority of the learners were found to have cerebral palsy followed by muscular dystrophy and spinal bifida.

The research revealed that there were different categories of assistive devices available for the learners at APDK Masaku School. The categories included those for mobility, positioning and seating, instruction and communication. The most common devices were those based on mobility. Data indicated that generally the devices were inadequate and
ineffective. It was therefore hard for learners with physical disabilities to achieve their full potential in instruction without adequate and effective assistive devices.

The findings also showed that teachers used assistive devices during instruction. This mainly depended on the devices which learners had. The devices found were mainly those for mobility and so learners who required to use other devices like instructional were affected during instruction because they were inadequate. Without adequate positioning and seating devices, the study showed that learners used the ordinary equipment such as ordinary tables used by learners without disabilities. This implied that tables in classes were not modified to suit the needs of the learners with physical disabilities. Cutout desks to help position learners depending on disabilities were not available. Teachers were in a position to improvise for some devices like pencil grip holders, pictures/photographs and communication boards. However the headteacher noted that even the most basic devices required funds to purchase materials needed for their preparation. The headteacher noted that the free primary education fund from the government through the Ministry of Education was very specific on how funds were to be utilized in schools and issues of assistive devices were not included whether in repair or purchase. It was also noted that some assistive devices like pictures, photographs and communication boards which would have been used to aid learning in the classrooms were inadequate.

The findings also brought out the views of teachers and learners on adequacy and appropriateness of assistive devices. Both teachers and learners revealed that mobility
devices were adequate although they lacked the aspect of quality. The headteacher noted that the reason for the availability of mobility devices was because the school had made it a mandatory requirement for every learner with mobility problem to report to school with a device relevant to his or her need at the time of admission. It was also made clear to parents that learners could not be retained in school if the devices were not functional during admission. It was not made as a requirement for other devices as far as admission was concerned because movement is what was considered basic and crucial. The school also didn’t want to burden the parents/guardians since they were not in a position to afford even those devices which were considered mandatory. The administration insisted on having fitting mobility devices but learners ended up reporting with devices that were small or big in size but they still got admitted in school. Where the problem of the learner involved weakness of the hands especially for those with CP, teachers had learners to his or her need at the time of admission. the use of their body parts which were flexible especially the feet to write and perform activities of the daily living.

The research findings revealed that teachers faced challenges when using assistive devices. It was found out that the main challenge was lack of adequate communication devices and teachers faced a challenge of inability to interpret what some of the learners meant when they spoke. The devices would have provided an opportunity to take them through the learning process to be able to communicate and participate in learning. Another challenge was that of positioning and seating learners with disabilities. It was revealed that majority of teachers were not exposed to in-service training where they would have been updated on issues about disabilities and assistive devices relevant. It
was noted that even though there were classroom assistants, the teachers revealed that
there were challenges in handling learners with incontinence as they were not mobile and
teachers somehow got involved in handling them alongside instructing. The deputy
headteacher indicated that the main challenge was that the school lacked an artisan and
the broken devices had to be taken to the artisans in Machakos town for repairs.

Learners also experienced challenges when using assistive devices. Learners using
mobility devices like wheelchairs had to be pushed by fellow peers to different points of
their destinations. This is because most of the wheelchairs were missing some parts and
others were quite heavy for them to push. Some mobility devices like chairs were either
big in size or small which made them uncomfortable and so they could not use them in
the classrooms. With a challenge of not having adequate positioning and seating devices
as well as instructional, learners had a challenge of getting tired as they were forced to
bend while seated to be able to use the tables available in class for use while writing.
Another challenge faced by learners was from other learners in school. These learners
were curious to see, operate and manipulate these devices. The head teacher noted that
some devices were broken by other learners out of curiosity.

5.2 Implications of the findings

Various authors have expressed that there are different physical disabilities associated
with learners with physical disabilities. Kennedy, cited in Ndurumo (1993) notes that
learners have difficulties performing one or more motor abilities due to muscular skeletal
disorders, neurological and/or other health impairments. The study shows that majority of
the learners lack adequate and effective assistive devices used to instruct learners with
physical disabilities. This is reflected on the challenges faced by both teachers and learners such as inability to interpret what learners said, positioning and seating learners during instruction as well as learners getting tired and falling when using Assistive Devices. The use of inadequate and ineffective Assistive Devices has led to decreased learning opportunity among learners.

5.3 Conclusion

From the foregoing findings of the study, the following conclusions were identified. APDK Masaku School for learners with physical disabilities had varied disabilities. Cerebral palsy had majority of learners with physical disabilities followed by muscular dystrophy and spina bifida. Learners were in need of assistive devices because it was only the mobility devices category which was the most common with learners. The devices had positive contribution to the instruction of learners since they assisted in making the learners get to classrooms without delays as well as getting closer to their peers when learning took place in classrooms. The rest of the devices were inadequate and ineffective. The teachers mainly used those devices that were available with the learners and those that the school provided to the learners. The headteacher confirmed that in-service trainings were rarely done. He noted that it was necessary that professionals in the area of physical disability in the ministry of education and Kenya Institute of Education be holding meetings with teachers regularly to revise and revisit areas that they found grey in this area as they taught. The teachers, headteacher, learners’ and the researcher’s views on adequacy and effectiveness of assistive devices concurred in that only the mobility devices were adequate in quantity and not quality but the rest of the devices were both inadequate and ineffective.
5.4 Recommendations

The purpose of this study was to investigate the adequacy and effectiveness of assistive devices used to instruct learners at APDK Masaku school. Based on the findings, it is recommended that:

i. The APDK Masaku School for the physical disabilities should employ an artisan to facilitate the repair of assistive devices since when they break down they are taken to artisans in Machakos town and they take some time.

ii. The Ministry of Education should organize regular in service courses to update the teachers on areas of physical disability. This area of disability which many view as just failure to walk or not being able to walk well is an area with varied disabilities requiring special different approaches in order to handle. The devices used for these disabilities are also different.

iii. The Ministry of Education should consider implementing the recommendations of the government of Kenya Task Force (2003) on the amount of money required for use by learners with physical disability per year. The Task Force recommended the amount of money required to meet the needs of a learner with special needs in education.

iv. The Ministry of education should design programmes in special needs where people are sensitized on all kinds of disabilities and should particularly be based on the expectations of such individuals from the society.

5.5 Suggestions for Further Research

On the strength of the study findings, the following suggestions on areas for further research are given:
i. The study only collected opinions from teachers and students. The study did not collect opinions from other stakeholders such as parents/guardians and well wishers whose suggestions would have been valuable. Further research can be done to consider all the stakeholders.

ii. The study restricted itself to only four categories of assistive devices mainly those for mobility, communication, instructional, positioning and seating. Further research is needed to consider those for leisure and the activities of daily living among others.

iii. The study collected opinions based on physical disabilities and assistive devices used for these learners. Studies can be carried out to include other categories of learners with disabilities and the types of the devices they use.
REFERENCES


KISE, (2002). Introduction to children with special needs. ODEL Module ID 001.


http://www.edutopia.org/assistive -technology-enhances-learning-all.


Appendix A: Teachers’ Questionnaire

This questionnaire is part of an educational study that is being conducted by the researcher in the institution. The information you give will be very important for this study. It will be treated as confidential during and after the study. The researcher is therefore requesting for your cooperation and assistance.

Section A

Please complete this section by putting in the responses in the spaces provided.

1. Name of school______________________________________________________________

2. Sex       Male [ ]       Female [ ]

3. Professional qualifications__________________________________________________

4. How long have you been a teacher?____________________________________________

5. In which class are you a class teacher?________________________________________

6. Are you trained to teach learners with physical disabilities? Yes [ ] No [ ]

7. Have you ever attended any in-service in the area of physical disability? Specify

____________________________________________________________________________

Section B

Part A

1) Indicate the number of learners with the following disabilities in your class

(a) Cerebral palsy ________________________

(b) Spinal bifida _________________________

(c) Muscular dystrophy ____________________

(d) Amputee ______________________________

(e) Brittle bone/osteogenesis imperfecta ________________

(f) Scoliosis ______________________________

(g) Juvenile Rheumatoid arthritis ________________

(h) Spinal cord injury ________________________

(i) Multiple sclerosis ________________________
(j) Others

**Part B**

**Instructions:** Please indicate by checking in the spaces provided your opinion of the statement indicated. Put a tick [✓].

**Key**

<table>
<thead>
<tr>
<th>SA</th>
<th>Strongly Agree SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Agree</td>
</tr>
<tr>
<td>D</td>
<td>Disagree</td>
</tr>
<tr>
<td>SD</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assistive devices are available for all the learners in my class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Positioning and seating devices used by learners in my class are adequate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mobility devices used by learners in my class are adequate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Instructional devices used by learners in my class are adequate.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Communication devices used by learners in my class are adequate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Assistive devices used by learners are in my class are in good condition</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Assistive devices used by learners’ suit their disability.</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Assistive devices used are durable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Assistive devices used are in correct sizes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Assistive devices used by learners in my class make them independent.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Assistive devices used by learners lead to improved participation during instruction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>In your opinion, assistive devices used;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12(a)</td>
<td>Help improve learners’ participation in class during instruction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12(b)</td>
<td>Help meet the needs of learners with diverse instructional requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12(c)</td>
<td>Improve learners’ academic performance in my class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12(d)</td>
<td>Are available to the needs of each individual learner.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td>---</td>
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</tr>
<tr>
<td>12(e)</td>
<td>If adequately provided, the devices should help facilitate better interaction between teachers and learners during instruction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>What challenges do teachers face using devices for instruction?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13(a)</td>
<td>Inability to interpret what learners want to communicate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13(b)</td>
<td>Positioning and seating learners using devices.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13(c)</td>
<td>Management of learners’ incontinence.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13(d)</td>
<td>Managing learners with mobility problem.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13(e)</td>
<td>Have to be there for the learners most times.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>What challenges are faced by learners using devices?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(a)i</td>
<td>Inadequate mobility devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(a)ii</td>
<td>Inadequate positioning and seating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(a)iii</td>
<td>Inadequate communication devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(a)iv</td>
<td>Inadequate instructional devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(b)</td>
<td>Devices being small,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(c)</td>
<td>Devices being big</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(d)</td>
<td>Devices breaking down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14(e)</td>
<td>Devices tiring the learners</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>14(f)</td>
<td>Devices taking long when out for repair</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THANKYOU
Appendix B: Focus group Interview for the Learners

The purpose of the focus group interview questions is to establish the adequacy and effectiveness of assistive devices used at Masaku by learners with physical disabilities and the challenges they face when using devices. The information you give will be very important for this study. It will be treated as confidential during and even after the study. This interview is part of an educational study that is being conducted by the researcher in the institution.

<table>
<thead>
<tr>
<th>Main Question</th>
<th>Probe Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What types of assistive devices are used in school?</td>
<td>Probe for mobility (wheelchairs clutches)), Instructional (paper holders, big ruled papers and exercise books), Positioning and seating (adapted desks and tables), Communication (communication boards), who provides</td>
</tr>
<tr>
<td>2. Are the devices used enough for all of you?</td>
<td>Probe for; mobility, communication, instructional, positioning and seating devices.</td>
</tr>
<tr>
<td>3. What is the state of the devices used by the learners?</td>
<td>Probe for; their sizes, independent use, heavy or light.</td>
</tr>
<tr>
<td>4. What challenges are faced when using the devices?</td>
<td>Probe for; tired, breakages, delay in repairs.</td>
</tr>
</tbody>
</table>
APPENDIX C: Head teacher’s Interview Guide

The purpose of the interview guide is to establish the adequacy and effectiveness of assistive devices used at Masaku by learners with physical disabilities and the challenges learners face when using these devices. The information you give will be very important for this study. It will be treated as confidential during and after the study. This interview is part of an educational study that is being conducted by the researcher in the institution.

Section A

Please complete this section by putting in responses in the spaces provided.

1. Name of school ___________________________ __________________________

2. Sex Male [ ] Female [ ]

3. Professional qualifications ____________________________

4. How long have you been a teacher? ____________________________

5. Are you trained in the area of physical disability? Yes [ ] No [ ]

6. Have you ever attended any in-service in the area of physical disability? Specify ____________________________

Section B

1. What categories of physical disabilities are found in your school? ________________________________________________

2. What assistive devices are used by learners and teachers in your school and who provides them? ____________________________

3. Are the assistive devices used by learners and teachers adequate and effective to meet the needs of learners in class during instruction? Probe for correct sizes, comfortable and whether they are enough ________________________________________________

4. What challenges are faced by teachers and learners while using assistive devices? ____________________________
5. What recommendation can you give as far as adequacy and effectiveness of assistive devices is concerned in your school?

___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

THANKYOU
Appendix D: Observation Checklist

In the following table, the researcher will observe the assistive devices used by learners during at least a teaching session in the seven classes purposively selected for the study. This will be done to ascertain the data as shown.

<table>
<thead>
<tr>
<th>Category of assistive devices</th>
<th>Specific items</th>
<th>No. of learners expected to use the devices</th>
<th>No. of learners with the devices</th>
<th>Devices fitting the learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional devices</td>
<td>Head pointers/ mouth pointers</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Paper mask tape</td>
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<tr>
<td></td>
<td>Page turners</td>
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<td></td>
<td>Book holders</td>
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<td></td>
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<tr>
<td></td>
<td>Pencil &amp; pen grip holders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paper holder devices</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mobility devices</td>
<td>Wheel chairs</td>
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<tr>
<td></td>
<td>Canes/walking sticks</td>
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<tr>
<td></td>
<td>Boots and Calipers</td>
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<tr>
<td></td>
<td>Standing and walking frames</td>
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<tr>
<td></td>
<td>Crutches</td>
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<tr>
<td>Positioning &amp; sitting devices</td>
<td>Corner chairs</td>
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<td></td>
<td>Adapted chairs</td>
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<tr>
<td></td>
<td>Adapted tables</td>
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<tr>
<td></td>
<td>Cut out desks</td>
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<tr>
<td></td>
<td>Shoulder &amp; chest straps on wheelchairs</td>
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<tr>
<td>Communication devices</td>
<td>Computers</td>
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<td></td>
<td>Communication boards</td>
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<td></td>
<td>Bliss symbols</td>
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<td></td>
<td>Photographs/ Pictures</td>
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<td></td>
<td>Talking books</td>
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<tr>
<td></td>
<td>Letter word stamps</td>
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</tbody>
</table>