EFFECTS OF HYPERMEDIA ON LEARNING ACHIEVEMENT IN LANDFORMS IN GEOGRAPHY FOR HEARING IMPAIRED LEARNERS IN MIXED SPECIAL SECONDARY SCHOOLS: KENYA

BY

OBONDO GAUDENCE

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MOI UNIVERSITY

APRIL 2019
DECLARATION

DECLARATION BY THE CANDIDATE

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DEDICATION

Thank you Lord for your grace has been sufficient for me on this journey (II Cor. 12: 19). Many times I would have stopped, but you constantly gave me reasons to press on (Psalm 28: 1) and exceeded all my requests (Ephesians 3: 20) on this journey. I therefore dedicate this piece of work to my children Patrick Castro and Antoinette Calcine. Thanks to all of you for the provision of your shoulders to lean on during the stressing moment of this study. You saw the vision and encouraged me to take hold of it. I am grateful for your foresight.
ACKNOWLEDGEMENT

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Research is not an isolated activity of exceptionally talented persons but collaboration with other researchers, as well as with previous research. My closet network has been classmates. The team has been at their best, creative, effective, encouraging and challenging; not to forget the enjoyable moments of leisure time. The kind of combination of fun and result is a gift. Thank you so much. In my own studies I am especially grateful to George Ouma, thank you for being a colleague, a personal trainer and a friend. I am happy to have good friends and dear relatives with whom I have shared life feelings and experiences. During the long, too long, period of working on this doctoral thesis you have believed that the work would be ready someday, and you have shown appreciation of and interest in it even when nothing was happening.

To my parents, the late mum Mary Consolater who never lived to witness my success, my father Festo Obondo, thank you for your love, support and encouragement over many years that I have been in school. I pray that my completion of this degree brings you a level of honour that blesses you (Exodus 20:12).

The final word goes to Xaveir and Mellanie. Your presence in my life has brought me life, not always easy or pleasant but always deeply satisfactory. Thank you for your continuous critical comments and creative ideas, concerning all areas of life. God’s grace and tremendous favour at work through you! I cannot state names of all individuals but to all of you who willingly offered support, energy and self-confidence, may God bless you one hundred fold in return for all you did for me.
ABSTRACT

The hearing impaired (HI) students often encounter communication problems in classroom yet some specific media can facilitate and enhance their learning. The purpose of this study was to investigate the use of hypermedia in teaching Landforms in Geography and its effects on learning achievement amongst the HI learners in mixed special secondary schools in Kenya. The objectives of the study were to; find out achievement of boys and girls exposed to use of hypermedia in teaching Landforms in Geography, find out determinants on use of hypermedia in teaching Landforms, determine the influence of hypermedia on learning achievement on Landforms, examine institutional support on use of hypermedia in teaching Landforms and to establish the attitude of the learners towards the use of hypermedia in teaching and learning Landforms. The study was informed by multiple intelligence and cognitive theory of multimedia learning regarding individual differences and strength of the brain to store well and recall images as opposed to text. The study was anchored on a pragmatic research paradigm adopting mixed method utilizing quasi experimental approach of Solomon nonequivalent control group design. The target population was 835 HI students, 40 teachers and 20 principals. A simple random sampling technique was used to obtain 4 HI mixed special schools with 79 HI students, 10 teachers and 4 principals for the purpose of data collection. Data collection instruments were pre-test, posttest, questionnaire and interview schedule. Reliability of the instrument was ascertained through test-retest by use of Pearson product moment correlation \( r \), while validity was verified by supervisors and content experts. The collected data was analyzed using narration, descriptive and inferential statistics. Chi-square, t-test and spearman correlation were used in inferential statistics. The results of the study revealed that use of hypermedia in teaching Landforms for HI learners led to higher learning achievement in both boys and girls. Further the use of hypermedia enhanced influence on learning achievement. Also the use of hypermedia depends on its effectiveness and teacher attitude in promoting learning. In utilizing hypermedia the accessibility and leadership roles were key challenges. The use of hypermedia had positive effect on learners’ attitude. It was concluded that use of hypermedia had positive effect on learning Landforms in Geography that contributed to higher learning achievements among the HI learners. The study therefore made the following recommendations; digitize HI content, in-service teachers on skills relevant to use of hypermedia, sensitization of principals on provision of hypermedia facilities. Principals should motivate teachers on use of hypermedia in teaching Landforms in Geography.
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>BOM</td>
<td>Board of Management</td>
</tr>
<tr>
<td>C.R.E</td>
<td>Christian Religious Education</td>
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<tr>
<td>CD ROM</td>
<td>Compact Drive Random Memory</td>
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<tr>
<td>CIEM</td>
<td>Curriculum Instruction and Educational Media</td>
</tr>
<tr>
<td>EFA</td>
<td>Education for All</td>
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<tr>
<td>GAT</td>
<td>Geography Achievement Test</td>
</tr>
<tr>
<td>HI</td>
<td>Hearing Impaired</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>KCPE</td>
<td>Kenya Certificate for Primary Education</td>
</tr>
<tr>
<td>KCSE</td>
<td>Kenya Certificate of Secondary Education</td>
</tr>
<tr>
<td>KESSP</td>
<td>Kenya Education Support Sector Program</td>
</tr>
<tr>
<td>KICD</td>
<td>Kenya Institute of Curriculum Education</td>
</tr>
<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
</tr>
<tr>
<td>KSDC</td>
<td>Kenya Society of Deaf Council</td>
</tr>
<tr>
<td>KSL</td>
<td>Kenya Sign Language</td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Cristal Display</td>
</tr>
<tr>
<td>MMR</td>
<td>Mixed Method Research</td>
</tr>
<tr>
<td>MoEST</td>
<td>Ministry of Education Science and Technology</td>
</tr>
<tr>
<td>MSS</td>
<td>Mean Standard Score</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology and Innovation</td>
</tr>
<tr>
<td>RMT</td>
<td>Traditional Method of Teaching</td>
</tr>
<tr>
<td>SL</td>
<td>Sign Language</td>
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<td>SNE</td>
<td>Special Needs Education</td>
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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

The world is moving very fast into a digital multiple periods in an environment characterized by information communication technology with its tenets that can influence teaching and learning process. The effects of inappropriate methods and techniques of teaching Geography are reflected in the national examination after four years of secondary education. Kenya national examination council (KNEC) laments that poor performance by candidates in paper one is significant especially landform processes. Adapted hypermedia is a combination of text, animation, picture, video and graphic in single application. Hypermedia on the other hand has influence on three senses in communication thus, kinesthetic, sound and sight and is believed to raise achievement in learning. Communication of hearing impaired in classroom is usually due to inability to hear which impacts negatively on learning achievement. Therefore there was need for a research to be carried out to establish whether use of hypermedia can solve academic achievement problem amongst the HI learners.

1.2 Background of the Study

Education is generally acknowledged as an instrument for fostering the worth and development of individual, for individual sake and for general development of the society. Findings over years have established that education of HI is not a uniform pattern all over the world. HI delays and lags behind their hearing peers academically. This leads to poor academic achievement. Paparella (2011), hearing impaired learners are not exposed to equal educational opportunities as their hearing peers. One of the main goals of Education in Kenya is a right to provide equal educational opportunities to every child, irrespective of their real or imagined disabilities, (EFA, 2004). The
instruction of the HI is sign language. SL is a fully fledged language with its own vocabulary, syntax and grammar. National Association of Deaf (NAD) believes that due to lack of communicative skills a huge gap lies between the teachers and learners. Hearing impaired learners demonstrate lower mathematics, reading and writing skills than hearing counterparts, even though their mental abilities are at par with their peers (Kiboss, 2012, Debevc et al., 2014). Jokinen (2010), of the worlds’ HI population only 5% are able to read and write. The education act 2011 provides that Kenya sign language (KSL) is an examinable subject. This improves communication and interaction between the teachers and learners.

In Tanzania the HI students have always lag behind their hearing peers in academic achievement just like others elsewhere (Hamilton, 2011). This is because institutions that train teachers do not include SL as a major component of curriculum hence they are not well equipped to teach these learners. Teachers cannot use KSL grammar effectively and their methods of instruction successfully. Teachers use resources such as diagrams, wall maps, world globe, pictures and chalkboard to teach Geography (Rutoh & Ndolah, 2013). Hence the learners cannot comprehend the concept of external landform processes taught in the class by the teachers. HI learners may pretend to be paying attention in the class but due to lack of hearing ability they lag behind in academic achievement.

Findings over the years have shown that the deaf students in Kenya have consistently trailed behind their hearing counterparts in academic performance (Adoyo, 2004). The problem is lack of sign language efficiency in teaching Geography. Most of the HI learners only know basic sign language and are not able to sign technical Geographic terminologies and concepts. Teachers write lessons on the blackboard and point as the
primary instructional media. When they fail to deliver effectively they resort to oral speech while learners resort to lip-reading which may not be helpful sometimes (Wakumela, 2009). As a result most HI learners do not perform well in Geography and their education is below standard of the hearing students. Literature revealed that teaching external landform processes concepts using KSL does not improve achievement in Geography. To give concrete meaning to the idea of equalizing educational opportunities for all children, instructional media, methodology, learning environment and classroom management must be provided for educational needs of all the children including the impaired. Deaf and hard-of hearing students are students with academic needs and strength different from their hearing peers (Knoors & Marsherk, 2014). One of the major academic challenges that affect the HI learners’ academic achievement revealed by studies conducted in America is short and long term memory (Marshark & Spencer, 2010).

Hearing impaired students suffer from visual input overload as they simultaneously attempt to pay attention to the teacher, interpreter, and any visual aids that may be presented (Marschark et al., 2014). This static media do not adequately represent, visualize or convey abstract information such as fiords, roche, zeugen, solifluction among others. This way of delivery reinforce the memorization of factual information and do not promote deeper understanding or application of principles involved (Hew & Bush, 2007). Hypermedia can enhance memory because it is a visual media, learners remember well pictures than words. Many scholars found that lack of pedagogical innovation in teaching Geography and lack of knowledge by the teachers pose challenges but rather disability poses the greatest challenge for the learners (Mbewe, 2014).
However the results of the study revealed that using hypermedia significantly improved academic achievement of HI experimental students in Geography. It provides different stimuli in presentations which include text, sound, still pictures, animation and graphics. It makes the process of reading dynamic and presents different drawings and pictures which support the clarification of ideas (Hindley & Heider, 2008; Patel, 2010). Using technology is a way of enhancing effectiveness of instruction and success of all students and need for good performance.

Determinants on use of hypermedia are measured through parameters of media selection, teacher characteristics and difficulties encountered in its use. Factors considered before choosing technology and methods to be employed include teacher characteristics such as self-efficacy, attitude, competency, professional development, gender, experience and technological support, media selection for example entails effectiveness, content, cost, objectives, availability and facilities among others. Geography teachers face challenges ranging from the teaching methods, teaching resources, their availability, effective use of KSL and managerial support (Rutoh & Ndolah, 2013). Hypermedia relates with animation, graphics and texts. It is effective and can attract the HI learners to explore the content (Nazri & Suailia, 2010). Hypermedia is the most suitable media for HI learners because it is capable of enhancing their understanding especially abstract concept such as external landform processes. Literature suggests that the level of engagement and the amount of time help to bring learning success self-space. Different learning materials make learning more effective and productive (Onuoha, 2011). However Kenya institute of curriculum development (KICD) has failed to adapt all curriculum to suit the HI (KICD, 2013) and there is also limited literature on the process of teaching and learning Geography using KSL hence there is need for a study on determinants on
media use. Animated illustration accompanied with video and kinesthetic are better to teach landform processes than static illustrations (Sharm, 2013).

Teacher characteristic is a key to learning achievement. It shows their understanding on how hypermedia will benefit their teaching and student’s learning. However lack of technical support, teacher expertise or the cost may stop them.

In Kenya there is currently limited learning experience in the traditional classroom settings for the HI learners (Kinuthia, 2009). KSL has its own punctuation and grammar and can communicate complex theories and concepts but there are problems and difficulties faced by the teachers. Main problem is that teachers are not efficient in Geography education (Nazi, 2009). Therefore teachers for HI must undergo re-training to acquire the appropriate signing skills (Fulton, 2009) since they are key quality to any educational quality.

A study conducted by American memory examined the influence of hypermedia, the literature revealed that hypermedia enhance learning through motivation, retention, understanding, enjoyment, self-direction, interest and knowledge construction. Mweri (2014) reports, poor academic achievement have been linked to factors such as motivation, understanding, inappropriate teaching methods among others. The art of teaching is to involve the HI learners in their active learning process by offering many different kinds of learning medium. This is in line with constructivism theory which stipulates that the best way of learning is by allowing learners to construct meaning (Arends, 2010). Students can customize a learning plan that helps them remember rather than adapted traditional technology which emphasizes more on memorization and imitation.
Adaptive hypermedia adopts information towards individual preferences and improves the experience of the learner who is interacting directly with the system. It makes the learner interested about the subject, they decrease learning time, and provide opportunities to learn non-traditional ways. It is transforming the way we teach and learn by transforming the process and the outcome (Eysink et al., 2009). Instructional materials accomplish 83% of what is learnt through sight motivating students in the learning process and make learning interesting. A chinese saying “I hear I forget, if I see I remember, if I do I know puts more emphasis on the importance of visual media such as hypermedia.

Adoyo (2014) indicates that poor performance is attributed to inappropriate teaching methods, on the other hand special schools are segregated and discriminated against yet classroom achievement is low (Mulambula & Sitieni, 2012). One of the major causes of this crisis is inadequate funding. Statistics indicate that the rights of students with disabilities to access education is not met (Handicap International, 2012) due to lack of funds. The magnitude of problem is great and serious as funds from the government are allocated more to other areas compared to instructional media which is essential in helping students improve academic achievement. Teachers use diagrams, pictures and chalkboard together with KSL to teach Geography, heterogeneous nature of hearing impairment often leads to a lack of organizational and government policy on technology use for deaf education (Zamfirov & Saeva, 2013). Teachers’ integration of hypermedia is stalled by lack of successful development opportunities in the constructs of technology and pedagogy (Levin & Wadmany, 2008).
There is some evidence that attitude towards technology relates positively with achievement (Matter & Schau, 2002; Shapley et al., 2010). Akcay et al. (2006) concluded that students’ attitudes and achievements towards analytical chemistry were better with technology. Hence there is need to provide technology based teaching for enhancing the positive attitude of HI students because it correlates to academic achievement. Students with positive attitudes are more likely to sustain their efforts and have the desire to be involved in learning tasks. In reviewing factors that can influence attitudes Osborne et al. (2010) emphasized that how materials are delivered in classrooms can affect students attitude. New technological learning covers the existing gaps and acts as bridge for learning effectiveness. Teacher’s attitude and understanding of technology use affect their technology use in instruction (Dudeney & Hockly, 2007; Liu & Huo, 2007; Park & Son, 2009). For example if teachers perceive technology as a threat to their traditional teacher-centered methodology in which they have received years of training, they may resist the use of technology (Liu, 2007).

However teachers are becoming more familiar with options and opportunities to improve instructional delivery and students’ achievement on subject areas and evaluations. Hashim et al. (2013) pointed out that problems that hard-of-hearing students face in the traditional classroom provide opportunities for the hypermedia movement. For teacher to effectively teach the HI, he must have a number of instructional strategies that are at their disposal. This study investigates whether using hypermedia instructional strategy can improve academic achievement of the HI learners.
1.3 Problem Statement

Education of the hearing impaired students is not equal to hearing peers globally. They are not exposed to equal educational opportunities as their hearing counterparts and have always lag behind academically. This leads to poor academic achievement (Paparella, 2011). Jokinen (2010), of the worlds’ HI population only 5% are able to read and write. Adaptive hypermedia has helped HI students in overcoming learning difficulties. It adopts information towards individual preferences and improves the experience of the learner who is interacting directly with the system. It makes the learner interested about the subject, decrease learning time, and provides opportunities to learn non-traditional ways.

Findings over the years have shown that the deaf students in Kenya have consistently trailed behind their hearing counterparts in academic performance in Geography (Adoyo, 2004). The problem is lack of sign language efficiency in teaching Geography. Most of the HI learners only know basic sign language and are not able to sign technical Geographic. As a result most HI learners do not perform well in Geography and their education is below standard of the hearing students. Literature revealed that teaching external landform processes concepts using KSL does not improve achievement in Geography. Kiboss (2012) found that Kenyan high school student with hearing impairment scored lower in math tasks. In years 2008, 2009, 2010, 2011, 2012, 2013 and 2014 secondary schools for the deaf registered mean scores in English of 1.5, 2.08, 2.5, 3.5, 3.0, 2.95, 3.07, CRE 1.87, 2.75, 4.8, 5.8, 6.1, 6, 5.95 and Geography 1.43, 2.89, 2.04, 1.96, 2.46, 1.38, 1.52. Further, Kaimenyi (2014, March 3) in his press statement, indicated that ‘‘there is decline in Geography performance.’’
According to the literature, the problems that appear in Physical Geography teaching and learning are; terminology, symbols and interpretation language. Teachers have problems and difficulties switching between KSL and English because KSL has its own punctuation, syntax and grammar and can communicate theories and concepts. Many scholars found that lack of pedagogical innovation in teaching Geography and lack of knowledge by the teachers pose challenges but rather disability poses the greatest challenge for the learners (Mbewe, 2014). Heterogeneous nature of hearing impairment often leads to a lack of organizational and government policy on technology use for deaf education (Zamfirov & Saeva, 2013). National Association of Deaf (NAD) believes that due to lack of communicative skills a huge gap lies between the teachers and learners. Teachers cannot use KSL grammar effectively and their methods of instruction successfully. Teachers use resources such as diagrams, wall maps, world globe, pictures and chalkboard to teach Geography (Rutoh & Ndolah, 2013). Hence the learners cannot comprehend the concept of external landform processes taught in the class by the teachers.

Hypermedia provides multiple representations of concepts that are meaningful to students who are hard of hearing. Hypermedia promotes learning while motivating students (Roblyer & Dering, 2013) allowing them to display and summarize information and knowledge using a combination of text, video, animation and graphics. It contributes to perception, performance, memory, visual memory, visual attention, and motor skills and has the potential to succeed in overcoming communication gaps. Kenya sign language was advocate for as a national language of instruction to facilitate learning of HI. Despite the efforts to improve academic standards of HI, performance is still decimal (Bunyesi, 2010). As a medium of instruction KSL contribute to poor performance because exams are set in English and

Hypermedia transforms the way we teach and learn by transforming the process and the outcome (Eysink et al., 2009). Students can interact with information based on images, animation and words at any time and in any order they desire in accordance with their own decisions. Unfortunately, far fewer studies have questioned the impact of using hypermedia in teaching and learning Geography of the HI. Thus investigation into this issue will provide firm ground for improving academic achievement of the HI through instructional media.

1.4 Purpose of the Study

The purpose of the study was to investigate the effect of adapted hypermedia on learning achievement in Geography for hearing impaired learners in mixed special secondary schools. Most of the HI learners cannot comprehend and explain Geographic concept. Due to lack of communicative skills, learners only know the basic KSL which has its own punctuation, syntax and grammar. A huge gap lies between students and teachers. Hence there is need to use hypermedia that utilizes variety of communication senses that provide alternative for sign language communication.

1.5 Objectives of the Study

The following specific objectives were pursued;

(i) To find out the achievement of control and experimental groups between boys and girls exposed to hypermedia lesson in external landform processes in mixed special secondary schools,
(ii) to find out determinants on use of hypermedia in teaching external landform processes in mixed special secondary schools,

(iii) to determine the influence on use of hypermedia on learning achievement in mixed special secondary schools,

(iv) to examine the institutional support on use of hypermedia in teaching external landform processes in mixed special secondary schools,

(v) to establish attitude of both teachers and leaners towards the use of hypermedia in teaching/learning external landform processes in mixed special secondary schools.

1.6 Research Question

What is the institutional support on use of hypermedia in teaching external landform processes?

1.7 Research Hypothesis

The following null hypotheses were tested in the study at significance level of 0.05α.

**Ho**<sub>1</sub>: There is no statistically significant difference between control and experimental boys and girls taught external landform processes using hypermedia and those taught without use of hypermedia.

**Ho**<sub>2</sub>: There is no statistically significant difference between learners taught external landform processes using hypermedia and those taught without.

**Ho**<sub>3</sub>: There is no statistically significant relationship between determinants and use of hypermedia in teaching external landform processes.

**Ho**<sub>4</sub>: There is no statistically significant effect of hypermedia on learners’ attitude in teaching external landform processes.
1.8 Justification of the Study

Accommodating all students with the best complementary instruction is a constant challenge. Hypermedia can alleviate this predicament and enhance learning achievement of the HI learners in Geography. In traditional classroom teachers use diagrams, pictures and chalkboard together with KSL to teach Geography, heterogeneous nature of hearing impairment often leads to lip-reading which may not be helpful. Initial research suggests that hypermedia learning is at least a viable alternative to the traditional classroom. It makes the process of reading dynamic and presents different drawings and pictures which support the clarification of ideas and communication information (Hindley & Heider, 2008; Patel, 2010). Hypermedia influences the three senses in communication and is believed to raise achievement in learning. Animated illustration accompanied with video and kinesthetic are better to teach landform processes than static illustrations (Sharm, 2013). Conventional approach which is widely used need to be integrated with technological innovations in teaching Geography to alleviate the situation to conform to expected national quality and standard in Geography. Kenya Vision 2030 policy is anchored on adoption of technology and innovation as an implementation tool (Government of Kenya, 2013). Computer based learning and non-projected technologies are commonly used, does hypermedia still have a place in secondary education? This question must be considered in light of current market trends in educational broadcasting which is strongly emphasizing on E- learning. Hypermedia is one of the current instructional media that should be used in teaching Geography.

The precision of hypermedia technology in the field of teaching Geography remains a subject of debate. This study is based on research that indicates effectiveness of hypermedia for improving student learning. It has great potential in teaching but it is
unclear how teachers of Geography would adopt this new technology. The results of students’ survey indicate that hypermedia materials are helpful for students especially to support individual learning process. Houston & Parigoe (2010) report that this group of students need to access skilled professional who can improve and receive expressive language through planned instructions such as hypermedia. Therefore this study considers whether or not hypermedia in comparison to conventional media such as print together with KSL is a successful technique for improving achievement in Geography for hearing impaired students.

1.9 Significance of the Study

The study aimed at investigating the achievement of the students and contribution of adapted hypermedia towards greater realization of the instructional potential in classroom. Hypermedia has potential of improving achievement in Geography especially in teaching abstract topics such as Landforms. Findings of this study will help teachers in evaluating their teaching strategies and help them realize the importance of class interaction and use of hypermedia instruction in handling learners with HI. It will add a wealth of knowledge in special education by filling in the instructional identified gap.

This finding may be used by software producers, policy makers and ministry of education to improve teaching quality of the hearing impaired learners and Geography and encourage the use hypermedia in their schools. It is also hoped that study results will provide knowledge that help in the development of special instructional media for the HI. This study will also empower teachers with a robust teaching strategy thus allows teachers reaching a simplified strategy which leads to easy understanding on the part of the HI students, improve quality of their teaching, motivate and raise the
HI students’ academic achievement in Geography. Besides, findings of this study will be useful to teacher-trainers in laying emphasis on key tenets of teacher competencies when handling learners with HI; use of hypermedia, use of teaching and learning resources and appropriate teaching approach. Further, the finding will be useful in informing formulation and developing relevant curriculum that captures key tenets of teacher competencies in handling HI.

1.10 The Scope and Limitation of Study

The study was basically concerned with the effect of using adapted hypermedia compared to conventional teaching and learning Geography. The Experimental study was conducted in four hearing impaired mixed secondary schools but there are twenty two schools. The study was confined to teaching of external landform processes in Geography by use of adapted hypermedia and conventional/KSL. Hypermedia presentation was made through the assistance of KICD and Intel explore and learn. A total of four classes of form three Geography participated; two classes were involved in conventional approach where print media and KSL were used, and two classes used adapted hypermedia where Solomons’ four non-equivalent control group design informed the study.

Mayer and Gardner theories were adopted. The data instruments were; pre-test, post-test, questionnaire and interview. The findings were generalized to students in other hearing impaired schools as they share the same curriculum and other conditions as those involved in the study. It was conducted in Kenya. The study was limited to the hearing impaired schools only which are so far very few and scattered in eight counties out of forty seven counties. Time and financial resources did not allow accomplishing study on a large scale, therefore choice of Solomon four nonequivalent
experimental design that focused only on four schools. The study was limited to Geography students, therefore the generalization of the findings is limited to the subject.

1.11 Assumption of Study

This study was carried out on assumption that:

For hearing impaired students to perform better in specified topics in Geography, appropriate media must be integrated in teaching and learning process in these schools.

Students and teachers are likely to have different attitude on use of adapted hypermedia as an instructional media.

Teachers do vary their teaching techniques preferably according to topics.

Conventional approach (sign language) is dominantly used in teaching Geography and therefore student’s achievement rests with quality of instruction and not students’ ability to learn.

1.12 Theoretical Framework

Theories behind the study are Gardner and Mayer;

a) Gardner theory of multiple intelligence (MI) regarding individual differences show the extent to which students possess different kinds of minds and therefore learn, remember, perform and understand in different ways. It serves as the most effective curricular and classroom instructional frameworks for classroom teachers to use in designing their lesson plan. Gardner (2008) asserts that MI theory allows the educators to expand their repertoire of methods and tools and strategies beyond those that are frequently used in the classroom. It may seem impossible to teach all eight
learning styles. Hypermedia becomes easier and more effective as it satisfies the many types of learning preference that a class embodies.

According to instructional needs of HI students, only four types of intelligences were applied in the hypermedia. These were, visual or spatial, bodily kinesthetic, interpersonal and linguistic. This is because HI students’ instructional technologies are usually adapted.

HI students are traditionally recognized as visual learners. Hypermedia technique is a great resource for teachers who work with them. Characteristics such as high memory capacity, visualization abilities, hyperlinks as well as multimedia are sophisticated artificial intelligence techniques which can be exploited to build instructional tools able to meet the needs of the HI students.

![Information Processing Model based on Mayer (2005)](image)

Figure 1.1: Theory of multimedia Mayer (2005)

b) Mayer cognitive theory of multimedia learning emphasizing the strength of the brain to store well and recall images as opposed to text. The Proponents of the Dual Coding theory (Mayer, 2005) emphasized the strength of the brain to store well and recall images as opposed to text. According to the theory, it works in three
assumptions; visual and auditory experiences/ information are processed separate and distinct information processing channels, each information processing channel is limited to its ability to process and processing experience/information in channels is an active cognitive process designed to construct coherent mental representation.

Further, it is activated through five steps; selecting relevant words for processing in verbal working memory, selecting relevant images for processing in the visual working memory, organizing selected words into a verbal mental model, organizing images into a visual mental model and integrating verbal and visual representations as well as prior knowledge (Mayer, 2001, p.54). The connection of pictures and verbal information is evident throughout history. Words and sentences are usually processed and encoded only in the verbal system, whereas pictures are processed and encoded both in the imagery and the verbal system.

This has been supported by several researchers stating, words are the image of things (Benson), Aristotle “without image thinking is impossible” and “Gardner ability to think in pictures hence combination of verbal and visual help people to recall information”. Therefore a great deal of information is better presented visually rather than verbally. Thus picture is a shift from long-standing process of reading, writing, counting and memorization skills.

Seven principles are associated with multimedia. In this context only four principles such as spatial contiguity, individual difference, temporal contiguity and multimedia principles are applicable in hypermedia for HI students. The pedagogical principle of teaching Geography is related to fieldwork and practical. Therefore the ability to see the formation of the earth and features such as arete, mass wasting, weathering, glacial, karst and coastal waves landforms from multiple perspectives and multiple
scales, with complimentary text, audio, animation, graphics and video media provides a powerful array of options for geographic learning.

Figure 1.2: Adaptive Content Delivery Model

On the other hand, the content delivery model takes into account constructs of adaptive technology process. The aim of the model is to identify the factors and issues which prompt teachers to use hypermedia in hearing impaired secondary schools. Marilyn Friend suggests a seven step approach to considering instructional strategies, accommodations, and or modifications to meet students with disabilities learning needs. The steps are: Identify classroom environment, curricular, and instructional demands, note student strengths and needs, check for potential areas of student success, look for potential problem areas, use information gathered to brainstorm instructional adaptations, decide which adaptations to implement and evaluate student progress (INCLUDE).

In this research it is completed through the following steps; adaptive to context, content adaptation process records, original content into adapted contents according to adaptive suggestion from adaptive process. The processes is made up of three steps; adaptive learning, context, content adaptation and adaptive content delivery. These steps complete adaptive process together. The adaptive learning model creates
adaptive content based on learning environment. At last the content delivery model delivers adapted content embedded with suitable markup. When the learners learn with this ubiquitous device, the system will distribute suitable content for learners. The content service suggests what information is recommended. The model illustrates adaptation in the use of technology that in this case will contribute to learning achievement rather than being obligatory to the user.

1.13 Conceptual Framework

The figure shows relationship between independent and dependent variables. Use of hypermedia, determinants on use of hypermedia, influence of hypermedia on learning, institutional support and learner attitude relate to achievement. Involvement by MoEST and KICD will determine usage of hypermedia by the teachers in classroom which in turn leads to academic achievements. Thus both conventional and use of hypermedia in teaching have effect on performance. Teachers should use hypermedia in pedagogy for hearing impaired learners because it provides many benefits at different levels (Love et al, 2006).

As figure1reveals, the integration of hypermedia in pedagogy within classroom system has influenced learners’ understanding, retention rate, motivation, self-learning, attitude, learning style and improved performance.

This statement is based on the fact that adapted technology allows hearing impaired teacher improve self-efficacy and teaching techniques. Hypermedia support transformation of classroom management and pedagogy. Pedagogy transformation could initiate tacit and explicit knowledge of the hearing impaired learners, this leads to a sustainable higher performance (Ruiz Mercader et al, 2006).
In this study three variables were investigated;

**Independent;** variable in the study is medium of instruction this was used in two levels, conventional technique (print)/KSL and use of hypermedia.

**Dependent;** student achievement in the topic covered in the study (external landform processes).

**Extraneous;** factors which the school and stakeholders such as KICD and MoEST have control over, for example instructional policy and directives.
Figure 1.3 Conceptual Framework
1.14 Definition of Terms

**Achievement**  
Improved performance thus increases quality of the outcome through motivation, retention and participation and high scores in the test.

**Adapted technology**  
A compensatory device that reduces effect of disability that result from impairment.

**Adapted hypermedia**  
An instructional tool which presents information through animation, text, video, graphic and still picture without any form of sound.

**Attitude**  
This is taken to mean the students and teachers acquired internal state or feeling influencing their choice towards learning and teaching respectively through use of hypermedia.

**Conventional**  
This refers to those instructional techniques in which entire class is exposed to instruction through use of sign language, print media and graphics. This instruction is characterized by use of textbooks, diagrams, pictures, and illustrations as the main reference in teaching external landform processes in geography.

**Demonstration**  
Hands-on technique to teach and explaining reasons for the steps.

**Determinants**  
Reasons why teachers would prefer to use or not use hypermedia in teaching external landform processes in
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Disability</td>
<td>A limitation or restriction and disadvantage caused to an individual functioning as a result of an impairment.</td>
</tr>
<tr>
<td>Environment</td>
<td>A condition which may affect learning and teaching process for example class size, facilities, glare and arrangement of the class.</td>
</tr>
<tr>
<td>External Landforms</td>
<td>Science of landforms and form of distribution across the physical landscape in Geography subject offered at secondary school levels in Kenya.</td>
</tr>
<tr>
<td>Geography</td>
<td>is a field of science devoted to the study of lands, features, inhabitants and phenomena of the earth.</td>
</tr>
<tr>
<td>Hearing Impaired school</td>
<td>Special school dealing with those students who have a hearing loss that interferes with the ability to process linguistic information through auditory channel.</td>
</tr>
<tr>
<td>Hearing impaired</td>
<td>Students with ear malfunctions that have a hearing loss which interferes with their ability to process linguistic information through auditory channels with or without amplification.</td>
</tr>
<tr>
<td>Hypermedia</td>
<td>An application of vision/teaching resource that combines audio, video, text, graphics animation and pictures and used in teaching landforms to concretize the content.</td>
</tr>
<tr>
<td>ICT</td>
<td>Encompasses the range of hardware (desktop &amp; portable computer Projection technology, calculators,</td>
</tr>
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data logging & digital recording equipment). Software application (generic software hypermedia resources) and information systems intranet, internet) available in schools at the time of research.

**Internet**
International network of networks of computers using a common protocol that allows search and exchange of information by teachers and students in schools.

**Impairment**
Refers to identifiable defect in the basic function of an organ or any biological part of the body, in this case, the ear.

**Kenyan sign language**
Sign language used in Kenya by HI learners to communicate in the classroom.

**Pedagogy**
Teaching/learning skills which enhance understanding.

**Redundant information**
Information presented at the same time and instruction presented before and after exposure to hypermedia content on external landform processes to prepare, reinforces or extend learning from hypermedia.

**Sign language**
The natural language predominantly used by the deaf which has its own distinct vocabulary and grammar predominantly used by the deaf.

**Skills**
Ability of the teachers in terms of know how to use hypermedia in teaching landforms for hearing impaired learners.

**Visual learners**
Hearing impaired learners who understand the content of external landform processes in content through sight.
1.15 Summary

The present study was aimed at finding out which technique between use of hypermedia and conventional technique/KSL achieved higher in terms of scores after the treatment and control groups were taught. It was hypothesized that there is no statistically significance relationship between achievement in treatment and control. The study was guided by theory on cognitive of multimedia learning and information systems and content delivery model. The other areas considered in this chapter were; background, problem statement, purpose of the study, significance, scope and limitation, assumption, justification and interrelationships between the independent and the dependent variables are illustrated on the conceptual framework in the chapter.

Finally, terms used in the thesis have been operationalized under the section on operational definition of terms. The succeeding chapter presents a review of literature related to the study and the subsequent knowledge gap.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review is a body of text that aims to review the critical point of current knowledge on particular topics. This chapter therefore gives an account of what has been published on the use of hypermedia and conventional approach the Kenyan sign language (KSL) by accredited scholars and researchers. It involves examining documents such as books, magazines, journals and dissertations that have a bearing on the study being conducted. Therefore the review focuses on studies on the concept of hearing impairment, theories behind the study, conventional method of teaching using KSL, illustrations, achievement of boys and girls exposed to hypermedia lesson, determinants on use of hypermedia in teaching, influence of hypermedia and learning achievement, the institutional support in the use of hypermedia for teaching and the attitude of learners towards use of hypermedia in learning. The chapter concludes by presenting a summary of the reviewed literature and the subsequent emerging knowledge gaps.

2.2 The Concept of Hearing Impairment

Kapp (2012) uses the term ‘hearing impaired’ to denote a group of people with various degrees of hearing loss. The term impairment is derived from the medical model which defines disabilities in terms of deviance, like an illness which should be fixed and cured. According to this model, a society has to adapt to accommodate the disabled individual and remove these barriers (Ross & Deverell, 2014). For the purpose of this study, the term hearing impairment/hearing impaired is used instead of aurally handicapped. This terminology has become synonymous with the Kenyan way of distinguishing between three categories of children depending on their ability to
hear, these are partially hearing children, hard-of hearing and children who are deaf (Kapp, 2012). He refers to children with a hearing loss of less than 35dB as partially hearing. Children with this level of hearing can be educated in the ordinary school. Hard of hearing students comprise of one whose hearing loss ranges 35dB and 65dB. These children attend hard of hearing schools or otherwise are admitted in schools for the deaf though in special divisions cum-classes (Kapp, 2012). For a child to be declared deaf he ought to have a hearing loss of over 65dB. They usually join schools for the deaf and the mode of teaching is by visual teaching and sign language. In this study, the focus is on all children who have hearing impairments regardless of the category of hearing loss.

2.3 Theories on use of Hypermedia in Teaching HI

Mayer cognitive theory of multimedia learning puts emphasis on the strength of brain to store and recall well images as opposed to text. Cognitive theory takes its name from the word cognition, which means process of knowing. It puts emphasis on unobservable constructs such as mind, memory, attitude, motivation, thinking, reflection and personal internal process. Cognition is based on information processing approach. Technology has changed the way we teach and learn. Many learning theories can be used to apply and integrate this technology more effectively. It is evidenced that there is relationship between technologies and cognitive, the implementation of each benefit each one.

Hypermedia attempts to describe how information in the classroom enters our senses and becomes stored in memory, is retained and used. Further emphasis is made on the arrangement and structure of the knowledge. According to cognitive theory human need to see things in a concrete manner to understand better. Hypermedia leads to a
cognitive pattern of engagement and motivation of instructional tools, which individualizes the mode of delivery, developing special teacher, fortifying the teaching process, decreasing cognitive load on the memory functioning and encouraging students to stay on task (Kazan, 2015). Jordat et al. (2008), cognitivists believe that human learn in linear form, involving mental processes such as mental planning, goal setting and organizational strategies. This usually is applicable when linear model hypermedia is used for classroom instructions.

Gardner theory of multiple intelligent regarding individual differences show how students’ data processing mechanism identifies a particular learning opportunity, process and retrieves the information for the purpose of gaining understanding the information, makes the necessary connection for creating new knowledge and assimilating new information. Understanding the role of long term memory for the deaf is essential to good instruction (Lang & Pagliaro, 2007). Ultimately researchers have found that ability of the ‘‘minds eyes’’ to depict or render an image or concept in terms of ability to retain and recall Geography terminology content was evidenced that students found concepts represented by a single sign much easier to recall than which require compound signs or finger spelling (Lang & Pagliaro, 2007).

Shatila (2015), humans are their own agents of change because they are in charge of choosing their action. Therefore Students have options to choose from hypermedia.

According to Abigail (2007), there are biological differences in brain development but this determines if there is difference in thinking process. He reinforces that boys are more successful in kinesthetic activities, visual, spatial relationships and competitive activities while girls are better with verbal linguistic activities and auditory learning. Hueber (2009) elaborates on this subject of gender differences in sciences and arts
confirming achievement gap is close when it comes to standardized testing. Thus the theory states that the biological differences between male and female are proven to be completely false. But results from pre-test contradicts the statements as there was difference in achievement between girls and boys, boys before instruction are more competent than girls.

Multiple intelligence theories adapted in the study show the extent to which students possess different kinds of mind and therefore learn, remember, perform and understand in different ways, such intelligence are invoked and combined to carry diverse problems and progress of various learners. MI theory has the capacity to solve problems encountered by HI learners as they have different disabilities for example in a class a teacher may be having deaf, loss of hearing, deaf and hard of hearing these may have different degree of profoundness. But hypermedia allows the teacher to expand his/her methods, tools and strategies beyond that are frequently used in the classrooms. The most important features in the development of hypermedia for HI are video, animation, text and graphics. In relation to this theory, visual cue is the most important element in developing the hypermedia for the HI learners (Faizah & Ariffin, 2010). Therefore video was utilized for each type of Landform (Obondo et al., 2013). The video shows the real situation related to the formation of land such as eskers, tombolo, diumlins, glacial karst, draas, and stack among others. Animation a 2-D was utilized in each of Landform process. It is important for these learners to build up their mind to relate signs with the graphics and also show the results of different forces such as wave action, wind action in semi-arid areas, glacial and mass movement, weathering and fluvial activities. Animated text was also utilized for each type of Landform. It is important for HI learners since it showed relationship of
features formed. The colour and size of the text can also give meaningful lesson to HI learners (Nazri & Suhailia, 2010).

2.4 The Concept of Hypermedia

Robleyer & Doering (2013) define hypermedia as ability to get from one media information element to another (p. 174). It is any computer controlled system that allows the user to interact with media that can contain text, graphic, sound, animations and film. The importance and necessity of this technology in assisting HI students learn more effectively have been established in many studies. Use of hypermedia in classroom is beneficial on many points. It can be more effective than traditional instruction by keeping students’ attention, students become more involved in learning process, and information is accessed more quickly. The results of students’ survey indicate that hypermedia materials are helpful for students especially to support individual learning process. There are a number of studies that have established the effectiveness of hypermedia technology on HI students’ learning and describe adaptive hypermedia as an alternative to traditional one-size fit-all approach (Dangsaart et al., 2008). Adaptive hypermedia adopts information towards individual preferences and improves the experience of the learner who is interacting directly with the system. It makes the learner interested about the subject, they decrease learning time, and provide opportunities to learn non-traditional ways. It is transforming the way we teach and learn by transforming the process and the outcome (Eysink et al., 2009).

Hypermedia is everything that we see, hear and interact with. Hypermedia is a nonlinear medium of information that includes images, graphics, audio, video, plain text, animation and hyperlinks. It allows images video, flash animation to be linked to
other content. Rich stimuli received by sensory organs such as vision, hearing, and touch are important elements that affect an individual’s conceptualization of the external world. There is an increasing need for different components within a single application- and for entirely separate applications to be able to communicate with each other simply and clearly. Hypermedia contributes to perception, performance, memory, visual memory, visual attention, and motor skills and has the potential to succeed in overcoming communication gaps. Students can effectively interact with information based on images, sounds, and words designed in a previously determined sequence at any time and in any order they desire in accordance with their own decisions, as well as analyze stimuli received during interaction and internalize them, concepts are stored hierarchically in the mind (Senemoğlu, 2015, pp. 43–44).

Hypermedia is computer based information retrieval system that enables a user to gain or provide access to text, audio and video recordings, photographs and graphics related to particular subject. Hypermedia is anything that allows the user to gather information nonlinear way. This means that the user has a choice as to what path he/she takes to gather information. The user has the option of skipping certain items or can go through every piece of information that is listed for example audio, images and video. Different people exploring the same body of information are likely to follow different paths depending on their interest and abilities. In print media such as textbooks and magazines, text and pictures are organized sequentially with one topic following another. In hypermedia information can be organized the way most people think, by associating context, ideas and concepts, whether represented as text, sound or images can be linked to related ideas and concepts (Beydogan & Hayran, 2015).
Hypermedia extends upon by allowing the user to click images, video, graphics and other media apart from text to create nonlinear network information. Hypermedia is powerful and its ultimate potential is anything but clear. It is an extension of hypertext that allows images, movies and flash animation to be linked to other content. Noninteractive cinema presentation is an example of standard hypermedia due to the absence of hyperlinks, power point presentation is another example of hypermedia. Teacher can add photos, graphics, pictures and even words to any document.

In the process of hypermedia learning and interaction, students are influenced by the way material is structured presented and processed (Kim & Gilman, 2008). Such interaction makes learning process active and interactive and responsive.

The characteristics of such interactive hypermedia application allow learners to be part of the learning process, experiencing control over the content, initiate search, making selection and manipulate the acquisition of the process.

Figure: 2.1: Hypermedia

As such hypermedia is interactive nonlinear, user controlled and often determined by a user’s interest and curiosity and learners take control of their own destiny. Hypermedia may show itself as linear, hierarchical or networked in nature. These three types run from base hypermedia to the most fully developed and complex
networked model. Linear model is the most basic of structures and organizes the presentation in chronological order of some kind either alphabetically or dates. These are frequently seen as power point aided oral presentations. It requires very little interaction on the part of the author, user or intended audience. This type does not take full advantage of hyperlinks to link pieces of related information. This use of hypermedia has been used by teachers in lectures and students in presentations since the advent of tools such as power point and often results in nothing more than fleshy text of the speech that has taken the place of older poster board visual aid. Still this form of presentation can be useful in the delivery of lecture notes or very basic oral project for students.

Hypermedia enables students to explore and construct their own learning, breaks down barriers of time and place allowing maximum flexibility for the learner. Students are provided a means to learn individually and at their own speed. Students can repeat difficult concepts, or skip already mastered skill areas. The students are active participants. However better use of hypermedia can be seen in other two models described by (Ruffini, 2007). Hierarchical organization uses a family tree type of sequence in which the user can navigate through the links specific to a particular area, for example a board presentation on the solar system allows the user to navigate into several subcategories. Network organization assumes that there is an interrelationship between many of the elements being linked. Its complexity is almost limitless and depends on how many of these interrelationships exist. In this model the user has greater control over what direction is taken and can end up in a number of different areas, all relevant to original topic. But this model also gives a greater likelihood of the user getting lost in the mixed of sources. While potential is great for extended learning on the subject, the possibility of information overload always looms
and might cause the learner to be overwhelmed. The student might also skip important concept thus get a shallow and fragmented conception of the subject. The risk of getting disoriented can result in confusion rather than understanding. Hypermedia involves a certain cognitive overhead, the user has to interact with the system in order to accomplish everything, which can be more or less complex.

2.5 Conventional Instruction, Kenyan Sign Language

Many HI learners across Kenya cannot benefit fully from conventional instruction because of hearing impairment which limits their ability to actively participate in classroom learning activities. Chickering & Gawson (2011) emphasized that active classroom involvement is not just sitting and listening to the teacher sign but by talking about what they learn, write about it, relate it to past experience and apply it to their daily lives. This helps them to improve retention of information and thus improve their academic achievement. Sign is a visually-based, not auditory, code with a grammar different from that of written for example ‘processing land instead of land processing’. Conventional instruction and KSL for teaching Geography are blamed for poor performance in Geography. Teachers use static medium such as textbooks and writing board which are not sufficient in Geography education (Standish, 2009). Esera (2008) and Kupermintz et al. (2006) highlight the educational needs of deaf and hard-of-hearing students. They maintain that among educational needs of this group of students are learning environment, educational interpreters, communication, using visual approach, and applying evidence based practices in instruction. Fgatabu (2013) found that sign language and byproduct of ineffective interpreting have great effect on performance on learners with hearing impairment. The study also found that sign language techniques are the widely used as a learning resource in the schools and that
training skills also affect the performance of learners with hearing impairment to a very great extent.

Sinnott (2009) emphasizes the significance of creating positive environment and supporting suitable instructional materials. This finding reinforce the theory that educational disparity between HI and hearing students is owe more by the teachers than the students themselves. A deaf student becomes more tired than the hearing student due to the need to constantly concentrate in order to hear or watch an interpreter (Lang & Pagliaro, 2007). Teachers need to use alternative media with individual work so that the deaf student does not need to concentrate for long time. To rectify this, teachers need to integrate appropriate image-based and iterative strategies necessary for effective instruction of these students (Lang & Pagliaro, 2007).

In traditional classroom settings, the teacher will begin class by answering questions from the previous work, then teach the new lesson, give notes and sometimes give assignments. Deaf students often perceive that they receive a distorted message when a non-signing teacher’s lecture is translated by the interpreter (Vignare et al., 2007). Therefore Adesina (2009) Obanyan (2010) come to a conclusion that teachers are the key pointers and determinant of a successive education. Hard-of-hearing students may also suffer from visual input overload as they simultaneously attempt to pay attention to the teacher, interpreter, and any visual aids that may be presented (Marschark et al., 2010). Opportunities to learn from classmates are often lessened due to communication difficulties with hearing students (Long et al., 2011) and teachers struggle to provide them after class learning support (Liu & Hong, 2007). But traditional methods and tools applied in classrooms are not found to be attractive or thrilling resulting to boredom and fatigue. New technologies proved to be successful
through many researches for improving the ability of handicapped children. Use of visual media during teaching and learning process promotes attention and interest among these children. However Slobodzian (2009) postulates, extra learning resources may not be accessible in class and there is a widespread lack of accessible interactive materials.

Many scholars found that lack of pedagogical innovation in teaching Geography and lack of knowledge by the teachers pose challenges but rather disability poses the greatest challenge for the learners (Mbewe, 2014). The result of such a challenge is persistent poor academic performance and has the perception that the concepts were prohibitively difficult. In order to address this longstanding issue researchers in the practitioner-driven, literature have stressed a need for teachers to have more confidence in the abilities of their students (Kritzer & Pagliaro, 2007). It is important to identify the most effective strategies in the content delivery process to achieve objectives (Alias, 2010).

Miller et al. (2013) also found that inappropriate teacher position interpretation have limited knowledge to translate the information. Clearly deaf students need different approach than non-deaf students. HI students experience learning difficulties due to the mismatch of methods used by teachers and learning styles of students. There is an increased need for interventions so as to support the learning of children with disabilities. It has been suggested that technology can serve as a means to increase the outcomes for students with disabilities, yet teachers report little tracing on how to use advanced technology such as hypermedia (Compell, 2010). In order to teach students with disabilities teachers need proper training on how to design lesson plans
using hypermedia that support the strengths and weakness of all students (Shtila, 2015).

Adaptive instruction embodies all instructional forms that accommodate the needs and abilities of different learners. The structural functions of recent adaptive systems are significantly more powerful than earlier ones, but still deaf students experience particular difficulty when learning technical skills, which may be due to a lack of signs for technical terms (Andrei et al., 2013) and a lack of qualified interpreters (Marschark et al., 2006). Even with effective sign interpretation, latency in interpreter processing, time may cause issues (Long et al., 2011).

Traditional teaching, the lecture or "telling"/ sign method is the method of teaching outside of manipulative work. In our schools teachers are comfortable with the traditional method because they remain in control of content and time. However no teaching method is completely ineffective in delivery of the content. Therefore the strengths of the traditional teaching are; time efficient, controllable by the teacher and predictable and manageable student learning. These three strengths are also looked at as being the weaknesses of the hypermedia. The weaknesses of the traditional teaching are; the stifling of creative thinking, student's self-concepts are not addressed, little student involvement in decision making and lack of intrinsic sources for student motivation.

Hashim et al., (2013) pointed out that the problems that hard-of-hearing students face in the traditional classroom provide opportunities for the e-learning movement. The conventional method of instruction is widely used and has been felt to be somewhat lacking in some desirable aspect of an environment that enables learners to fully benefit from the teaching and learning transaction. In this method, teachers verbally
articulate content greatly using the sign and chalkboard to set out important points and give students notes while the students listen, wrote down notes, occasionally participated and verbally answered questions (Friedman, 2005). The traditional mode of school teaching is the lecture (sign) method, though this method has been criticized for being authoritative, boring and predictable due to emphasis on memorization and the use of specific information (Zhang & Zhou, 2006). Students often have a difficult time in visualizing concepts and struggle to grasp information that is presented either verbally or in text.

In this approach to secondary teaching, most class time is spent with teachers lecturing and students watching and listening. The students work individually, assisting and cooperation is discouraged. Hence World Education Services (2011) notes that the most significant point is fostering improvement and making full use of the learning process. Therefore we sought to enhance the learning process for our students, where teachers move away from transmission teaching and adopt active learning approaches where learners are more engaged, better motivated and acquire a deeper understanding, these would improve understanding. Olaleye (2010) realized that there is a close correlation between teachers characteristics and learners academic excellence. Currently the primary method of teaching Geography is via textbooks and sign (lectures). These static media do not adequately represent, visualize or convey abstract information such as solar system, physical features under the sea and landform processes. These teaching methods reinforce the memorization of factual information and do not promote deeper understanding or application of principles involved (Hew & Bush, 2007).
2.5.1 Kenya Sign Language and Printed Media

Kenya sign language was advocated for as a national language of instruction alongside English to facilitate activities of students with HI (Ndurumo, 2009). Despite the efforts to improve academic standards of students with HI, performance is still decimal (Bunyesi, 2010). Geography is a bulky subject in contents which requires a comprehensive explanation when responding to from text to written is a problem (a switch from KSL to written). Most HI teachers only know basic sign language even with the aid of printed media such as writing board and textbook, they are not able to sign technical concepts. When teacher fails to formulate appropriate strategy to teach a concept, he resorts to oral speech while learners resort to lip-reading which may not be helpful sometimes (Wakumelo, 2009). Therefore Geography teaching basically still remains at the chalk, wall, charts plus textbooks and traditional teaching means. How to solve this contradiction between teaching and learning has been constant pursuit. The challenges emanate from limited technology, inexperienced teachers, new language of instruction (KSL), English yet the mode of instruction has different code from KSL (Hamilton, 2011). The teachers also lack communicative competency in sign language to effectively teach with the aid of printed media and graphics. They do not know sign language to explain Geographic terminologies. They write on the board and point this as primary teaching aid, as a result most learners do not perform (Jokinen, 2010). Kenya Institute of curriculum development (2013) reports that teachers cannot use KSL grammar effectively and their methods of instruction successfully this leads to poor performance in class. This creates a situation where Geography lessons are never taken seriously by students. Hence there is need to integrate instructional media which can enhance their understanding and achievement. Despite that printed media are reality in abstraction, medium such as textbooks...
individualize learning through independent study and assignment. They are used as teaching assistant in classroom. In Kenya global deaf connections (2010) reports that HI students receive limited resources because of stereotypes that deaf education is a waste of time and money.

2.6 Use of Hypermedia in Teaching and Learning Process

Hypermedia in the classroom holds potential as a tool to allow students to construct their own knowledge by making meaningful connections. Hypermedia promotes learning while motivating students (Roblyer & Dering, 2013) allowing them to display and summarize information and knowledge using a combination of text, video, music, animation, graphics and sound effects (p. 179). Knoors & Marschark (2014) there are a number of studies that have established the effectiveness of technology on the HI student learning for example intelligent thai text to thai sign translation language for learning (Dangsaart et al., 2008). Multimedia application to change the text or voice to an animated sign language (Allan & Harrison, 2010) web 2.0 (Vrettaros et al., 2010), and use of video (Debevc et al., 2010; Obondo et al., 2013) have helped the teaching and learning process for the HI students. However most of researchers have only focused on areas of language and field of graphics is lacking. Bottoni et al. (2011), the production of multimedia material by deaf-center learning environment (DALE) has helped HI students in overcoming learning difficulties. Chowdhuri et al. (2012) agree that deaf students cannot be exempted from e-learning approach. The use of technology in learning has helped them largely.

However, Paolucci (2007) suggest that the complexity of hypermedia in the classroom should be based on the subject matter, learners’ characteristics and project objectives. Different learners will need different models of hypermedia. He notes that the
cognitive style of the learner has much to do with the success of hypermedia in the classroom. And contends that active or exploratory learner responds very well to the use of hypermedia, while those with other learning cognitive style do not respond favorably. Even so he says hypermedia is especially effective regardless of cognitive style when discovery learning is the goal. He notes studies showing effectiveness of hypermedia is promoting the association and linking of the different ideas, but also notes that hypermedia is not effective when goal is recall of facts and data. From the literature it is evidenced that hypermedia have great potential for teaching and learning because of the innovative way it presents information and the control and freedom it gives learners over their learning. Although hypermedia provides “flexible information environments”, reading hypermedia documents poses certain challenges for learners. Successful learning in a hypermedia environment goes beyond effective uses of top-down and bottom-up processes; it requires additional learning and interpretation skills to cope with the demands of the new environment. However, empirical research has shown that rather than compensating for unsuitable learning prerequisites of some learners, hypermedia tends to increase the gap between good and poor students.

2.6.1 Preferred Learning Style

Learning style can be defined as complex manner in which learners most efficiently and most effectively perceive process, store and recall what they are trying to learn. It is how they prefer to learn and it is an important factor for students’ academic achievement and attitudes. Some prefer to work with concrete information (experimental data, facts) while others are more comfortable with abstractions (symbolic information, theories). Avile & Moren (2010) have the same opinion, the outcome from previous research indicated that teaching with learning style adaptation
helped increased students’ performance and boosts their motivation to learn. Recent research suggests that the style by which one learns and supplies knowledge is an important characteristic to consider in the aggregate educational process (Graf et al., 2008; Kolb & Kolb, 2009). Therefore identifying the uniqueness of learning style is important in encouraging students’ involvement in the learning process (Naimie et al., 2010; Yang Graf et al., 2009; & Tsai, 2008).

The literature in the research domain of learning style suggests that the process of learning is facilitated more appropriately when instructional methods match the learners’ style inclination (Itsieh et al., 2011). Many researchers suggest that consideration to learning style is important when establishing gender gaps. Examples of these are boys who would prefer to learn kinesthetically by doing things such as experiments or activities and girls would learn well visually by seeing. Perceived differences in the learning styles of boys and girls are one of the most frequently expressed explanation for the gender in achievement. Gurian (2006) reaffirms that there is a significant difference in the ways boys and girls learn. Boys have attention deficit issues and learning difficulties, they are movement driven (kinesthetic) in their learning process. This argument is also based on the presumption that if boys are naturally different to girls because of their biological make-up, then it follows that they will have different approaches to learning (Skeleton et al., 2009). However Cole (2006, p. 26) contradicts stating that gender is not the strongest predictor of attainment, social class attainment gap is three times wider. DFE (2007, p. 3) affirms that factors such as ethnicity and social class have a greater bearing on educational achievement than gender considered on its own.
Deaf students must be visual learners because their sense of hearing is compounded, so their sense of sight must be enhanced. Hypermedia is used to bring education to individuals with such challenges for example audio to visual conversation for HI. IA El-Zraigat (2013) show that HI students in Jordan exhibit needs on learning style and behavioral academic communication. Furthermore, Wolters et al. (2011) show that HI students have severe language problems compared to their hearing classmates. To address this Houston & Parigoe (2010) report that this group of students need to access skilled professional who can improve and receive expressive language through planned instructions such as hypermedia.

2.7 Academic Achievement

Academic achievement can be weighed by using several yard sticks namely normative academic status and classroom academic status and academic excellence (Semmel & Frick, 2010). As regards classroom status relates to learners success as compared to his or her colleagues in class. One way of measuring classroom status is by seeking teachers' perceptions of learner’s achievement and ability to learn expected academic content. Academic progress according to Semmel & Frick (2010) is the change in academic achievement observed from one year to the following one and can be determined by observing gains on achievement examinations and teachers view of the leaner's change.

2.7.1 Hearing Impairment and Academic Achievement

Students may perform badly on internal standard examinations and be achieving as well as their classmates. There is a case where students may be scoring well and grade level as per standardized test scores but be lagging behind their colleagues in academic circles fail to show sufficient success to reach their classmates’
achievement. Bashir et al. (2014) denote that in a research on the academic achievement of students with HI show that they trail behind their hearing age mates at the same age and grades as regards what is expected of them. There is also shortage of qualified teachers of deaf and of research-based teaching methods and instructional materials for HI (Dye et al., 2008). Marshark & Knoors (2012) revealed in their studies that cognitive differences exist between HI and hearing students that indicate the need for some different pedagogical techniques and instructional materials. Further, Traxler (2010) asserts that about 50% of a national sample of students with HI at high school produced results that were below basic proficiency level in reading comprehension and tackling mathematical problems. It was also found out that students in inclusive setting instructed in general education schools score highly pertains to academic achievements than their colleagues in self-contained schools (Kluwin & Stinson, 2013).

2.7.2 Achievement of Boys and Girls on Use of Hypermedia

Gender in global and technological perspective is no longer a significant impediment for performance (Esiobu, 2011). The African value based on gender is also fading away and giving way to global view (Adegbija, 2006). It seems pertinent to consider whether hypermedia can perpetuate gender gaps or if they can be used to counteract them. It has been argued for instance that the types of media (including hypermedia) that boys and girls choose to engage with are very different (Leonard, 2006), and so it is teachers who are utilizing these medium and should consider how learning media may impact the learning of girls and boys differently by considering differences in achievement.
Nwona (2015) noted imbalance against women in science and technology. Research has demonstrated that different teaching methods and instructions produce different results therefore, the identification of the best teaching strategy must be done if the best results must be achieved. Zember & Blume (2011) report that, most studies show that girls perform better than boys in schools. In teaching Geography, research suggests that a strong masculine bias exists in the map reading (Gender Geography, 2010). However Abubakar & Oguguo (2011) in their comparison, found no significant difference between performance of girls and boys. This agrees with Uduosoro (2011) who found no significant difference between performance of boys and girls.

However gender difference in achievements in some specific fields has not received much attention, it is assumed that there exists a gap in achievement in Geography with perception that males perform better than females. In northern Nigeria, it is believed that subjects like physics, drawing, geography and the like are for boys and not for girls (Warning, 2006; Younger, 2007). Agbuga & Xiang (2008) report that boys recorded high performance than girls in Geography. The result is similar to that of Kubiatko et al. (2012), the influence of gender was significant and the boys achieved statistically significant high scores.

However Francis et al. (2008) argue that girls are improving more rapidly than boys. Gender Geography (2010) stated that students’ mastery of Geography in physical and practical Geography are low therefore there exists a gender gap in achievement in Geography in perception that boys perform better than girls. Husain & Millet (2009), the variance of test scores differs substantially by gender, significantly more boys than girls score very high ranges in Geography thus gender disparity is significant.
Warrinto & Younger (2007) contradicts this reporting that girls outperform boys at school at least in terms of certain key academic hence there is need to refocus equal opportunities to redress the balance for boys. Guis et al. (2008) had different opinion, they found that there are gaps in test score in all subjects. This is attributed to methods of teaching and preferred learning styles (Skeleton, 2007).

Despite promising developments in the education of HI students, their achievement continues to lag behind that of their hearing peers, and many do not acquire the knowledge and skills to reach their full potential (Qi & Mitche, 2012). Research suggests several reasons for this troubling and long-standing under achievement. Many HI students enter school lacking fluency in either a signed or spoken language (Singleton & Morgan, 2006). Teachers frequently struggle to adequately structure the environment and provide access and opportunities for HI to learn (Knoors & Marsch, 2014).

2.8 Determinants on use of Hypermedia

Several researchers have performed studies in an attempt to find out if the incorporation of hypermedia technology into the classroom helps students, and if so, what factors contribute to a positive outcome (Dawson et al., 2008). To maximize the effects of effective use of educational technology in learning, there are factors teachers should consider before implementation. The teachers’ characteristics such as knowledge, beliefs self-efficacy, competency and media selection such as learner participation, effectiveness, content, objective among others all affect the success of a learner (Brush & Saye, 2009). The teacher quality is the single most important determinant of student performance. The results expected, learning needs, individual
preference, logistics and technological support with careful planning, experience in teaching in a virtual environment can promote achievement in learning (ICM, 2012).

2.8.1 Selection of Hypermedia

There are many factors that encourage a teacher to use hypermedia in classroom. For example availability, participation, cost, objectives, content among others. All these are important in motivating a teacher to use hypermedia. Gilbertson & Ferre (2008) present major difficulties when making educational decisions regarding students who are deaf and hard-of-hearing. However using hypermedia in the classroom by itself is not effective unless the teacher has the theory model of instruction (Gorder, 2008). Adegbija & Fakomogbon (2012) found that teacher qualifications and in-service training through workshops and conferences promoted utilization of instructional media. In addition, Onasanya (2006) in a study on preparing primary school teachers on selection, production and use of instructional media for effective classroom teaching in Nigeria, found that the skills acquired by teachers during training equipped them to produce instructional media. Mwololo (2011) also found that teachers’ knowledge and skills influenced the use of visual media in teaching. These scholarly remarks points to the fact that training of teachers at the different levels equips them with knowledge and skills in the preparation of instructional media and promotes utilization of variety of media.

However most training colleges and university do not provide instruction designed to teach students the criteria for selecting the media relevant to the objectives and methods of instruction (Heo, 2011). The role of the teachers is didactic and well established. The teacher should become one of many resources that the student may learn from, engage students in experiences that challenge previous conception of their
existing knowledge, allow students responses to drive lesson and seek elaboration. Success hypermedia integration is what makes a difference in reforming a classroom. Researchers have shown that a key factor in encouraging teacher to introduce and sustain the use of multimedia in classroom instruction is modelling (Toe, 2006; Shi & Bichelmeyer 2007; Wei et al. 2009; Li, 2010). Toma (2007) found that lack of modelling was a disabler while Bullock (2006); Gorder (2008) found that clear expectations, easy access to technology and technical support and positive experiences with computer in classroom hinder teachers’ use of technology. However Koh & Frick (2009) found three important factors need to be operational; (access and technical support) teacher relationship with key technical players and positive organizational attitudes towards technology use. Teachers use of hypermedia is promoted by Pirie & Kieren (2008) who emphasized the view that technology should be a tool for learning content instead of making technology content. They endorsed that there is need for teachers to rethink the use of technology. It is also noted that availability of instructional media encourages its usage. For technology to be exploited in an environment, it must first exist. Kadzera (2006) further reports that lack of instructional media resources is one of the reasons contributing to minimal use of instructional technology.

2.8.2 Active Classroom Participation Determines use of Hypermedia

Teachers work with students in such a way that there is an increase in critical thinking skills and the use of the hypermedia as a learning tool. They make practical choices of tools and media that will shape the way students learn, express themselves and perform (Drayton et al., 2010). Students are able to explore and construct their own learning. It breaks down the barriers of time and place, allowing maximum flexibility for the learner thus students are provided a means to learn individually at their own
speed, students can repeat difficult concepts, or skip already mastered skills areas. It is believe that the most important characteristic of hypermedia is its ability to encourage students to be proactive learners. Its flexibility and ability to draw diverse tools truly offer something for HI students who excel in any of what Gardner calls “intelligences”. For example, a student who may not be good at written expression but has visual aptitude can document learning with sound or pictures.

However Friedman & Friedman (2011) contradict, ‘’while this learning can be superior to traditional face–face instruction when pedagogically appropriate methods are used, they sometimes fail to be successful for HI students’’. In addition Friedman determined that successful use of hypermedia need to utilize a variety of teaching tool that enhance learning for students using different learning preferences. They should be able to learn quickly and slowly as they need. While being able to build upon their current knowledge or go back and fill in learning gaps. Thus students will be able to construct their own knowledge in a way that best suits their internal learning structure providing deeper and more permanent understanding. However non visual learners may consider hypermedia learning as overload because it is having several channels in a single application yet a learner may not be comfortable with one of the applications hence lack of motivation.

2.8.3 Teacher Effectiveness on use of Instructional Media

As essential factor for effective technology integration is the teacher, since she/he directly indicates the best instructional practices for his/her students (Rehmat, 2014). Olaleye (2010) highlighted on teachers’ characteristics as predictors of students’ academic performance in secondary school in Osun state Nigeria. Farah (2011) mentions that teachers who feel uncomfortable using technology are unlikely to
incorporate the use of technology in the classroom because of the fear associated with using something that they have limited experience using. Effective teaching is slippery concept to grasp.

Effective teaching is not based on some universal laws but there are multitude ways of being a good teacher and teaching effectively. This is captured by Marland (2007) who says, teaching effectiveness varies according to time, place and learners in the classroom. What is effective for one teacher will not work for another teacher. What is effective in this era will not be effective in the next. Killen in his books on teaching and learning (1998, 2003, 2005, 2007, 2009 & 2013) says, that for a teacher to be effective he/she must be knowledgeable, enthusiastic, confident, optimistic, and effective in communicating, committed, compassionate, curious, patient and persistent, will share and collaborate, resourceful and inventive, well organized, ethical and reflective.

Tomlison & Germundson (2007) consider high quality teaching to be like jazz. In creating jazz, the process involves combining musical sounds, using different elements and brings together a wide variety of cultural styles utilizing a range of instructional strategies and educational theories. Marsh (2010) delineates the characteristics of effective teachers to include highly knowledgeable, communicate well, give clear instructions in their teaching and have a good relations with students, staff and parents.

**2.8.4 Benefits of using Hypermedia in Teaching and Learning Process**

Teachers are becoming more familiar with options and opportunities to improve instructions and delivery. Hypermedia materials and environments can provide multiple representations of concepts that are meaningful to students who are hard of
hearing. Dimiling (2010) indicates that deaf and hard-of-hearing students may need special vocabulary intervention in order to improve their recognition, production, and comprehension of the words and phrases. Nevertheless, there are potential risks that can impede learning based on hypermedia system. First, there is spatial disorientation, also known as the “lost in hyperspace” phenomenon. This disorientation occurs due to a high degree of learner control in a nonlinear space and can be disastrous, given the lack of appropriate instructional support, as students may find it difficult to get ‘a good grasp’ of the learning material in a hypermedia system. Second, cognitive load will impede learning if not carefully managed (Chandler, 2009).

2.8.5 Teacher Characteristic use of Hypermedia in Teaching

With respect to teachers’ personal factors, it is concluded that teachers’ perspectives and understandings of technology utilization influence their technology utilization in teaching (Judson, 2006; Wozney, Venkatesh, & Abrami, 2006; Dudeney & Hockly, 2007; Liu & Huo, 2007; Park & Son, 2009). For instance, if teachers think that technology can be a menace to their traditional method of teaching, that is teacher-oriented method in which they have been trained for long years, they refuse to accept technology utilization (Liu & Huo, 2007). However the millennial generation have higher exposure to technology and internet use, playing video games, chatting, which creates greater disparity between the student learning styles and the teachers knowledge of and ability to use technology (Drayton et al., 2010). Teachers’ integration of hypermedia is stalled by the lack of successful development opportunities in the constructs of technology and pedagogy (Levin & Wadmany, 2008).
A major factor that influences teacher hypermedia use in classroom is whether a teacher received technology training in their institutions or not. If teachers are appropriately taught how to use technology before they enter a real classroom, their computer self-efficacy will increase, and their likeness to use hypermedia in classroom will improve (Koh, 2009). Teacher personal factors such as teacher’s attitude and understanding of technology use affect their technology use in instruction (Dudeney & Hockly, 2007; Liu & Huo, 2007; Park & Son, 2009). For example if teachers perceive technology as a threat to their traditional teacher-centered methodology in which they have received years of training, they may resist the use of technology (Liu, 2007). In a study on the discrepancy between teachers and integration of technology found that the reasons for inconsistency include teachers’ limited or improper theoretical understanding on student-centered instruction and technology integration or how to transfer theoretical concepts on technology integration into practice.

2.8.6 Teacher Technological Competencies

Competencies are the combined knowledge and skills which individuals need to execute tasks in their professional endeavors (Unaids, 2009). As noted in (ICM, 2012) the most important of these elements is that the teacher must be engaged and active in all aspects of acquiring knowledge, skills and professional behaviors needed to demonstrate practice. Park & Son (2009) revealed that internal factors such as teachers’ limited computer skills, knowledge about computers and beliefs and attitudes significantly affects teachers’ decisions on the use of hypermedia in teaching.
Inadequate teacher training is often cited as the most serious obstacle in helping teachers to learn how to use technology in their instruction. Yang (2008) found that due to lack of experts, technology integration is low. Using hypermedia for instructional integration requires knowledge and skills which are different from simply using computers (Angeli & Valandes, 2009). Teachers do not have adequate technology knowledge and skills to serve the increasing number of students with disabilities who participate in education classrooms (Wagner et al., 2006). Teachers should have adequate skills to guide such learners. They need specific knowledge and skills to utilize technology for education.

Cillessen & Verhoeven (2011) show that deaf students have severe language problems compared to their hearing classmates, to address increasing needs of these students. Houston & Perigoe (2010) report, that HI students need access to skilled professionals who can improve receptive and expressive language throughout planned programs. Kamonya (2008) carried out a study on factors hindering teaching and learning activities for students with HI at secondary school level. The findings revealed that most teachers were not conversant with KSL to effectively teach this group. The study findings by Kamonya (2008) concur with Bunyasi (2010).

Competency related knowledge and skills is influenced by many factors such as attitude, beliefs (Yang & Huang, 2008), self-efficiency and moral (Anderson & Maninger, 2007). Mueller et al. (2008), measuring teachers’ hypermedia integration proficiency with frequency of usage, asserts that teachers who are not using technology are usually assumed to lack competency or proficiency. Smarkola (2008) examined teachers’ intention to use computer for instruction and found that it can be predicted by belief-based measures pertaining to attitude (usefulness and
compatibility), subject norms (peer influence and superiors influence), and perceived behavioral control (self-efficacy technology and constraints / support).

However, Shue (2007) found that teachers’ use of hypermedia and their inclination toward its use were largely determined by teacher technology interface factors such as ease-of-use, computer self-efficacy and perceived usefulness. However it is difficult for teachers to have technological competency because technology keeps on changing and this will mean that they keep on upgrading. For this reason it calls for the ministry to provide funds for teacher development. Eitmer & Ottenbreit-Leftwich (2010), described influence of self-efficacy beliefs, knowledge, pedagogical beliefs and cultural context on technology integration as independent on the other.

2.8.7 Teacher Self-efficacy

Brown et al. (2010) asserted that technology self-efficacy has come to play a crucial role in the preparation and implementation of teachers who can successfully use educational technology to enhance student learning. Farah (2011) stated that teachers’ behaviour is affected by their self-efficacy and their beliefs about their abilities. Teaching instruction behaviour also includes how they plan and prepare strategies and procedures they implement, the tools used and their personal presence when delivering instruction. Further, EL-Daou (2015) described self-efficacy determines whether tools and capabilities are necessary to accomplish specific tasks. However it is also Wei (2009) evidenced that teachers’ resistance to technology use is more about “change’.

It was also revealed that some of the barriers reflected are lack of adequate professional activities, confidence, preparation and resources. Teachers also felt that they are insufficiently trained and lack of technical support is minimal. In Australian
studies all identified the common barrier to technology use in the classroom as a lack of professional development and lack of access to computers. However, Okolo & Bouck (2007); Silver-Pacuilla (2006) contradict, a secondary cause is teacher resistance to embracing the pedagogical practices necessary to integrate technology into instructional practice effectively. There are varied opinions on this, for example Alper & Raharinirina (2006) postulate, teachers cannot effectively integrate hypermedia because schools lack funding to support technology in HI classrooms and Nelson, 2006; Marino & Beecher (2008), school personnel who are adequately trained to make informed assistive technology decisions are in short supply and few teachers understand how to integrate assistive technology into content area instruction. Ahmad et al. (2012) claimed that peoples’ thought influence their action and motivate them to attempt or restrain from certain behaviour.

2.8.8 Teacher Attitude and use of Hypermedia in Classroom

While hypermedia provides many new opportunities for issue like learning styles, student-centered instruction are promoting higher-level thinking, teachers’ attitude and beliefs often stop them from fully integrating hypermedia into their instruction (Toe, 2008). This hesitation leads to technology being used as a substitute for other tools in their traditional teaching styles instead of a new approach for instruction (Judson, 2006). These factors include self-efficacy, personal technology use, positive teacher attitudes and beliefs towards hypermedia and access to professional development in computer technology area. Teachers are gaining more positive attitudes towards hypermedia after a realization of its potential for learning. And many teachers are in favor of adapting constructivist instructional approaches but are not sure of where to begin.
Judson (2006) acknowledges that positive attitude towards the use of hypermedia in classroom will draw the greatest advantage. It correlates to improved achievement. Attitude can be related to a number of facts such as experience, age, gender and academic performance. Early studies have shown that females tend to have more negative views toward computer instructions than males thus; there is relationship between gender and attitude towards computers. Findings revealed that teachers felt powerless to change their attitudes and perceptions on their present practices to shift to technology use in the classroom and further that teachers’ preferred method of teaching is the traditional method rather than using technology. As more and more activities in the classroom are orchestrated with computers, teachers are realizing that hypermedia is more complex and more capable than other media such as filmstrips or overheads (Hew, 2007).

2.9 Influence of using Hypermedia in Teaching

Constructivism holds the belief that learning processes are complicated, contextual, and situated, and it places much emphasis on using engaging methods of teaching. Hypermedia represents constructivist attempt at situating students within learning environments that are complex and contextually realistic, and commonly seen as valuable student-centered pedagogical approach (Savery, 2006). Brush & Saye (2009), there is a close relationship between technologies and constructivism, the implementation of each one benefiting the other. Hypermedia allows the students to engage more fully with the subject matter at hand, facilitates deep understanding and ability to develop important reasoning skills such as critical thinking, problem solving and prioritization (Schmidt et al., 2009). Learners are expected to take charge of their own learning; they are at liberty to direct their own learning process (Dabbagh & Blijid; Stobel & Van Barneveld, 2009). However Mweri (2014), using SL within
classroom is one solution to reach all the HI learners. Sign language can enhance the learning process by bringing visual, auditory and kinesthetic feedback to help reach all learners.

In such student driven learning process, issues of learner self-direction, attitude and willingness to explore arise as questions of pedagogical effectiveness switch focus from the behaviors of the teacher to the behaviors of students. The exploration of interest in hypermedia has led many to consider educational value of hypermedia especially given their observed ability to engage a wide variety of audiences in sustained and voluntary action (McGonigal, 2011). Hypermedia in the classroom helps teachers to accommodate different learning styles enabling videos, audios and a variety of still visuals easily added to the classroom instruction along with the written text by the teacher. Teacher can visually introduce experiments which are hard or impossible to reenact in the classroom especially when materials are insufficient. Hence access to video would facilitate students’ acquisition of visual skills (Obondo et al., 2013). Hypermedia allows teachers to collect a great deal of information in various forms (graphics, sound, animation, text video, simulated, 3D and image series) are connected with each other through invisible chain to form a complete resource system (Michael et al., 2008).

Students affirm that hypermedia material presents issues that we do not always see in the classroom and it gives better understanding (Whitby, 2012). Teachers who had experience of using hypermedia for teaching revealed that they found the teaching method was easier to acquire knowledge related to content in virtual environment (Li-Ling & Suh-ing, 2014), getting closer to your learning objectives (2010).
Hypermedia has revolutionized the traditional style of education and opened new opportunities (Li-Ling et al., 2013). It provides faster information environment in various formats and opportunity of freedom access to know (ICM, 2012). It is clear that hypermedia allows students the control over learning in which they select the modules and choose the sequence of presentation of information according to your goals, time and rhythm (Unaid, 2009). It is believed that hypermedia can increase potential learning, can increase learners’ responsibility for the process of teaching and learning, greater collaboration of students in educational process and better quality learning (Compell, 2010). However, usability issues as disorientation, distraction and cognitive overload can occur (Farah, 2011). Sign language helps teachers to manage learners’ behavior, keep them active, assist them in speech and language development and promote positive peer to peer communication interacts. In order to face traditional style challenge requires new and creative approach to improve efficiency and effectiveness in the learning process in classroom (Posey, 2013). Research has shown that pairing sign with English help learner formulate mental picture. This multi-modal experience can help create new pathways in brain hence help learner recall and remember sign words and spelling (Daniels, 2010).

2.9.1 Influence of Hypermedia on Learning Achievement

The instructional uses in the classroom for HI students take the place of many traditional strategies and allows for the creation and display of knowledge through video portfolios, documentation of knowledge and school activities, and visual literacy instruction (Roblyer & Doering, 2013, p. 192). Given that visual tools are necessary when working with HI students and/or teachers, the ability to create and demonstrate independent high order thinking and problem-solving skills is vital. Hence all the benefits of hypermedia presented so far converge on student
achievement on subject areas and evaluations. How do students in hypermedia classrooms perform and score on tests? Research has concluded that when students are engaged in technology-immersed classrooms, there is a gain in achievement in all subject areas (Means, 2010; Shapely et al., 2010). In recent years, hypermedia has introduced the pedagogical strength in facilitating student learning and supplementing learning with liveliness as it adds richness and meaning to the information presentation with the use of more than one medium (Shank, 2005; Asthana, 2009).

It is proven that use of hypermedia in the classroom correlates to improved achievement on the part of the student but Means (2010) cautions that technology alone is not a cure for poor scores. She reports on a research project that sought to find out what elements of technology use in the classroom truly affect student scores.

It is important for students to self-adjust the time and determine the information based on individual differences, so that when individual differences can be accommodated by having alternatives in learning, students will then be engaged at a deeper level and appreciate the student-centered learning approach with more sense of participation (Keppell, 2008). In addition, it was found that when multiple media contents are used to present information simultaneously, students can learn more effectively with focused attention than those who are studying with separate media where attention is split. This is because human brain will have more processing loads to integrate and re-arrange all different sources of information (SEG Research, 2008). Hypermedia gives students opportunities to interact socially both at school and at home. Students’ individualized participation will be different from those arising in traditional classroom for example when studying autonomously, the student is forced to find solutions for themselves. Computer tasks are introduced in a way that is meaningful to
students, stimulate curiosity, and engage knowledge that students already have but challenge them to think harder or differently about what they know, encourage students to devise solutions, invite students to make decisions.

Teachers can interact with the students when they do not write any sentence, for example; Knowledge construction this is a symbolic representation of concepts to gain better understanding and appreciation of such concepts. Collaborative construction- the fact that knowledge construction is made collaborative way may help learners experience a social encounter with concepts. Also collaborative activity may imply that participants are faced with reflective situations whose resolution may help reduce a better understanding and internalization of the new learning. Despite the role of hypermedia in classrooms, few research studies have investigated HI learners’ use of computerized landform processes. For instance, questions such as “Do HI learners find computerized external landform useful for interpreting the process?” or “What types do they prefer and find useful?” remain largely unanswered.

2.9.2 Hypermedia helps Students Learn and Understand the Subject

There is empirical support for concluding that hypermedia information provides learning advantages in several specific situations. Learning is better when the information is referentially processed through two channels than when the information is processed through only one channel. Hypermedia information seems to improve learning when the media show closely related, supportive information (Kozma, 2008). The researchers believed that pictures provide a context for understanding the ambiguous text. The students who saw the picture recalled more ideas from the text than the students who did not see the picture. Hypermedia information appears to be more effective for learners with low prior knowledge or
aptitude in the domain being learned. Mayer (2008) believes that this is because the multimedia helps low domain knowledge learners to connect the new knowledge to prior knowledge or, for learning. Hypermedia may also make more important information more obvious. However, learners with high domain knowledge have a rich source of prior knowledge that can be connected to the new knowledge. These learners can make these connections or build cognitive models with text alone. Also, learners with high domain knowledge are more likely to know which information is important and on which information they should focus their attention. The students with low aptitude performed better in the conditions with moving pictures or static pictures with motion arrows than the condition with static pictures alone. Hypermedia that encourages the information to be processed referentially, building dual coded verbal and pictorial cognitive representations, seems to improve learning. Despite its ability to improve understanding, it is not suitable for all the subjects. Its suitability is highly dependent on the content and ability of the students.

However use of hypermedia in pedagogy may cause confusion. The presentation of hypermedia content should exclude extraneous and redundant information: Research suggests that hypermedia learning is more effective when it includes only content that is relevant and aligned to the instructional objectives. And is more effective when it is interactive and under control of the learner. Research tells us that when learners are able to control the pace of presentation they learn more, not all students learn at the same pace. Though hypermedia has numerous benefits in pedagogy, learners need to be able to interpret visual images, video, film, charts, and tables, navigate through complex and continually changing systems of information. With the recent development of hierarchical hypermedia, computer based instruction has evolved
from simple linear to application to user controlled complex simulations and virtual environments (Alavarce & Pierin, 2011).

Distraction that may result from a high level of learners is likely to be experienced. The richness of nonlinear presentations carries a risk of potential intellectual indigestion, loss of goal-directness, and cognitive entropy. Disorientation which learner may face while using hypermedia, they may get lost in hyperspace if knowledge based is unstructured. It is difficult to navigate and integrate information into personal knowledge due to cognitive overload. Fabio & Antoniett (2012) report that alleged benefits of hypermedia have been supported by several studies, such benefits have been proven also for showing learning problems. Proponent suggests that its ability to make information available in multimedia formats, provide individual control, engage the learner and cater to various learning styles and needs makes it harbinger of new learning revolution.

Nearly two decades of research on hypermedia education, researchers have not yet solved some of these basic issues raised by this technology. For example hypermedia presentation may be too overwhelming for some students given that sometimes these resources may introduce too much information for students to learn in a very short amount of time. The teacher has to make sure that information is broken into meaningful chunks so that every student has enough time for mastery of the skills. Building hypermedia system requires information from the internet to learn a wealth of knowledge. It entails activities such as interactive interface, learner navigation, teacher activities and individual or collective learning. Materials should also conform to the cognitive flexibility theory (Fang, 2006).
All these require teacher knowledge and skills. It requires technical knowledge for learners to navigate it effectively. It is a selective learning strategy, to avoid students from deviating from a certain target, and improve the learning efficiency in this process, learner can choose appropriate learning content and strategies according to their interest and basis. Hypermedia resources are not always interactive, it is teacher’s responsibility to exploit the learning resources and use them to facilitate learning instead of asking students to listen and watch them in passive way. Shin et al. (2009), teacher preparation effort is a challenge to technology integration into classroom instructions. However this will result into students learning different content in the same lesson. They can jump from one topic to another hence this can enable them to access any material without getting lost however some may access irrelevant materials (Fang, 2006) are teachers able to teach learners.

2.9.3 Hypermedia Instructional Support and Content Retention

Words and pictures are better than words alone: Mayer (2008) ‘’people learn better from words and pictures than words alone. In this context, words include written and spoken, and pictures include static graphic images, animations and video. That using both words and pictures is more effective than words alone in light of what we know about our brain processing information. Obondo et al. (2013) tell us that video is more much effective than narration and text. By using multiple channels of working memory content can effectively increase information integration into long term memory and not lost. Animation appears to be most effective when presenting concepts or information that students may have difficulty envisioning (Betran & Court, 2005). Sharm (2013), animated illustration accompanied with video and kinesthetic are better to landform processes than static illustration. However hypermedia application is more effective when learner attention is not split and
related content is presented together in time. Visual learning is more effective than words when words and pictures are presented simultaneously than presented sequentially. Hypermedia presents text and pictures in close proximity which is more effective in student’s learning. Split attention occurs when the learner is forced to attend information that is far apart such as when content is visually far apart on the board or if it is presented at two separate points in time, when related content is not presented together, learner attention is split and brain has more work to do to integrate the disparate source of information. Learners studying the same information where attention is split do not gain. However the learners must have visual skills in order to accurately interpret and understand information presented in hypermedia format.

2.9.4 Hypermedia Instruction Promotes Learners Motivation

Increased Motivation; it is established that meeting the needs of teaching and learning style will improve students’ learning and providing efficiency and motivation to students. Literature on motivation and classroom learning has shown that motivation plays an important role on influencing learning and achievement (Cornu, 2010). Research has also shown that instructional context strongly affects students’ motivation. Instruction materials that are challenging such as hypermedia give students choices and promote perceived autonomy self-determination can have a positive effect on students’ motivation (Jabbur, 2011). Students have shown that each student has their own learning style (Marshark, 2014). Hypermedia can be incorporated into nearly any lesson and may generate excitement by delivering content in a new and exciting format. It brings variety to the class and has the ability to break up drills that the students may find boring. Students control over their learning experience, ability to meet demands of students at different abilities motivates learners to continue learning at their own convenient. Allen et Al. (2008) &
Compell (2007) have suggested that motivational construct have a positive impact on academic success in academic performance in instructions. Hypermedia systems are characterized by a high level of interactivity. This interactivity is referred to as learner control in the respective literature. For several reasons this learner control is seen as a major advantage of hypermedia for learning and instruction. For instance, learner control might increase students’ interest and motivation, facilitate adaptive instruction, or provide affordances for active and constructive. Hypermedia is becoming a globally consistent and practiced learning strategy in schools. Roblyer & Doering (2013) hypermedia promotes learning while motivating students allowing them “to summarize and display information and knowledge using a combination of text, video, animation, music, graphics, and sound effects” (p. 179). Roblyer & Doering (2013) define hypermedia as “the ability to get from one media/information element to another” (p. 174). This cannot be more necessary across all media settings than for the Deaf and Hard of Hearing (D/HH) as it “enables instruction adapted for learners’ needs” (p. 176).

Computer Prompting & Captioning Co. (2012) software can be vital in the classroom setting as it alleviates the human factor of a sign-language interpreter (though the interpreter is invaluable to the communication, comprehension, and cognitive academic language acquisition needs of the student) and the unforeseen problems and issues around his or her physical presence information processing. It is suggested that the hypermedia learning system’s rich content encourages learning in a task-driven process, where learners are motivated to explore alternative navigational paths through domain knowledge and different resources, and subsequently promotes effective learning as it allows students to construct their own learning goals and plans.
2.10 Institutional Support of the use of Hypermedia

The changes in computer-based technologies have been incredible and it is difficult for schools and universities to stay in step with the current industry norms. Computers which were at the top line five years ago are now horribly outdated today. Updating computer resources is extremely expensive and combined with the budget constraints that schools are now facing, it is no wonder that many institutions lack current technological resources. Hew (2007) identified six factors that affect successful technology integration. They are lack of resources, lack of specific knowledge and skills, institutional structures, teacher attitudes and beliefs toward technology, and types of assessment and subject culture. Institutional factors such as lack of planning on the part of the administrators further hinder technology integration (Hew, 2007).

For instance, there was a certain administrator who proudly announced at a staff meeting that the school had recently acquired two computers that could be checked out for classroom use. There was no mention of who could instruct the teachers on how to use them or even what were the computer capabilities.

Institutions have not improved the possibilities for the people with disabilities in recent decades, regardless of these learners’ inherent aptitudes and abilities (Melber & brown, 2008). However Devvies; Gerjets et, al. (2006) criticized hypermedia learning for not specifying the instructional approach chosen and cognitive structure, process and resources to benefit from this approach. The innovative teachers would spend time to prepare and use instructional media in their instruction while those with negative attitude towards instructional media might not make any effort to prepare and use the instructional media during instruction (Begi, 2007; Kadzera, 2006).
Therefore the management of institutions should find ways to engage teachers in the selection and development of media resources because this ensures the learning outcomes are regarded. A similar view was held by Abdo & Semela (2010) in a study on instructional media use in Ethiopia who recommended that management should provide media resources to teachers because they do not have time to search them on their own. And in a study on supporting teachers in technology and computer use in academic subjects concluded that availability of learning materials and their accessibility to them determined the frequency with which teachers use instructional media.

Teachers viewed the level of administrative support and encouragement by the college management as key factor in implementing instructional media use. Hew (2007) reported that teachers are encouraged to use technology in the classroom if they are given technical support. In this connection, if management adjusts the nature of teaching tasks which include assigning manageable work load and number of students in class, adequate planning time would encourage teachers to use instructional media. In the study by Hew, teacher’s perception of the level of management support was negative and hence related to their frequency use.

Subject culture is another obstacle, institutions have a culture thus rules and practices that have been developed around specific institution subject by the administrators. Teachers are more reluctant to integrate technology. They need to be shown real examples of how technology can work within their work frame of their job (Hew, 2007). The pressure of high stakes testing is also a factor to successful integration of technology into instructions. The digital divide in and out of the classroom worries administrators as they attempt to increase the use of technology disentrancing learners.
and teachers. Critical catalysts for innovation and for integrating hypermedia into instruction requiring careful examination of instructional policies, processes and decisions by the stakeholders (Akyel & Ercetin, 2009).

There is evidence to suggest that school leadership is an important strategy that influences successful integration of media. Afshari et al. (2008), in a baseline data gathered from 30 secondary school Principals in Tehran, Iran, the use of computers for instructional and administrative purposes has a transformational effect that enhances computer use in schools. In another survey on the influence of principals ‘‘technology training on the integration of technology in schools’’, it was established that the principal’s own knowledge of computer technology influenced the levels of integration in the rest of school curricular. This then would be an effective strategy for application thus principals would provide leadership for teachers to follow and impart the same in classroom. This was further confirmed by a study conducted in British school system which found that the principals’ strong leadership is important in ICT implementation in schools. This strategy encourages teachers to use technology in the classroom. Abdo & Semela (2010) also concluded that teacher’s ability to integrate instructional media is affected by the strength of school leadership.

The challenges to incorporating technology include assisting the teacher to integrate technology into instructions, providing adequate user support and financial planning. The study identifies administration and staff perceptions of key technological issues such as teaching and learning, infrastructure, mission attainment, organizational growth and outreach. Akyel & Ercetin (2009) assert, barriers to incorporating instructional technology include insufficient or obsolete hardware and software, inadequate facilities and support services, lack of time and money.
2.11 Students’ Attitude and Integration of Hypermedia in Classroom

The nature of technology caused the shift in students’ attitude. They enjoyed and preferred hypermedia formats than traditional methods probably because of their increased motives and attitudes (McGowan, 2009). HI students require the ability to communicate with teachers and fellow students. This is a major requisite to success. Students’ performance in the classroom was affected by communication difficulties associated with hearing and this in turn affected their academic achievement (Sharma, 2013). The level of achievement is related to the quality, quantity and timing of support services received by learners. There is some evidence that attitude towards technology relates positively with achievement (Matter & Schau, 2002; Shapley et al., 2010). Hence there is need to provide technology based teaching for enhancing the positive attitude of all HI students which in turn improves academic achievement. New technological learning covers the existing gaps and acts as bridge for learning effectiveness. Students with positive attitudes are more likely to sustain their efforts and have the desire to be involved in learning tasks. In reviewing factors that can influence attitudes Osborne et al. (2010) emphasized that how materials are delivered in classrooms can affect students attitude.

Morris & Finngan (2008) found that students who have negative attitude towards hypermedia tended to have difficulties locating content and resources and often felt lost in the course. Conversely, students who successfully navigate hypermedia believe they have ability to control the environment of the course (Morris & Finnegan, 2008) and to meet their own intrinsic learning goals by placing new knowledge in their own contextual framework. Akcay et al. (2006) concluded that students’ attitudes and achievements towards analytical chemistry were better with technology. And multimedia application for graphs is more attractive than traditional. Yildirim &
Fakultesi (2006) in their study, the results showed that the use of hypermedia as a cognitive tool resulted in a similar level of student achievement as those who were enrolled in traditional instruction. They concluded that students who had been exposed to traditional teaching for a long time are never used to technological way of teaching.

Mulvey (2010) backs up the claims for nature with some biological evidence using brain imaging is an issue for hypermedia integration. Thus the classroom environment can be incompatible with the preferred learning style of the students, making it difficult to process information and learning resulting into stress and frustration (Cardoso et al., 2012). Integration of computers in our schools requires positive attitude from students. When some students do it with enthusiasm, the others feel anxiety. Different researchers have got contradictory results that school children are less anxious thus anxiety is not related to technology. Sometimes equality is necessarily achieved through identical treatment but from giving people the best opportunity to succeed given individual circumstances (Gurian & Stevens, 2009).

Use of hypermedia involves many techniques which the teacher has to be aware of and be able to solve for example distraction has been noted that learners browsing hypermedia environments often access information by following their interest which may change according to the context currently provided (EducPsychol Rev, 2007). In this case, the necessity to avoid distraction and to concentrate effort onto the main task may result in resource-demanding processes of meta-level decision making and action control. Cognitive overload can also result from the freedom provided by hypermedia environments to control the interaction with the system. Teachers must be sensitive to the idea that students' motivation to learn is influenced by attitudes of
both. Therefore the teacher should be aware of the students need and plan accordingly. Despite the difficulties experienced, hypermedia may function to highlight or clarify important points or simply to provide lexical or syntactic information.

2.12 Gaps in Reviewed Literature

Hypermedia simultaneously serves as universally designed approaches that can benefit a wider set of students. A study by Blatto-Vallee et al. (2007) examined the visual-spatial representation of Geography problems for those who are deaf and found that students who noted schematic relationship far outperformed their pictorial counterparts. The major weakness in the literature concerning education of HI is that very little systematic attention has been paid to the question of how teachers actually work with them in the classroom and the relative achievements of the learners exposed to one specific form of intervention. Few attempts have been made to look systematically at how deaf learners are taught to read and few evaluations have been carried out to demonstrate the effectiveness of specific methods of teaching.

Adaptive e-learning hypermedia is an approach whose target is to personalize the learning experience for learners. It has been developed to support learning style as a source for adaptation (Monochehr, 2006; Brown et al., 2009). However less attention was paid to learning styles and their effects on learning achievement. And most of those systems lack evaluation on the impact on students’ achievement (Popescu et al., 2007).

Most designs used in the research on use of hypermedia are merely qualitative. For example Wolf (2007) presented some empirical data in form of descriptive statistics in form of bar and line graph, charts and standard deviation, no inferential testing was
carried out. Educational hypermedia research is mostly focused only on learners with typical development, rather less is known about designing educational hypermedia for learners with special needs including the HI. Analysis of characteristics of HI students and the distinction between characteristics likely to affect academic achievement that are tangential is largely missing from those many discussions (Stinson & Kluwin, 2011). The history of efforts to educate HI learners is a controversial one, particularly with regard to language of instruction and pedagogy (Hermans, 2010).

2.13 Summary

This chapter has given in details how hypermedia can improve learning by exploring our main experimental question which is, do students who are newly introduced to technology (hypermedia) get more benefit compared to conventional way of performing their task? Teaching has a shift focus of activity from the teacher to the learner. Long ago films and videos were considered frivolous extracts in the classrooms, reserved for Friday afternoon or substitute teachers but attitude about teachers with media have changed. Hypermedia is now recognized by most educators as a powerful communication media which can enhance learning. The hypermedia technology form contrast to traditional means of teaching Geography which is facing new challenges. Therefore how to improve traditional method to meet demands of the time and realize the modernization of teaching and thus improve the quality of teaching and enhance learning of HI has remained a problem. But hypermedia and other electronic media such as internet and computer based teaching have become more effectively compensate for the shortcoming of traditional teaching method of the HI.
CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter has presented a detailed description of the research methodology which were used to address the objectives as follows find out; the achievement of boys and girls exposed to hypermedia lesson in external landform process in Geography for HI learners, determinants on use of hypermedia in teaching external landform process in Geography, determine the influence of using hypermedia on learning achievement on external landform, examine the institutional support on use of hypermedia for teaching learners with hearing impairment and the attitude of leaners towards the use of hypermedia in teaching and learning external landform processes.

This section covers philosophical paradigm, research design and strategy, research area, study population, sample and sampling technique, instruments, validity and the reliability of the instruments for data collection and analysis procedure and ethical issues and chapter summary.

3.2 Research Philosophy

According to Taylor et al. (2007) a paradigm is a broad view or perspective of something. Weaver & Olson (2006) assert that paradigms are patterns of beliefs and practices that regulate inquiry within a discipline by providing frames and procedures through which investigation is accomplished. Therefore when undertaking research, it is important to consider different beliefs. These beliefs have been called philosophical assumptions (Creswell, 2013). Research paradigms can influence the way in which the research is undertaken. Creswell (2013) states why philosophy is important in the research. It shapes how formulation of the research problems and research questions
in which certain variables are predicted to explain the outcome. Jwan & Ong’ondo (2011) look at philosophical paradigm as constituting a way of looking at the world and interpreting what is studied and therefore an indication of how research ought to be conducted by whom and to what degree of involvement and interpretation. According to them, all researchers operate within particular paradigms to the extent that all researchers have a philosophical way of interpreting the world which may not be explicit but still influence the research process. Creswell (2013) contends that it is not possible to conduct rigorous research without understanding its philosophical underpinnings. Thus a good research inquiry ought to make the philosophical paradigms within which the study is situated to explicitly show that a researcher is aware of their influence on the conduct of inquiry. This study adopts pragmatic world view as its philosophical paradigm in order to investigate effects of hypermedia on learning achievement of HI learners in external landform processes.

The philosophical underpinning of this study is pragmatism. Pragmatic opinion allows for mixed methods approach to the design of the study engaging both qualitative and quantitative methods. It endorses practical theory and what works best in real world situation. Pragmatism puts a high premium on human inquiry and equates it with scientific inquiry. It regards highly the reality of influence on inner world of human experience in seeking to know the factors that determines learner’s academic achievement, pragmatism advocates for use of variety of methods in the inquiry so as to bring out superior results compared to where mono methods are used (Johnson & Onwuegbuze, 2004). In this study, pragmatism is applicable in the following ways; it allowed the use of more than one method in data collection. That is questionnaire, interview schedule and achievement test were used to collect data, thus combining both quantitative and qualitative methods.
3.3 Research Design

Research designs are plans and procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell, 2009). The study assumed a pragmatic research paradigm as data was collected systematically using quasi experimental approach. It adopted a mixed method (MM) of inquiry in transformative procedure. It is an approach that combines or is associated with both qualitative and quantitative (Ayiro, 2012, Rass, 2005). It involves collecting and analyzing data from both approaches so that overall strength of the study is greater than either quantitative or qualitative methods (Cresswell & Plano clark, 2007). The data was collected simultaneously to understand best the research problem (Cresswell, 2009). Educational institutions are social setups which face various complex challenges that require solutions which are appropriately addressed through research that make use of both qualitative and quantitative. Research has become complex, interdisciplinary and dynamic and there is need to compliment the methods (Cohen et al., 2007). Because of foregoing reasons, the researcher chose to use mixed methods with concurrent strategy of quantitative and qualitative.

Further in the analysis each of the objectives required generalization of quantitative data. Some variables in the objectives required interval data for example analyzed results of the pre-test and posttest for the groups. These were used to measure the achievements in the groups so as to find out the effect of independent variable on academic achievement and the interval data was generated.

According to Johnson and Onwuegbuze (2004), Mixed Method Research approach is the third strategy in educational research (Creswell, 2013). It is defined as a class of
research where the researcher combines qual and quan methods. It draws strengths from using both in the study. It also bridges the gap between qual and quan data.

![Convergence Model Diagram](image)

**Figure 3.1 Convergence Model (Creswell & Plano Clark, 2011)**

The convergence model explains adoption and application of mixed method research approach into a research. In the model, data collection, analysis and results of either qualitative or quantitative are done first separately, the results from both qual and quan are then compared and contrasted and finally the results are integrated in the interpretation phase. However this model was biased towards quantitative, and this positioned research in transformative framework.

By applying statistical techniques to this data, it was possible to generalize from findings to other experimental settings. The study used quasi experimental research design where independent variable was manipulated by the researcher. It was also found appropriate since it allowed the investigation of causal relationships between use of hypermedia (IV) and academic achievement (DV). Independent variable is an antecedent and presumes to influence dependent variable which is the outcome variable (Creswell, 2009; Fraenkel &Wallen, 2000). The design was experimental
research design involving Solomons’ four non-equivalent control group design presented in fig 3.2

E 1 - - - - - - - R - - - - - - - O 1 - - - - - - X - - - - - - O 2
C 1 - - - - - - - R - - - - - - - O 3 - - - - - - K- - - - - - O 4
E 2 - - - - - - - R - - - - - - - __ - - - - - - X - - - - - - O 5
C 2 - - - - - - - R - - - - - - - __ - - - - - - K- - - - - - O 6

Figure 3.2: The Solomon four nonequivalent.

E = Experimental groups
C = control groups
R = Random assignment of the groups
O = Observation of pretest / posttest
X = Administration of treatment, hypermedia
__ = No pretest
K = Conventional / KSL technique

Groups O1 and O3 were pretested while groups O2, O4, O5 and O6 were post tested. X is the treatment where learners were taught using adapted hypermedia, K is where they were taught by KSL on the concept of external landform in Geography. E1 was the experimental group which received pretest, treatment and posttest. C1 was a true control condition and the post test. E1 and E2 represented a cross sectional two sampled schools that were experimental groups which received treatment followed by post-test. C1 and C2 represented cross sectional sampled schools that were taught using conventional (print)/ KSL.
Maturation and history effects were controlled in this design by having two groups taking pretest and a post test. The dotted line - - - indicate the use of nonequivalent groups while continuous line No pretest (Mugenda & Mugenda, 1999) contamination, the treatment and control groups from different schools which are far apart. Pretest enabled the researcher to check the entry level of the students before the experiment started as cited by (Githua & Nyabwa, 2008). The design is preferred because classes in schools once constituted exist as an intact group (Wachanga & Mwangi, 2004), the school authority do not allow such classes to be broken and reconstituted for research purposes (Borg & gall, 1989). The design help to assess the effect of experimental treatment relative to control group, assess the interaction and treatment conditions, assess the effect of pretest relative to post test, and assess the homogeneity of the groups before administration of treatment (Borg & Gall, 1989). The nonequivalent groups, pretest and posttest approaches was used to partially eliminate the initial difference between the experimental groups and control groups. Solomon four group design combines pretest- posttest control group design and control posttest only design. It consists of four groups, two of which are pretested and two which are not pretested. Individual are randomly assigned to one of the groups. The treatment is given to one of the pretested and one of the groups that did not receive pretest. All groups are then post tested.

3.4 Area of the Study

The study was conducted in Kenya. Kenya is found in East Africa. It has an area of about 583,000km² with a population of about 40million. The location of Kenya is as follows; it lies between Longitude 34°E and 42°E; Latitude 4°N and 4°S (Appendix H). The main economic activity is agriculture. In the year 2005, it was classified by UNDP as a low human development country and ranked 154 out of 177 countries.
The UK department for international development estimates that over 55% of population lives below poverty line. The estimate of the total number of deaf children in Kenya is 230,000 (KSDC, 2005).

Kenya is purposively chosen because the HI schools were also established in the country. They are twenty two in total and these schools are wide spread in ten counties.

3.5 Target Population

The target population were 20 hearing impaired mixed special secondary schools in Kenya. There are 20 principals, 40 Geography teachers and 835 students. Population is defined as the total collection of elements about which the study wish to make some inferences (Cooper & Schindler, 2008). Unit analysis was mixed special secondary school. Teachers were selected as respondents because they are directly involved in any curriculum implementation that integrates instructional media in a classroom situation. Thus being implementers of teaching strategies they are able to provide required information regarding the objectives of the study especially the effect of instructional media on hearing impaired secondary learners’ academic achievement. The principals were included as respondents because they are the managers of the schools in Kenya therefore they have the role to budget for the money given out by the ministry. Thus are chief executive officers of special schools, they may shade light on availability of instructional media resource. And also provide information about stakeholders such as KICD about the provision of instruction media. Students were selected too as respondents because they are the consumers of the integration of instructional media in teaching and learning therefore their learning outcome revealed whether it is necessary to adapt hypermedia for better learning of external landforms.
Further students are the beneficiary of instructional media, hence their feeling about use of hypermedia in pedagogy is very important.

### 3.6 Sampling Procedure and Sample Size

The researcher employed probability sampling procedure. The sampling techniques selected for the study ensures that the subgroups are proportionally represented, accounts for some subgroup characteristics (Cooper & Schindler, 2008; Krysik & Finn, 2007). The reasons why sampling was used in the study to select schools from target population included; issues of cost, need for accuracy of the results and speed data collection. The sampling also allowed for conducting better, extensive investigation and processing of data.

The unit of sampling was individual class in school because classes operate as intact groups thus, each school was considered as one group. Hearing impaired schools was the sampling frame. After sampling the researcher visited the schools to ascertain if they were suitable for research. During the visit the researcher established availability of network, LCD projector and electricity and also obtained information on class composition and learners characteristics from the school records (how many were, hard of hearing and deaf, their profoundness).

Purposive sampling was used to obtain HI residential mixed secondary schools, Geography teachers and form three Geography class. Bui (2014) observes that in purposive sampling a researcher selects individuals who are considered representative because they meet certain criteria for the study. Form three class was purposively selected for three reasons. First, external landform is taught in form three syllabus. Second, it provided existence of intact group in the school. This was necessary so that the schools’ administration and learning process was not interrupted by involving
small groups of students from every class taking Geography. Last, it is at this class that learners decide on the subjects to take, therefore teaching needs to be intensified to lure more students to take Geography and get better grades in the subjects they have selected. Simple random sampling technique was used to draw samples of schools from the already selected for experiment and control groups because it gives accurate information about the groups (Mugenda & Mugenda, 2000).

Schools were randomly selected and assigned to control and experimental groups. The following process was used to draw the random sample; the list of school in each county was required to serve as a sample frame.

The names of the schools as per number assigned for each county was randomly picked through the use of computer and groups randomly assigned and labeled experimental group (E), control group (C). The number of learners per class depended on the school enrolment therefore the study concentrated in few chosen schools whose enrolment varied and had the following number as indicated in table 3.1; Questionnaire was administered to ten Geography teachers and interview schedule administered to four principals of residential mixed special secondary schools.
Table 3.1: Sampling Techniques and Size

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sampling Techniques</th>
<th>Target population</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>Purposive</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Students</td>
<td>Purposive</td>
<td>835</td>
<td>-</td>
</tr>
<tr>
<td>Control 1 (Form 3)</td>
<td>Simple random</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Control 2 (Form 3)</td>
<td>Simple random</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>Experimental 1 (Form 3)</td>
<td>Simple random</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Experimental 2 (Form 3)</td>
<td>Simple random</td>
<td>-</td>
<td>21</td>
</tr>
<tr>
<td>Teachers</td>
<td>Purposive</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Principals</td>
<td>Purposive</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>917</strong></td>
<td><strong>93</strong></td>
</tr>
</tbody>
</table>

3.7 Research Instruments

Pragmatic philosophical paradigm implied that the overall approach to research is that of mixing data collection methods and data analysis procedures within the research process (Creswell, 2012). The primary data was collected from the research hypothesis established (Mcmillan, 2012). The research instruments used were pretest-posttest experimental, where adapted hypermedia was designed to suit HI learners. Hypermedia was developed using animation, text, graphic in bold typed face and video connected from internet, educational YouTube and CD-ROM purchased from KICD, these were in a single application. A lesson plan was also prepared on the content of hypermedia (see Appx K). A guide manual was developed for the teachers involved in administering hypermedia that was used throughout the treatment period (see Appx J). The teachers of experimental group were trained by the researcher on
how to use hypermedia for teaching. The control group was taught using illustrations, pictures, textbooks, and the content based on the revised KICD 2002 Geography syllabus. A pre-test was administered to O1 and O3 and there after all the groups were taught for one month as recommended in the syllabus (KICD, 2000). At the end of the treatment period a post-test was administered to all the groups. The study used GAT pre-test and posttest, questionnaire and interview schedule as tools for data collection. The instruments were self-developed. They were selected because researcher required detailed information which necessitates the use of multiple instruments to collect data in order to answer the objectives and test hypotheses.

3.7.1 Pretest and Post-test

Standardized questions from form two on physical features (Landform process; folding, faulting and vulcanicity) were used to collect a data on study participants’ level of performance before intervention took place. It was administered to groups O1 and O3. This was administered to check whether the groups were different before manipulation started. These areas were tested because they are among the abstract units in Geography paper one which is poorly performed.

Post-test which is Geography Achievement Test (GAT) was the main instrument used to collect data, it is consisting of twenty five items drawn from validated KCSE (see Appx C). GAT was adapted from KNEC past examination papers and modification was made to measure the students’ achievement. It contained twenty five structured questions on external landforms with a maximum score of 100. The test was administered to all groups. Pretest and posttest was used because they showed students’ understanding (see Appx B & D). This was used to test the Hypotheses if there was difference between achievement in control and experimental groups.
3.7.2 Questionnaire

Questionnaire was selected because respondents were able to read and synthesize questions (Oso & Onen, 2008). There were two types of questionnaire one for the students (see Appx E) and the other for teachers (see Appx F). The information involved both open and closed ended question items. The questions were developed by the researcher from instruments that have been previously used by other researchers after conducting a review of the literature in the field. The teachers’ questionnaire was structured into two sections. The first section was designed to obtain information about the integration of hypermedia in teaching external landforms in Geography for learners with hearing impairment, influence of integrating hypermedia on learning achievement in external landform processes and information about the availability of adapted ICT used by learners. The second section of the questionnaire solicited information about teachers’ attitude on use of hypermedia for teaching external landform processes and attitude of learners towards use of hypermedia in learning external landforms and suggestions on strategies appropriate for teaching hearing impaired learners. The close ended questionnaire had five point response scales ranging from strongly agree to strongly disagree. For all the items, the response was rated; with strongly agree rated point one and the rating increased to maximum five points for strongly disagree. It was administered to both teachers and students. The Likert scale was selected because it suites the objectives of the study (Cooper & Schindler, 2008).

Questionnaire was used because it is suitable for collecting a lot of information over a short period of time. It was used since the study is concerned with variables that could not be directly observed such as views, opinion, attitudes and feelings of the respondent and those that could be observed such as availability of electricity, number
of students and information could be described in writing. Ten teachers and the experimental groups in the study whose population depended on the enrolment responded to the questionnaire.

3.7.3 Interview schedule

The interview was used as a complementary instrument to boost the information which was obtained by use of questionnaire. Interview was conducted with the principals who are in charge for the purchase of instructional materials (see. Appx G). The interview questions concentrated on the following aspects; establish institutional factors on teachers’ use of hypermedia in teaching Geography, the provision of instructional materials in schools by principals, institutional support on use of instructional media and information about the availability of adapted ICT used by learners in special schools.

According to Calmorin & Calmorin (2007), interviews are used to collect information from respondents in order to arrive at a conclusion. The interview was designed in a way that it had open ended type of questions in which probing was used to obtain deeper information. The researcher guided the interviewee through the interview process. The individuals were interviewed to find out facts that could not be directly observed such as feelings, thoughts and intentions. The interview for the principals was intended to capture the principals’ views on factors that determine HI schools learning and academic achievement and the role of stakeholders in the provision of instructional media (Cohen et al., 2007).

To analyze the interview data, the data were first transcribed, then chunked, coded and categorized following the guidelines by Miles & Huberman (1994). A two level scheme as described by Miles was used; at a more general level, a state list of codes
was constructed using research questions as a guide. At more specific levels, codes generated directly from the interview data were nested in the more general codes. During coding processing the codes were refined, revised and new codes for emerging themes were added. Patterns from data were extracted and relationships between coded segments were studied. The data was then sorted into categories and sub categories according to their common themes and shared relationships.

3.8 Trustworthiness (Reliability and Validity)

Bassey (1999) citing Lincoln & Guba (1985) defines trustworthiness as ensuring that the research process is truthful, careful and rigorous enough to qualify to make that claims that it does. Under trustworthiness, terminologies used by quantitative research have same meaning as credibility in qualitative, while external validity is referred to as transferability in qualitative research. Reliability in quantitative research carries the same meaning as dependability in qualitative. According to Denzin & Lincoln (2005) the argument for the different terminology is that in qualitative, where terms like, credibility, transferability and dependability are predominantly used, trustworthiness is evaluated differently from qualitative research.

3.8.1 Dependability (Reliability)

Dependability (reliability) is defined as extent to which the research procedure is clear to enable other researchers replicate the study to get similar results (Yin 2003; Mason 2002; Nunan, 1990). We have internal and external reliability. Nunan (1990) gives a distinction between the two by defining internal reliability as the consistence of data collection, analysis and interpretation and external reliability is defined as the extent to which independent researcher can reproduce a study and reproduce results similar to those obtained in the original study. Yin (2003) suggests that the way to
ensure dependability is to make clear and detailed description of the steps followed in the study.

To ensure dependability in this study, the research ensured the following; checked transcripts to ensure that they did not contain obvious mistakes made during transcription, clarify constructs.

A pilot study was conducted in two schools which were not part of the study. The questionnaire and interview schedule were administered twice to respondents at an interval of two weeks by use of test-retest method. The tests and hypermedia were also administered in these schools. These schools had similar characteristics as the sampled schools. The results of the posttest exams were checked through inter rater reliability where one test was administered once and scored by two groups.

The reliability was calculated using the split half procedure Spearman-Brown prophecy formula. The procedure involved scoring two halves (odd verses even items) and then calculates the correlation coefficient for the two sets of the scores. It gave the reliability coefficient of 0.76. Hence it was considered reliable in accordance to the recommended minimum reliability coefficient of 0.70 for experimental research purpose (Wallen & Fraenkel, 2000). The inter rater evaluated reliability across different students.

Provide detailed explanation of data collection and analysis methods and the decision made throughout the study. Carefully and frequently recording the time, timing of the events and observes comments that are placed into categories. Constantly comparing data with codes and writing memos about the codes and definition to ensure no drift in definition of codes neither shifts in meaning of codes during process of coding.
3.8.2 Credibility (Internal validity)

Credibility is defined as the extent to which the study actually investigates what it claims to investigate and reports what actually occurred in the field (Yin, 2003; Mason, 2002; Creswell & Miller, 2000; Nunan, 1992). To ensure validity, the researcher used form three textbook and questions from KNEC past papers, this increased content validity. The researcher ensured that all instructional materials used in the study like hypermedia were designed and hypermedia lesson plan developed. These were face validated by experts in KICD thus the script was sent to them and Kenya Institute of Special Education also ascertained their validity. Books, CD-ROM, approved syllabus for Geography education at form three levels were also purchased from KICD.

The schools were randomly assigned in order to obtain high control of the external and internal validation. The researcher mapped the content of the test against the content of the syllabus and lesson plan. They matched the test hence had high content validity. The researcher also used face validity to estimate the test measurement of the content and also asked the experts for example teachers in the content area to assess and determine the relevancy of the test, the KICD and research supervisors from department of C I E M judged the items which were measured.

To decrease threats to credibility strategies recommended were employed by renowned qualitative researchers. These included triangulation, member checks using experienced researchers such as University supervisors and colleague review. Triangulation is the term used in qualitative research to mean the use of multiple approaches, methods, techniques and or sources of data and is noted as a way of strengthening the trustworthiness of study, while also facilitating a researcher to gain
deeper understanding of the phenomenon under the study (Denzin & Lincoln, 2005; Stake, 2005; Yin, 2003; Richards, 2003; Mason 2002; Gillham, 2000; Creswell & Miller, 2000; Bassey, 1999; Stake, 1995). Gillham (2000) emphasizes that a researcher should look for different kinds of evidence what people say, what you see than doing what they make or produce, what documents and records show.

Under triangulation, we have several types namely; data triangulation, investigator triangulation, theory, methodological, source and triangulation of data generation techniques. The study adapted methodological (data) triangulation and source triangulation. Yin (2000) defines data triangulation as a method of generation of data using different techniques with the aim of getting details about the same issue under the study and corroborating the information. In this case interview schedules, questionnaire and posttest were utilized to gain detailed information about the phenomenon of effects of hypermedia in relation to HI academic achievement. According to Creswell & Miller (2000), source triangulation involves getting data from different participants. In this study four HI mixed special secondary schools, ten Geography teachers, four principals and seventy nine students were used.

Member checks; Merrian (2002) member checks involves sending participants a copy of their interview and questionnaire transcripts and asking them to verify the accuracy of the content. This strategy was adopted by taking data and interpretation back to the principals, teachers and students from whom the data was derived from to verify its plausibility.

Using experienced (University supervisors, peer (colleagues) review. Stake (2006); Mason (2002) assert, more importantly and relevant to credibility as used in qualitative research. It was extremely necessary to involve peer and experienced
researchers for example supervisors in reviewing the key concepts in the study to help establish that they were operationalized appropriately. The researcher worked with her supervisors at every step of this study and applied peer review by discussing the process of the study and the congruency of emerging findings and interpretation with colleagues. Yin (2003); Mason (2002), define transferability (external validity) as the extent to which the research findings may be generalized to other cases or contexts. Although the issue of transferability or generalizability in qualitative research is debatable, Yin (2003) explains that in doing case a case study, your goal.

3.9 Data Collection Procedures

The researcher first obtained permission from the relevant authorities who included the School of Education Moi University, department of CIEM, certificate from National Commission for Science, Technology and Innovation (NACOSTI) and the principals of schools in the study area giving authority to collect data from the schools. Hypermedia on the selected sub topics on external Landforms was developed using animation, text, graphic in bold typed face and video connected to the internet from educational YouTube, CD-ROM obtained from KICD and Intel Explore and Learn from Intel, this was used by the experimental students. Pre-test was developed from form two under the sub topic of internal Landforms and administered to collect data on the performance in Geography on abstract topics (landforms such as vulcanicity, folding and faulting) before intervention took place.

The researcher had control and treatment groups composed of four groups exposed to conventional and hypermedia for one month. The relevant post-test were administered by Geography teachers, thus Geography achievement test (GAT) was used to collect data after teaching with Hypermedia and KSL together with printed media and
graphics. The test was administered and marked by the subject teachers. And questionnaire was administered to all groups by the researcher. The researcher also carried out interview by conducting face-to-face interview sessions with the principals. During the interview the researcher made notes which were later transcribed. Fields visit lasted for six weeks. One month was for teaching and two for administering post-test and questionnaire. Geography teachers were trained using manual guide (see Appx J) on the use of hypermedia in teaching.

3.10 Data Analysis

Both descriptive and inferential statistics were used to analyze the data. Descriptive statistics included calculation of means, frequencies, percentages and standard deviation. For the quantitative data analysis, data was converted to the Statistical Package for Social Sciences (SPSS. V18.) and results presented in tables, charts, frequencies percentages and standard deviation. First, a descriptive exploration of the data was conducted. Inferential statistics, a t-test was used to ascertain whether or not their mean score differences were significant at either 0.05 or 0.01 levels. The t-test was selected as a tool for analysis because of its specific instrumental in establishing the statistical significance of the mean difference between the two variables only.

A chi-square technique was also used in interpreting results to find out differences in attitude. It is a superior method of comparing differences between two groups. Moreover, the requirement of this statistic is that the sample size is smaller, the measurement is nominal and suitable for categorical data. It is also a superior method of comparing differences between two or more groups. It was used to analyze difference in the four means and determine whether the means were significant at significance level of 0.05, thus were used for testing these null hypotheses. It was also
applied to the data specifically to compare the averages of the responses which were conducted concerning educational materials that teachers use depending on their skills. The efforts made by KICD in the development and provision of the teaching and learning materials in hearing impaired schools. Therefore in the study it explained the overall contribution of each variable.

Jwan & Ong’ondo (2011) define data analysis in qualitative research as a systematic process of transcribing, collecting, editing, coding and reporting the data in a manner that makes it sensible and accessible to the reader and researcher for the purposes of interpretation and discussion.

The qualitative data the interview was transcribed and emerging themes identified based on the various objectives. Then the findings were presented through narration. Many researchers including Jwan & Ong’ondo (2011) suggest that data analysis in qualitative research ought to follow a six point procedure involving the following steps;

**Transcribing the data;** this involves turning the data from verbal (and sometimes nonverbal) to written mode (Dornyei, 2007; Clarke & Broun, 2006). In this study detailed interview with principals was recorded in writing.

**Re-familiarizing with the data;** this process is also referred to as pre-coding (Dornyei, 2007) enables the researcher to re-familiarize with the data even more but also helps in editing.

**First phase coding;** coding involves highlighting extracts of the transcribed data and labeling these in a way that they can be easily be transcribed, retrieved or grouped.
Interview was coded and highlighted according to codes generated from the literature review.

**Second phase coding:** this phase of coding helps to substantially reduce the number of codes Dornyei & Cresswell (2007) refer to this as axial coding. Similar codes were grouped together to avoid unnecessary overlaps and repetition noted in the first phase thus related categories were clustered.

**Third phase coding:** at this stage, the research grouped categories into themes. Cresswell (2007) refers to this as selective coding. According to Jwan & Ong’ondo (2011) the themes usually correspond to the research hypothesis. This was discussed by the supervisor, peers and also refers to literature review on how to group different categories and code into themes.

**Producing a report:** at this final point the researcher went through the whole chunk of data the relevance of every, direct, category and data. Those not relevant were dropped and every direct speech were put into reported by paraphrasing.
Table 3.2: Data Analysis

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Tool</th>
<th>Data Measurement</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement between girls and boys</td>
<td>GAT Pre-test  / Post-test,</td>
<td>Quantitative</td>
<td>Means, SD</td>
</tr>
<tr>
<td>Determinants on use of hypermedia</td>
<td>Questionnaire</td>
<td>Quantitative</td>
<td>t-test</td>
</tr>
<tr>
<td>Influence of using hypermedia on learning achievement</td>
<td>Questionnaire</td>
<td>Quantitative</td>
<td>percentages</td>
</tr>
<tr>
<td>Institutional support on use of hypermedia for teaching</td>
<td>Interview</td>
<td>Qualitative</td>
<td>Chi-square</td>
</tr>
<tr>
<td>Attitude of learners towards use of hypermedia in learning</td>
<td>Questionnaire</td>
<td>Quantitative</td>
<td>Likert scale</td>
</tr>
</tbody>
</table>

3.11 Ethical Consideration Issues

These are the rules and regulations that governed the study to be conducted. This revolved around issues like seeking permission, informed consent (voluntarily participation), confidentiality, anonymity, truthfulness and avoiding harm to participants.

Permission to carry out a study: makes the research authentic and makes it possible to conduct it (Christian, 2005). The data was collected after obtaining a research permit authorization from the NACOSTI and MoEST as required by law by presenting an introductory letter from Moi University. An introductory letter to
schools was obtained from the sub-county education office. A preliminary visit was made to targeted schools to inform principals of the intended research then appointments made.

**Informed consent:** Patton (2002) talks of informed consent as a process whereby participants give their consent to participate in a research study after getting honest information about its procedure, risk and benefits. To ensure this, the researcher explicitly informed all her respondents the purpose of her study. The respondents were given freedom to make decisions whether to participate in study or not.

**Confidentiality:** Patton (2002) contends that confidentiality means that no one has access to the participants’ data or name in the possession of the research and no one can match research information with that of a participant. The researcher maintained confidentiality, thus confidentiality was considered by making sure that they remained anonymous. Names of the schools, students, teachers and principals were not used. All the respondents were given ample and sufficient time to respond to all questions administered. The study ensured safety of the learners and no information given was not leaked to their teachers and no information from teachers was disclosed to the administration.

**Anonymity:** A participant of a study has a right to have his or her identity remain anonymous. Christian (2005) suggests that it is the researcher’s obligation to keep the respondents identity and responses’ private. The researcher ensured that anonymity of participants was respected when reporting on the interview that was carried out. Tedlock (2005) suggests that a respondent’s anonymity is guaranteed when given response cannot be matched with a given participant.
Harm to participants: In any research, participants must be protected from physical, social, emotional and spiritual harm of any nature (Patton, 2002) in this study the researcher ensured that none of the respondents was exposed to any harm by avoiding asking private and sensitive questions and irrelevant pre-test/posttest questions.

Truthfulness: the researcher maintained truthfulness throughout the study by avoiding plagiarism, fraud and abuse of privileges. The researcher has conducted the research and presented genuine results (no plagiarism). Plagiarism refers to a situation where a researcher refers to other peoples’ work without acknowledging the author or stilling ideas from other scholar. Fraud refers to a situation where researcher takes data that has been collected for example the researcher completes questionnaire on behalf and in absence of the respondents. It also includes false presentation of research methodology and results. Often in research, subjects participate on mutual trust. Abuse or misuse of privilege in research refers to a situation where the researcher misuses or abuses the trust of the subject. Thus the data collected, its presentation and results were done with integrity.

3.12 Summary of Chapter three

This chapter has described in details the research philosophy, design and methodology employed in the study. This highlighted the specific study design, study population and instruments of data collection. The data has been presented, analyzed and interpreted in the next chapter.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the analysis and interpretation of the research findings from the data collected and in view of stated objectives. This study assessed the effect of hypermedia in teaching and learning external landform processes in Geography on learning achievement of hearing impaired students in special mixed secondary schools in Kenya. The results presented was in teaching and learning external landform processes in Geography on learning achievement of hearing impaired students in special mixed secondary schools in Kenya. The result presented was derived from four mixed HI secondary schools of form three classes totaling to 79 students, 10 Geography teachers and 4 principals. The chapter presented the findings under the following themes and subthemes:

4.2. Use of Hypermedia and Students’ Learning Achievement

The objective of the study was to find out the achievement of control and experimental groups between boys and girls exposed to hypermedia lesson in external landform processes. The tool used to collect data was Geography achievement test (GAT). The experimental group was exposed to hypermedia and control was taught by conventional (print & graphics) / KSL technique.
The finding recorded high mean scores gain (53.2%, 54.71%) by the experimental group who achieved statistically significantly higher scores in the GAT than control (47.13%, 47.07%) group as revealed in figure 4.1. The results from this study suggest that integration of hypermedia instruction is positive over conventional as a whole. Learners were able to see landform process by themselves without much explanation. This promotes achievement because it is a visual media and HI learners are visual learners. This is in line with Parton (2006) who identified five ways that hypermedia application can promote achievement and learning for students who are deaf. These include; improving accessibility, instructional design, promoting development and creating discovery learning. All these put together leads to higher scores than those taught without use of hypermedia. This was further supported by meta-analysis by various researchers who examined over 200 studies that compared learning presented in traditional way to the same information presented via hypermedia instruction and
found that learning was higher through hypermedia than traditional (Long et al., 2011).

Control underperformed (47.13%, 47.07%) because HI students have difficulties in visualizing the concept of landform processing. These learners are lip readers hence require intense concentration and this is tiring over long time, this could have led to poor performance. Teachers use static medium such as textbooks and writing board which are not sufficient in Geography education (Standish, 2009). And they are not presenting the curriculum material in a logical form that is accessible to deaf students. This is in line with Fgatabu (2013) who found in his study that, sign language techniques are the widely used as learning resources in the schools and have great negative effect on performance on learners with hearing impairment. Teachers write on the board and point this as primary teaching aid, as a result most learners do not perform (Jokinen, 2010). Further, Adoyo (2004) indicated that poor performance of HI is attributed to inappropriate teaching techniques.

4.2.1. Geography Achievement Test Analysis and Data Presentation

The findings established whether there is any significant difference in achievement between pre-test and posttest scores. GAT was used to collect the data. Geography means score of experimental and control groups on pre-test and posttest GAT were analyzed through descriptive statistic involving mean and standard deviation. The results in table 4.1 indicates that the pretest group, control had (M=47.13; SD=9.1), (M= 47.07; SD= 8.6) and experimental registered (M= 45.3; SD= 8.7), (M=53.2; SD=9.3). These scores are low, this could be attributed to the fact that the topics are abstract and terminologies are difficult to explain effectively in KSL. For example
teachers cannot use grammar effectively to explain abstract concepts such as slow mass wasting.

In posttest only, control had (M=42.3; SD = 8.7), and experimental (M=53.2; SD= 9.3), experimental groups have attained high scores whether pretested or not probably due to treatment they received. HI leaners have a challenge of language of instruction, English code from KSL, teachers fail to effectively explain geographic terminologies hence resort to oral teaching and learners lip-read as others guess. Several scholars postulate that poor performance has been attributed to poor teaching strategies and medium of instruction for the HI learners (Adoyo, 2001, 2004; Ogada, 2012). Dye et al. (2008) affirm that there is also shortage of qualified teachers of deaf and of research-based teaching methods and instructional materials for HI.

Table 4.1: GAT Pre-test, Post-test Means and Standard Deviation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre-test</th>
<th>Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>Conventional C₁</td>
<td>15</td>
<td>47.13</td>
</tr>
<tr>
<td>Conventional C₂</td>
<td>23</td>
<td>___</td>
</tr>
<tr>
<td>Use of hypermedia E₁</td>
<td>21</td>
<td>45.2</td>
</tr>
<tr>
<td>Use of hypermedia E₂</td>
<td>20</td>
<td>___</td>
</tr>
</tbody>
</table>

N= 79

The results in table 4.2 reveal that experimental group has performed better than the control group in Geography achievement test. Control had (M=47.13; SD=8.5), (M=44.60; SD=8.5), and experimental had (M=45.2; SD=8.0), (M=53.85; SD=9). The experimental has shown higher standard deviation meaning that they have performed drastically, their grades have improved. Hypermedia provides multiple
representations of the concept that are more meaningful to HI learners than conventional which provides static information in a linear mode. It is important for the teachers to use medium that can address the deficits of achievement and enhance performance. Onuoha (2011), teachers use instructional materials to make learning more effective, productive and achieve the objectives.

Table 4.2: Group GAT Pre-test, Post-test Means and Standard Deviation

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Pretest Mean</th>
<th>Pretest Sd</th>
<th>Posttest Mean</th>
<th>Posttest Sd</th>
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<tr>
<td>Conventional</td>
<td>38</td>
<td>47.13</td>
<td>8.5</td>
<td>44.60</td>
<td>8.5</td>
</tr>
<tr>
<td>Use of Hypermedia</td>
<td>41</td>
<td>45.2</td>
<td>8.0</td>
<td>53.85</td>
<td>9</td>
</tr>
</tbody>
</table>

Data in table 4.2 indicates variability in the mean obtained by different groups. The difference in means may or may have not been caused by chance. To ascertain, an independent sample t-test was carried out at a significant level of 0.05α. The following were the results of inferential statistics.

Table 4.3: t-test of Pre-test Means between Experimental and Control Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Df</th>
<th>Sig.</th>
<th>Mean</th>
<th>Std err</th>
<th>95% interval of the diff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( 2 tailed) difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Pre-test</td>
<td>34</td>
<td>0.130</td>
<td>4.45</td>
<td>2.86</td>
<td>-1.372</td>
</tr>
</tbody>
</table>

The study carried out the t-test on the means of experimental and control to find out whether the means are significantly different. Table 4.3 indicates that the p-value is greater than 0.05α, (0.130>0.05) this data did not provide sufficient evidence for rejection. It was therefore concluded that there is no significant difference between
students in these schools. Meaning the entry behavior of the groups is similar and therefore giving the two samples (C & E group) homogeneity status.

During form one selection, students are selected randomly so long as the student has attained 150 marks and above. This is the KCPE pass mark for the HI students. All the HI secondary schools are national schools hence the entry behavior is the same. Disparity in achievement heavily relies on other factors such as environment, facilities, administration and pedagogy. The finding is in line with Means (2010); Shapely et al. (2010), when students are engaged in technology-immersed classrooms, there is a gain in achievement in all subject areas.

**Table 4.4a: Pre-test Achievement between Control Boys and Girls**

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Sd</th>
<th>df</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>12</td>
<td>46.58</td>
<td>9.6</td>
<td>34</td>
<td>0.73</td>
<td>0.942</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>54</td>
<td>2.65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P > 0.05, Not Significant

On comparing the means of control boys and girls, the statistic output in table 4.4a reveals that means score of girls (M = 54; SD = 2.65) and boys (M = 46.58; SD = 9.6); t (34) = 0.73, p > 0.05. The p-value of 0.942 is greater than the testing point of 0.05α. This indicates that the pre-test means of the boys is not significantly different from pre-test means of the girls. It is evidenced that the mean achievement of the control group due to gender was not significantly different at 0.05α levels. The null hypothesis was accepted since the data did not provide enough evidence for rejection. Hence it was concluded that there is no significant difference between pre-test achievement of girls and boys students who were taught through conventional approach / KSL. Meaning the entry behavior of the groups may be similar for having same means. Girls are competent just like boys and disparity in performance is
affected by other factors. The finding is supported by Abubakar & Oguguo (2011) in their comparison, found no significant difference between performance of girls and boys. This agrees with Uduosoro (2011) who found no significant difference between performance of boys and girls. DFE (2007, p. 3) affirms that factors such as ethnicity and social class have a greater bearing on educational achievement than gender considered on its own. But a high standard deviation of 9.6 by boys clearly show that they achieved more than girls in terms of average as shown in table 4.4a thus they had better grades. Agbuga & Xiang (2008) report that boys recorded high performance than girls in Geography. The result is similar to that of Kubiatko et al. (2012), the influence of gender was significant and the boys achieved statistically significant high scores.

Table 4.4b: Pre-test Mean Scores between Experimental Boys and Girls

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Sd</th>
<th>Df</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>14</td>
<td>44.64</td>
<td>7.4</td>
<td>35</td>
<td>4.4</td>
<td>0.000</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>41.57</td>
<td>9.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P< 0.05, Significant

Table 4.4b reveals that significant difference exists between pre-test means score of girls (M= 41.57; SD= 9.3) and boys (M= 44.64; SD =7.4); t (35) =4.4, p< 0.05. The p-value 0.000 is less than the testing point of 0.05α. Therefore the result indicates that difference exists between experimental girls and boys. Boys before instruction are more competent than girls in Geography achievement. This could be attributed to perceived differences in the learning styles of boys and girls. This is one of the most frequently expressed explanations for the gender difference in achievement. Boys learn by doing things such as experiments or activities and girls would learn well visually by seeing. The finding is supported by Husain & Millet (2009), who report
that test scores differs substantially by gender, significantly more boys than girls score very high ranges in Geography thus gender disparity is significant. However this result is contradicted by Zember & Blume (2011) who report that most studies show that girls perform better than boys in schools. Warrinto & Younger (2007) reaffirm this reporting that girls outperform boys.

4.2.2 Posttest Analysis of Data

After a period of four weeks of learning external landform processes, a posttest was administered to all the groups. This time the means were high as compared to pretest. Experimental had a mean of 53.85 and control 44.60 as table 4.5 indicates. Learners who were taught by use of hypermedia achieved statistically significant higher scores in the GAT compared to those taught through conventional/KSL way. This descriptive analysis shows a probability of experimental group being superior in achievement. And this could be attributed to integration of hypermedia. Research has demonstrated that different teaching techniques produce different results, therefore the identification of the best teaching strategy must be done if the best results must be achieved (Houston & Parigoe, 2010). The outcome from previous research indicated that teaching with learning style adaptation increased students’ performance and boosts their motivation to learn (Avile & Moren, 2010). However this can only be confirmed by an inferential statistic.

Table 4.5: Posttest Means at Group Level

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>38</td>
<td>53.85</td>
<td>9</td>
</tr>
<tr>
<td>Control</td>
<td>41</td>
<td>44.60</td>
<td>8.5</td>
</tr>
</tbody>
</table>
The results per schools are shown in the table 4.6 as follows; experimental pre-test had a mean of 54.71, experimental posttest only recorded a mean of 53.2. The difference in achievement of the two groups should be explained as influence of pre-testing. Pre-test may have influenced achievements. In control group, control pre-test had a mean of 47.07 and control posttest only recorded a mean of 47.13. This is contrary to experimental groups. The group that was not pre-tested is above the group that was exposed to both tests. This shows that pre-test did not have influence on posttest. It can be hypothesized that experimental are competent than control. The competence of experimental is attributed to hypermedia treatment they received.

Table 4.6: Posttest Means and Standard Deviation of the Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Posttest</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (pre-test)</td>
<td>54.71</td>
<td>8.5</td>
</tr>
<tr>
<td>Experimental</td>
<td>53.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Control (pre-test)</td>
<td>47.07</td>
<td>8.6</td>
</tr>
<tr>
<td>Control</td>
<td>47.13</td>
<td>8.7</td>
</tr>
</tbody>
</table>

However this is subject to confirmation after inferential statistic is carried out on the data as illustrated in table 4.7.

Table 4.7: t-test of Posttest and Pretest Difference

<table>
<thead>
<tr>
<th>Variables</th>
<th>Df</th>
<th>Sig.</th>
<th>Mean</th>
<th>Std err</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2 tailed)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>interval difference</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper</td>
</tr>
<tr>
<td>Pre-test / posttest</td>
<td>35</td>
<td>0.000</td>
<td>6.056</td>
<td>1.377</td>
<td>3.261</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.850</td>
</tr>
</tbody>
</table>
An independent sample t-test was carried out for the purpose of inferring from the data and testing of the hypothesis, pre-test had no influence in the study as table 4.7 reveals. The t-test p-value was 0.000. The t-test p-value is less than the set alpha of 0.05\(\alpha\). This shows that there is statistically significant difference in the pre-test and posttest. Hence the null hypothesis was rejected. There is statistically significant difference between the experimental group and the control group at a significance level of 0.05\(\alpha\) for the interest of the experimental group.

The findings that high achievement was recorded on the posttest GAT could be due to some groups being given treatment. Bashir et al. (2014) denote that in a research on the academic achievement of students with HI show that they trail behind their hearing due shortage of instructional materials. Mayer (2005) asserts that hypermedia is more effective for learners with low aptitude and it helps them to connect the new knowledge with the prior knowledge. Further finding indicates that support with careful planning, experience in teaching in a virtual environment can promote learning achievement (ICM, 2012). However Mweri (2014), using SL within classroom is one solution to reach all the HI learners. Sign language can enhance the learning process by bringing visual, auditory and kinesthetic feedback to help reach all learners.

Table 4.8: t-test of Posttest Means for the Control and Experimental Groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Df</th>
<th>Sig.</th>
<th>Mean</th>
<th>Std err</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2 tailed)</td>
</tr>
<tr>
<td>Posttest</td>
<td>77</td>
<td>0.001</td>
<td>6.870</td>
<td>1.952</td>
<td>10.157</td>
</tr>
</tbody>
</table>
The study sought to test difference in means of control and experimental group. The significance was to establish the effectiveness of hypermedia as opposed to conventional and KSL techniques of teaching. The t-test p-value is 0.001 less than alpha of 0.05. This reveals that there is a statistically significant difference in the posttest means of experimental group and control group. The difference is in favour of experimental group that was exposed to hypermedia. The finding that the mean of experimental is high leads to conclusion that hypermedia is effective in improving learning achievement in external landform processes in Geography by HI learners. The null hypothesis was rejected thus accepting the alternative hypothesis which states, there is statistical significance difference between learners taught using hypermedia and those taught without hypermedia. Hypermedia is effective in enhancing achievement through; self-learning, promotes retention, enjoyment and motivation in Geography. Abu Khtwah (2012) asserts that these characteristics help to meet the different aspects of the individual learners. This is because hypermedia enhances ranges of sensory stimuli in instructional circle, hearing, seeing and doing play important role in achievement. Moreover opportunities to learn from classmates are often lessened due to communication, teachers also write lessons on the board and point it as a primary teaching aid. Several research have supported this finding Vignare et al. (2007), deaf students often perceive that they receive a distorted message when a non-signing teacher’s lecture is translated by the interpreter. Whitby (2012) affirms that hypermedia material presents issues that we do not always see in the classroom and it gives better understanding. Nearly 40 hypermedia studies found that compared to traditional lecture, learning improvement were higher for the groups that used hypermedia.
An independence sample t-test for the group gave a p-value of 0.756 as table 4.9 indicates. The p-value is greater than the set alpha 0.05. There is no statistically significant difference between the experimental boys and girls at a significance level of 0.05. This means that there is no difference in the posttest in external landform processing due to gender. The null hypothesis is therefore retained since the data did not produce sufficient evidence for rejection. This result implies that gender does not have any significant effect on performance means score of learners exposed to hypermedia technique. Thus learners perform independent of gender when taught using hypermedia. It also suggests that teachers should integrate hypermedia to teach learners in order to reduce any gender difference in students’ achievement in Geography. The finding of gender difference is in line with that of (Esiobu, 2011), gender is no longer a significant impediment for performance. However Zamfirov & Saera (2013) contradict, they found that girls and boys learn differently by considering difference in achievement. Further, in teaching Geography, Gender Geography (2010) research suggests that a strong masculine bias exists in the map reading. However Guis et al. (2008) had different opinion in their finding, they found that there are gaps in test score in all subjects.

Before a conclusion was drawn that hypermedia is a treatment that has enabled girls to be as competent as boys, it is necessary to test if the girls in control have performed
as well as boys. The study tested the significance in mean difference between control girls and control boys using an independent sample t-test.

Table 4.10: t-test Posttest Means for the Control Girls and Control Boys

<table>
<thead>
<tr>
<th>Variables</th>
<th>Df</th>
<th>Sig.</th>
<th>Mean</th>
<th>Std err</th>
<th>95% confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>77</td>
<td>0.002</td>
<td>0.521</td>
<td>0.130</td>
<td>0.289</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.452</td>
</tr>
</tbody>
</table>

The results revealed as indicated in table 4.10 that the t-test value was 0.002. The p-value is less than the alpha at a significance level of 0.05α. On the analysis it is found that the difference in means of control boys and control girls is statistically in favour of boys. Boys in control have outperformed the girls. This just confirms that it is hypermedia that created conducive environment that led to girls in experimental group to perform as well as boys. Warning, 2006; Younger (2007) affirm that in northern Nigeria, it is believed that subjects like physics, drawing, Geography and the like are for boys and not for girls. Agbuga & Xiang (2008) reaffirm that boys recorded high performance than girls in Geography. The result is similar to that of Kubiatko et al. (2012), the influence of gender was significant and the boys achieved statistically significant high scores. Therefore adapted hypermedia is an alternative to traditional approach to teach HI learners. It adopts information towards individual preference and improves the experience of the learner who interacts directly with the system. However Warrinto & Younger (2007) contradict, the previous finding report that girls outperform boys at school at least in terms of certain key academic hence there is need to refocus equal opportunities to redress the balance for boys.
Therefore Alias (2010) reaffirms that it is important to identify the most effective strategies in the content delivery process to achieve objectives.

4.2.3 Most Preferred Learning Style

Learners were asked the most preferred learning style. Questionnaire was used to solicit the information on learning style. Table 4.11 reports that visual was the most preferred learning style. Experimental group (73.17%) agreed that visual is a better way of learning. This group has the highest percentage for visual learning because visual can simplify information that is difficult to understand by illustrating and signing relationship among the elements giving learners a chance to comprehend visually. For example learners were able to see the landform process with color, text and animations emphasizing important points. Visual learners think and learn in pictures. Hard-of-hearing learners are visual learners because they lip read and sign read and interpret the concept. IA El- Zraigat (2013) explains that deaf students must be visual learners because their sense of hearing is compounded, so their sense of sight must be enhanced. Hypermedia is used to bring education to individuals with such challenges for example audio to visual conversation. Due to loss or residual hearing, audio is not appropriate even though there are others who can hear but for uniformity the teacher should use the most appropriate media which facilitate learning for the whole class.

However the Control group (36.84%) preferred demonstration, they struggle to lip read and interpret sign language simultaneously. This make them tired and bored hence prefer other learning styles such as visual. Dimiling (2010) indicates that deaf and hard-of-hearing learners may need special vocabulary intervention in order to improve their comprehension of words.
Table 4.11: Most Preferred Learning Style

<table>
<thead>
<tr>
<th>Learning style</th>
<th>Control group</th>
<th></th>
<th>Experimental group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Demonstration</td>
<td>14</td>
<td>36.84</td>
<td>8</td>
<td>9.51</td>
</tr>
<tr>
<td>Visual</td>
<td>13</td>
<td>34.21</td>
<td>30</td>
<td>73.17</td>
</tr>
<tr>
<td>Observation</td>
<td>10</td>
<td>26.31</td>
<td>2</td>
<td>5.26</td>
</tr>
<tr>
<td>TOTAL</td>
<td><strong>37</strong></td>
<td><strong>26.31</strong></td>
<td><strong>40</strong></td>
<td><strong>5.26</strong></td>
</tr>
</tbody>
</table>

$\chi^2 = 12.244$ df = 2 p-value = 0.002  
$\chi^2 = 7.157$ df = 2 p-value = 0.028

Further, a chi-square test was performed to compare the most preferred learning style among the groups. $\chi^2 (2, N = 79) = 12.2$, $p = 0.002$ and the result indicates that a significant difference was found between experimental and control groups on learning style. The control group considered demonstration as the best option, the $p$-value was 0.002 less than 0.05 $\alpha$ the significant level. HI learners are kinesthetic they learn best by doing. Concrete experience assist or help learners to open up new understanding, fosters good thinking, shortens learning but enhances long term memory. Nazri & Suheil (2010) assert that color and size of the text can also give meaningful lesson to HI learners.

Observation had the least percentage, (26.31%) from control group and (5.26%) from experimental group preferred observation as a learning technique. The percentage is low because it is a rare technique used in teaching Geography lessons unless students are taken for a field trip which is not regularly organized due to high cost and it is time consuming.
It is possible that students learning preference can influence teacher’s choice of instructional media. If a teacher perceives that majority of learners are of a particular learning style this may drive the teacher’s decision to choose instructional media that is viewed positively by the learners. The finding is supported by Mayer (2008), ‘’it is believed that students learn better when they are allowed to use their preferred learning style’’. However Donkey (2008) concluded that learning style should not change teaching style.

4.2.4 Media Preferences in Learning Process

Students were asked to indicate the best media in teaching and learning process. Table 4.12 reveals that hypermedia is the best amongst control (34.21%) and experimental group (51.21%) agreed. This is because hearing impaired learners heavily depend on visual learning. Over emphasis on sign has contributed to failure in Geography. Learners and teachers are not competent enough to use SL effectively in explaining concepts. KICD (2013), teachers cannot use KSL grammar effectively and their method to instruct learners successfully. Proponents say that even verbal learners need visual support to grasp certain types of concepts. Esera (2008) maintains that among educational needs of this group of students is using visual approach, and applying evidence based practices in instruction is essential.

Therefore teachers should use hypermedia because it provides many benefits at different levels, for example they can interact with the students without writing any sentence. This has been proven by this study where students who were taught by hypermedia performed better than those who were taught through sign and chalk. This is in line with Robleyer & Doering (2013) ‘’HI students learn more effectively with hypermedia’’. However Johnson & Seaton (2012) indicate that students who are deaf
and hard-of-hearing do not access a sufficient schooling, and they are not receiving a full range of services that address their unique needs.

Print was last for both groups, control had 18.42% and experimental 9.76%. Though print materials individualize learning through independent study, they are abstract and generally provide limited built-in interactions, it may take days or weeks for printed matter to exchange between student and teacher. Chickering & Gawson (2011) emphasize that classroom involvement is not just sitting and listening to the teacher sign and read from the textbook but relate it to past experience and apply it to their daily lives.

Table 4.12: Media Preferences in Learning Process

<table>
<thead>
<tr>
<th>Media</th>
<th>Control Frequency</th>
<th>Control Percent</th>
<th>Experimental Frequency</th>
<th>Experimental Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypermedia</td>
<td>13</td>
<td>34.21</td>
<td>21</td>
<td>51.21</td>
</tr>
<tr>
<td>Print</td>
<td>7</td>
<td>18.42</td>
<td>4</td>
<td>9.76</td>
</tr>
<tr>
<td>Writing board</td>
<td>10</td>
<td>26.31</td>
<td>11</td>
<td>36.58</td>
</tr>
<tr>
<td>Illustrations</td>
<td>8</td>
<td>12.05</td>
<td>5</td>
<td>12.20</td>
</tr>
<tr>
<td>TOTAL</td>
<td><strong>38</strong></td>
<td><strong>100</strong></td>
<td><strong>41</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

An open-ended question was further asked why they considered the media chosen as the most preferred. Hypermedia was the most preferred, they gave various reasons for their choices. For example many said ‘‘the media is interesting and enhances understanding’’. Hypermedia facilitates understanding and is interesting because they are able to utilize variety of teaching tool and are in charge of their own learning as they are able to play and stop and this is interesting and enhances understanding.
Hashim et al. (2013) pointed out that the problems that hard-of-hearing students face in traditional classroom provide opportunity for hypermedia.

However control group had a mixed reaction because other reasons account for 50%. This indicates that there is no one media that can accomplish all the learning priorities and no teaching technique is completely ineffective in delivery of the content. Maryland (2007) affirms that what is effective for one person may not be for the other.

4.3 Determinants on use of Hypermedia in Teaching External Landform Processes for HI Learners

The objective was to find out determinants on use of hypermedia in teaching external landform processes. Questionnaire was used to collect data for analysis. There are several factors that should be considered before choosing technology to employ. These include media selection criteria and teacher characteristics. Considering factors which determine use of instructional media, the teachers were asked to rate the determinants on use of hypermedia.

On media selection, the data in table 4.14 suggest that effectiveness (90%) is the most important factor that teachers should consider on the integration of instructional media. Thus media should be able to enhance learning. The nature of the learners (HI) in this study calls for an instructional media which provides varied alternatives. Therefore hypermedia is effective because it offers multiple perspectives on teaching external landform processes. It helps to illustrate abstract principles by providing cases that can be observed without paying visits to those places. Ruiz Mcrcader et al. (2006) report that hypermedia supports transformation of classroom management and pedagogy. Pedagogy transformation could initiate tacit and explicit knowledge of
hearing impaired learners, this leads to sustainable higher performance. Dangsaart et al. (2008) further explain that adaptive hypermedia is an alternative to traditional one-size fit-all approach. Several researchers Obondo et al. 2013; Debevc et al. (2010) reaffirm that use of video have helped the teaching and learning process of the students in Geography. Using technology is a way of enhancing effectiveness of instruction and success of all students and need for good performance. Hypermedia is deemed a valuable educational tool because it presents information in multiple modes.

It provides easy access to large information, provides students with greater autonomy and responsibility in the quest for learning (Gracia & Gracia, 2005; Greene, 2007).

Cost of hypermedia was ranked moderate (70%). Media selection should be cost effective in terms of use. This encourages school management to buy or purchase the media for instructions. Hypermedia entails use of internet. Most schools have network connectivity but are unable to maintain the cost of network throughout the term due to limited funds. Similar report was revealed by Alper & Raharinirina (2006) that teachers cannot effectively integrate hypermedia because schools lack funding to support technology in HI classrooms.

However environmental factor is insignificant, 70% teachers rated it low, less important factor in implementation of technology. This suggests that there are other reasons that influence integration of hypermedia. This was echoed by Forgaz (2006) who revealed a number of factors influencing technology use. According to Forgaz, the most important factor is lack of experience and access to educational software and professional support. However Brush & Saye (2009) contradict this finding, they found that teacher quality is the single most important determinant of student performance. Further, availability of and access to technology resources and technical
support were the most important factor that determine the frequency in which teachers use instructional materials.

Number of student in class was seen as insignificant, because class size was (50%) ranked last by many teachers. Medium such as hypermedia is suitable for any number of the students in a class whether large or small. In this study classes were generally large. HI classes should have a maximum of twelve students but all the sampled schools had fifteen and above. Technology can be the great equalizer in a classroom with diverse learners. Whereas teachers can find it difficult to differentiate instruction for 30+ students in one class, all with different needs and abilities, Machnaik (2007) postulates, teaching style, like learning are highly personal and influenced by extrinsic and intrinsic factors.

Table 4.13: Consideration on Selection of Hypermedia for Instruction

<table>
<thead>
<tr>
<th>Statements</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>F 3 (30)</td>
<td>F 3 (30)</td>
<td>F 4 (40)</td>
<td>100</td>
</tr>
<tr>
<td>Objectives</td>
<td>F 6 (60)</td>
<td>F 4 (40)</td>
<td>F 0(0)</td>
<td>100</td>
</tr>
<tr>
<td>Content of the lesson</td>
<td>F 4 (40)</td>
<td>F 4 (40)</td>
<td>F 2 (20)</td>
<td>100</td>
</tr>
<tr>
<td>Attitude</td>
<td>F 7 (70)</td>
<td>F 2 (20)</td>
<td>F 1 (10)</td>
<td>100</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>F 9 (90)</td>
<td>F 1 (10)</td>
<td>F 0(0)</td>
<td>100</td>
</tr>
<tr>
<td>Cost</td>
<td>F 2 (20)</td>
<td>F 7 (70)</td>
<td>F 1 (10)</td>
<td>100</td>
</tr>
<tr>
<td>Environment</td>
<td>F 3 (30)</td>
<td>F 0(0)</td>
<td>F 7 (70)</td>
<td>100</td>
</tr>
<tr>
<td>Class size</td>
<td>F 2 (20)</td>
<td>F 3 (30)</td>
<td>F 5 (50)</td>
<td>100</td>
</tr>
<tr>
<td>Participation</td>
<td>F 8 (80)</td>
<td>F 1(10)</td>
<td>F 1 (10)</td>
<td>100</td>
</tr>
</tbody>
</table>

N = 10

Note: percentage is in parentheses
4.3.1 Effectiveness of Hypermedia in Learning External Landform Processes

The students were asked to state the effectiveness of hypermedia in learning. From table 4.14, the results show that students from both groups accepted that hypermedia is good with control group rating at 71.05% and experimental 85.36%. After using hypermedia, the results revealed that the experimental group was impressed with the use of hypermedia as indicated by a higher percentage.

A chi-square test results $\chi^2 (1, N = 79) = 4.4, p = 0.35$ shows that most students agreed that hypermedia is an effective media in teaching and learning process because there is no significant difference between the experimental and control groups. It is an instructional material where learner is given authority to review the topic on their own pace and in accordance to their individual interests, needs and cognitive process. Robleyer & Doering (2013) report that hypermedia allows the user to interact with media that can contain text, graphic, animations and film. Students can learn more effectively with focused attention than those who study with separate media where attention is split. SEG Research (2008) further confirms this finding “this is because human brain will have more processing loads to integrate and re-arrange all different sources of information”.

However, there are those who said that it is poor; control had 21.05% and experimental 9.75% as revealed in table 4.14. Students may take hypermedia as an entertainment and not for learning. It is true that using hypermedia in the classroom by itself is not effective unless the teacher has the theory model of instruction (Gorder, 2008).
Table 4.14: Effectiveness of Hypermedia in Learning Process

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control</th>
<th></th>
<th>Experimental</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>V. good</td>
<td>3</td>
<td>7.89</td>
<td>35</td>
<td>85.36</td>
</tr>
<tr>
<td>Good</td>
<td>27</td>
<td>71.05</td>
<td>2</td>
<td>4.87</td>
</tr>
<tr>
<td>Poor</td>
<td>8</td>
<td>21.05</td>
<td>4</td>
<td>9.75</td>
</tr>
<tr>
<td>TOTAL</td>
<td>38</td>
<td>100</td>
<td>41</td>
<td>100</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 4.438 \quad df = 1 \quad p\text{-value} = 0.35 \]
\[ \chi^2 = 38.712 \quad df = 2 \quad p\text{-value} = 0.000 \]

### 4.3.2 Learners Participation During Hypermedia Presentation

Teachers were asked to state the role of the students during hypermedia presentation. The finding in table 4.15 indicates that 70% of the students were active. Hypermedia is an interactive learning media. New technology has drastically changed students’ role from traditional instruction to virtual learning. Hypermedia is shifting the emphasis from teaching to learning. An active student will have more responsibilities of their own learning as they can share their knowledge with others.

Employing active learning strategies serves two fold purpose; they make a dynamic classroom ever changing environment in which students have a voice and allowed them to view teachers as people who are flexible enough to take risks in the classroom instruction. It also encouraged students to stay interested and learn more from class when teachers use many medium in single application.

Hypermedia provides powerful tools to support the shift from teacher centered to learner centered paradigm and new roles of teacher-learner and new media. It is believe that the most important characteristic of hypermedia is its ability to encourage students to be proactive learners (Drayton et al., 2010).
### Changes in Learners

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive learner</td>
<td>Active learner</td>
</tr>
<tr>
<td>Reproducer of knowledge</td>
<td>Producer of knowledge</td>
</tr>
<tr>
<td>Solitary learner</td>
<td>Collaborative learner</td>
</tr>
<tr>
<td>Solely learning content</td>
<td>learning to learn, think, create and</td>
</tr>
<tr>
<td></td>
<td>communicate</td>
</tr>
</tbody>
</table>

However 30% teachers agreed that learning with hypermedia is a passive way of learning. As stated earlier in the literature, hypermedia is in three categories that is linear, network organization and hierarchical organization. These teachers could have used linear model which is a passive way of presenting information. In this model both the learners and teachers have very little to do. It is also likely that there are some teachers who have not had experience with hypermedia therefore they are not sure whether hypermedia can encourage passive or active learning. Sivapalan & Crega (2005) concurs that the main challenge is how to enhance students’ participation during presentation. Classroom experience has demonstrated that students who contribute to Geography discussion tend to succeed academically, thus there is relationship between classroom participation and student achievement.

#### 4.3.3 Extent to which Hypermedia Change Teaching Technique

Table 4.15 reveals that 50% of teachers agreed that use of hypermedia greatly changes their teaching technique. Hypermedia application involves use of several medium at ago. This relieves the teacher from carrying into class more medium. Hypermedia has potential to transform achievement of the HI through instructional technique.
Changes in Learners

From | To
---|---
Single sense stimulation | Multi-sensory stimulation
Single media application | Multimedia application
Delivery of information | Exchange of information
Monologue communication | Dialogue & collaboration
Analogue resource | Digital resource

All these changes in pedagogy demand a new learning environment to effectively harness the power of hypermedia (Zhu, 2003; Kim & Gilman, 2008).

Table 4.15: Teachers’ Opinion on Learners Participation during Hypermedia Presentations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of students during Presentation</td>
<td>Passive</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Active</td>
<td>7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>Extent to which hypermedia</td>
<td>Not at all</td>
<td>2</td>
</tr>
<tr>
<td>Change teaching technique</td>
<td>Much</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Very much</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

A further inquiry by an open-ended question was made by asking the reason why the media could extend students learning. Those who said that hypermedia can extend learning beyond classroom gave the following reasons; *TE1, it improves understanding because students could see the process of various landforms for*
example formation of headlands and bays, TE2, it can be used anytime anywhere and facilitates creativity.

The results further revealed that hypermedia is the best because students can access information on their own through navigation. This motivates them hence learn better therefore teachers should always keep learning at the center of learners. Technology is the central focus and heart of all activities and pedagogy in classroom instruction. National Teacher Institute (2006) concludes that I hear I forget, I see I remember, I do I understand.

4.3.4 Challenges Encountered in Selecting Hypermedia

Table 4.16 reveals that many teachers (60%) ranked challenges to access hypermedia as the most popular problem they encounter in thinking about selecting materials/activities for teaching Geography. Access to instructional media is an important factor affecting selection of hypermedia for instruction. Teachers can only use what they are able to get. Slobodzian (2009) reports extra learning resources may not be accessible in class and there is a widespread lack of accessible interactive materials (Parton, 2006). Hypermedia is an instructional material that is assembled by the user according to the content, it is not a material that is readily available. Since most teachers are lacking technical skills, they are not able to access it easy. This finding is supported by other researchers, Flick (2007) affirms that availability of and access to technology is important factors that determine the use.

Individual difference (30%) was another popular difficulty encountered by teachers in selecting hypermedia. HI students have varied disabilities for example in a class there may be dump, deaf, partial deaf, deaf and dump among other individual differences. Therefore it becomes difficult for a teacher to select media that can suit all of them.
The finding is supported by several researchers Yang & Tsai (2008); Graf et al. (2009); Naimie et al. (2010) indicate, identifying the uniqueness of learning style is important in encouraging students’ involvement in the learning process.

Number of students in class was seen as insignificant, because class size was (50%) ranked last by many teachers. Medium such as hypermedia is suitable for any number of the students in a class whether large or small. In this study classes were generally large. HI classes should have a maximum of twelve students but all the sampled schools had fifteen and above. One goal of Education in Kenya gives equal educational opportunities irrespective of any real or imagined disabilities (EFA, 2004). This has given rise to population of children with disability in schools. Many teachers consider that these classes are too large and they give rise to a number of problems. The problems include discomfort, control, individual attention and learning effectiveness.

However this was not experienced during hypermedia presentation because the media was interesting and students’ attention was captured due to its high interactivity. Schmidt et al. (2009) contend that hypermedia allows the students to engage more fully with the subject matter at hand, facilitates deep understanding because of its interactivity. Technology can be the great equalizer in a classroom with diverse learners. Whereas teachers can find it difficult to differentiate instruction for 30+ students in one class, all with different needs and abilities, Machnaik (2007) postulates, teaching style, like learning are highly personal and influenced by extrinsic and intrinsic factors.
Table 4.16: Challenges Encountered in Selecting Hypermedia

<table>
<thead>
<tr>
<th>Challenges in selection</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student’s preference approach</td>
<td>F%</td>
<td>F%</td>
<td>F%</td>
<td>F%</td>
<td>F%</td>
<td>F%</td>
<td>F%</td>
</tr>
<tr>
<td>Students individual difference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is difficult to access</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of guide books</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students’ attitude does not allow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class roll doesn’t allow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 10

Note: percentage is in parentheses

4.3.5 Teacher Characteristics on use of Hypermedia Teaching and Learning

Teachers were asked their own characteristics which prevent them from using hypermedia in teaching. They ranked the statements in order of priority.

Teacher characteristics are important aspects for use of media. Technological competency plays an important role in the integration of instructional media. It is the responsibility of the teacher to think about how to make process of learning more accessible through technology.

Table 4.16 reveals that self-efficacy had greatest (60%) effect on teacher’s use as none of the teachers’ ranked it last with an average percentage. It is difficult for teachers to have technological competency because technology keeps on changing and this will mean they keep on upgrading their skills. Brown et al. (2010) asserted that technology self-efficacy has come to play a crucial role in the preparation and implementation of educational technology to enhance student learning. Farah (2011)
stated that teachers’ behaviour is affected by their self-efficacy and their beliefs about their abilities.

Attitude (70%) is another factor that is most considered on use of hypermedia. Attitude plays a very big role on the implementation of instructional media. Teachers have the option on what to choose for effective teaching. Toe (2008) affirms that teachers’ attitude and beliefs often stop them from fully integrating hypermedia into their instruction. Ahmad et al. (2012) claimed that peoples’ thought influence their action and motivate them to attempt or restrain from certain behaviour. However Mowelolo (2011) contradicts this finding by reporting that teachers’ knowledge and skills influenced the use of visual media in teaching. Kadzera (2006) further reports that lack of instructional media resources is one of the reasons contributing to minimal use of instructional technology.

The study revealed that gender is not a characteristic which prevents a teacher from integrating hypermedia in pedagogy 40% of teachers ranked it as the least important. Regardless of gender, Knoors 2012; Marsch (2014) teachers frequently struggle to adequately structure the environment and to provide access and opportunities for HI to learn. Adegbija (2006) postulates that African value based gender is fading away and giving way to global view.

It is also evidenced that teacher experience is insignificant because 40% ranked it least factor which may prevent them from integrating hypermedia. Number of years in service does not have significance in use of hypermedia thus integrating technology into classroom does not require experience. ICM (2012) contradicts this finding stating that learning needs, technological support with careful planning, experience in teaching in a virtual environment can promote use of technology. Use of technology
depends on other factors such as cost, content, availability, attitude, competency, objectives, technological support, leadership among others. Similar results was found by Smarkola (2008) examined teachers’ intention to use computer for instruction and found that it can be predicted by belief-based measures pertaining to attitude (usefulness and compatibility), subject norms (peer influence and superiors influence), and perceived behavioral control (self-efficacy technology and constraints/support). However several researchers have contradictory opinion, Wozney (2006) found that teachers personal use computers outside of teaching activities was the most significant predictor of teachers use of hypermedia in classroom. Angeli & Valandes (2009) assert that integrating hypermedia into teaching means considering the needs of the students, curriculum and availability of hypermedia as well as the lesson planning and media design issues.

Table 4.17: Teacher Characteristic on Use of Hypermedia

<table>
<thead>
<tr>
<th>Rank</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers’ Characteristic</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>ICT competency</td>
<td>50</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teaching experience</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Hypermedia self-efficacy</td>
<td>60</td>
<td>20</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Leadership support</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Technological support</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Institutional characteristics</td>
<td>20</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Attitude</td>
<td>70</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Professional development</td>
<td>10</td>
<td>0</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
4.4. The Influence of Hypermedia in Teaching and Learning External Landform

The objective of the study was to determine the influence on use of hypermedia on learning achievement in mixed special secondary schools. Questionnaire was used to collect data and chi-square was used to interpret results to test hypothesis. Hypermedia had positive influence for learners who used it. This was seen in terms of retention, motivation, enjoyment, interest, knowledge construction and self-direction. These finally lead to improved performance.

![Figure 4.2: Influence of Hypermedia in Learning](image)

**4.4.1 Use of Hypermedia Promotes Retention in Learning**

On a likert scale, the researcher seeks for the learner’s opinion on use of hypermedia in learning. Figure 4.2 indicates that 58.8% of learners from experimental group agreed that use of hypermedia leads to increased retention. This is because
hypermedia is an interactive media where learners use it repeatedly, at their own pace, time, convenience and rewind to observe what was not understood. Animation as one of the hypermedia elements, emphasize important points on the topic covered. Sharm (2013) supports the finding, animated illustration accompanied with video and kinesthetic are better to teach landform processes than static illustration. Further, Drayton et al. (2010) learners make practical choices of tools and media that will shape the way they learn, express themselves and perform. This finding is in line with Mayer et al., (2005), hypermedia presentation are more effective when the learners have the ability to interact with the presentation by slowing down or starting and stopping it. Interactivity is associated with learning achievement and retention of knowledge over time. Kozma (2008) further supports this, hypermedia stimulate students interest and motivation, and give the maximum degree of freedom.

Posttest results revealed that students taught through traditional technique scored lower grades (44.60%) than those by hypermedia (53.85%). Students showed better attention and retention of the subject matter. It was revealed from the study that hypermedia is a powerful tool that enhances retention hence improves academic performance. This was evidenced by students’ responses stating; “Hypermedia is good because it enhance my retention ability thus improves learning efficiency”. Therefore it was concluded that traditional technique is ineffective in knowledge gain and retention. This finding support the work of Marschark et al. (2005) who found that heard-of-hearing students may also suffer from visual input overload as they simultaneously attempt to pay attention to the teacher and any visual aids that may be presented. Ability to retain and recall Geography terminology content was evidenced that students found concepts represented by a single sign much easier to recall than which require compound signs or finger spelling (Lang & Pagliaro, 2007).
4.4.2 Use of Hypermedia Creates Motivation in Learning

Figure 4.2 indicates that 80.5% learners from experimental group agreed that hypermedia is motivating when used for classroom instruction. Hypermedia learning system’s rich content encourages learning in a task-driven process, where learners are motivated to explore alternative different resources, and subsequently promotes effective learning. Students were motivated to learn on their own time and pace. They could watch pictures on external landform processes such as formation of Arete of glacial feature and Tombolo of wave landform. Literature on motivation and classroom learning has shown that motivation plays an important role on influencing learning and achievement (Cornu, 2010). To rectify this, teachers need to integrate appropriate image-based and iterative strategies necessary for effective instruction of these students (Lang & Pagliaro, 2007).

Animations used emphasized the points on the processes. This helped the HI students to visualize a process or other dynamic phenomenon that could not be envisioned easily for example exfoliation and static weathering processes. Betran & Court (2005) support this finding, animation appears to be most effective when presenting concepts or information that students may have difficult envisioning. Further Allen et al. (2008) & Compell (2007) have suggested that motivational construct have a positive impact on academic success in academic performance in instructions.

Students were asked an open ended question why they thought hypermedia is good, responses solicited were;

Student 1; I was motivated to watch stages of weathering, glacial action, mass wasting and wave action.

Student 2; It was amusing, interesting and motivating to watch process of corrie and ice flow from corrie to the valley.
Student 3: *It is interesting and therefore motivating to rewind to watch weathering processes such as mechanical by frost.*

Student 4: *I will be able to critically interpret information presented correctly.*

However while all teachers hope their students will be self-motivated, some need more extrinsic motivation than others. Even motivated students occasionally need their teachers to prompt them to complete their tasks. It is widely accepted by other researchers that motivation is a key element within a learning process.

In the control group the main teaching was sign language, chalk and illustrations. The results revealed that 77.8% agreed that hypermedia can motivate learners. These limit their ability to actively participate in classroom learning activities. From the result, it can be concluded that both groups unanimously agreed that hypermedia is a motivator. Motivation has strong effect on enhancing academic achievement. Despite that the recent adaptive systems are significantly more powerful than earlier ones, but still deaf students experience particular difficulty when learning Geography due to lack of signs for technical terms (Andrei et al., 2005).

4.4.3 Use of Hypermedia Promotes Understanding

The results from experimental group in figure 4.2 reports that understanding had the highest influence on use of hypermedia. Learners agreed 100% that hypermedia leads to greater understanding of the topics covered on Landforms. And therefore after using hypermedia students asked the teachers to continue using hypermedia since it supported their learning process. It allowed them to determine the order in which they would like to access information, for example how specific content should be displayed, is it verbal or pictorial format representation? Schmidt et al. (2009) said in their finding that hypermedia allow students to engage more fully with the subject at hand, facilitates deep understanding and ability to develop important reasoning skills
such as critical thinking and problem solving. Lessons in which hypermedia is used are more beneficial to HI students than conventional method. A major advantage of hypermedia is its defining feature compared to traditional forms of learning. Students affirm that hypermedia material presents issues that we do not always see in the classroom and it gives better understanding (Whitby, 2012).

Understanding was further realized when questions involving labeling were scored by almost all experimental students as opposed to control. This is proven in appendix B, an indication of understanding the process and resulting features of Landform. To teachers it alleviated the task of sign language instruction alongside English teaching. According to psychology and information storage, simple memorization, can read 10%, can hear 20%, can see 30% thus for HI adapted hypermedia gives 40%. This is further explained by Mayer (2005) the proponent of dual coding theory in his principle associated with multimedia, temporal contiguity principle states that students learn better when corresponding words and pictures are represented simultaneously rather than successively. Therefore it is clear that performance was improved by the intervention of students understanding. This is further explained in few sentences derived from the respondents. EL2 learner said “I have understood and able to explain and differentiate features formed through glacial action”.

The control 66.6% agreed that hypermedia could enhance their understanding. Conventional technique with sign language does not help students to understand the complex concept. For example in Kenya resulting features from glacial action is not real since Kenya lies within the tropics and does not experience the condition. Miller et al. (2013) also found that inappropriate teacher position interpretation have limited knowledge to translate the information. This method promotes rote learning where
students have huge memorized knowledge without deeper understanding. This is supported by Hew & Bush (2007) who said that conventional method reinforces memorization of factual information and do not promote deeper understanding.

4.4.4 Use of Hypermedia Make Learning Enjoyable

The figure 4.2 reveals that 82.5% learners of experimental group agreed that they enjoyed learning with hypermedia. Students enjoyed learning because they were in charge of their own and individualized learning which offers learner-centered approach. They could explore it in multiple ways, thus could select and sequence information according to their personal needs and preference. Friendman & Friendman (2011) assert, undergraduate using hypermedia unanimously enjoyed using hypermedia program because of their realism. Many also described the program as self-explanatory and easy to use.

However 47.2% of the control group agreed that they would enjoy learning with hypermedia. This is because most of them have not had prior experience with hypermedia. Most teachers do not like integrating hypermedia in their instructional strategies. Hypermedia appears complex to some students and teachers. Chandler (2009) reports, students may find it difficult to use hypermedia because overload may occur due to constantly assimilating and referring to previous hyperlinks to understand the next link.

4.4.5 Use of Hypermedia to Promote Self-direction Learning

Figure 4.2 reports that majority of experimental (92.3%) agreed that hypermedia gave them opportunity to learn on their own. Hypermedia provides students’ self-direction. This is no great surprise as experience with hypermedia results in self-learning. Direct instruction is based on the constructivist theory, that learning can be greatly
accelerated if instructional presentations are clear and simple. Hence all students can learn regardless of their disabilities. The HI students could access pictures and text in their own suitable way. Berndson & Luckner (2010) support the finding that using hypermedia technology is vital in preparing HI students, Parton (2006) contradicts the finding, he notes that while active learning is important for all learners, it is also critical for students who are deaf or hard of hearing.

The control group 15.1% agreed that hypermedia can offer self-direction. This group did not use hypermedia in their instruction hence had no experience. Traditional teaching method which was predominantly used does not allow manipulative work. Teachers spend most of their time writing on board taking this as most appropriate teaching aid for visual learners like the HI as they listen. Zhang & Zhou (2006) pointed out that this method is authoritative. The expository and heuristic strategies of teaching form extreme ends of a continuum in the teacher-learner interactions during various instructional methods. Therefore none of them does the work 100% hence there is some levels of interaction.

4.4.6 Use of Hypermedia Makes Learning Easy, Fast and Interesting

Figure 4.2 reveals that majority (85.2%) of experimental agreed that hypermedia made their learning easier, faster and interesting. Hypermedia presents information worth 2-3 pages in conventional approach within two seconds. Hypermedia is characterized by high level of interactivity, this motivates and interests the learners. It is also an easier and faster way of learning. Learners continue learning at their own convenience. By seeing over and over again, the leaners are able to recall what has been learnt and some concepts become more visible and self-explanatory. It reduces the language demand for the HI learners. Shank, 2005; Ashthana (2009) postulate that
hypermedia has introduced pedagogical strength in facilitating student’s learning and adding richness with the use of more than one medium. Thus learners with interest learn better, easily and faster because they are not forced to learn, as they decide what to do on their own. This is evidenced from Alexnder & Jetton (2013), reported that involving learners in the decisions regarding their learning process increases interest and motivates.

However 24.7% students from control agreed that hypermedia is interesting, easier and faster to use in learning process. This group prefers print, they can use printed media on their own without guidance of the teacher. For example textbook individualizes learning. However Jokinen (2010) contradicts, teachers write on the board and point this as primary teaching aid, as a result most learners do not perform. We use hypermedia every day and many time without realizing for example when we watch ballgame, printed headline on TV, we even watch recorded videos, music video or see them presented in an interactive format on TV screen. This shows that we are living in a world of hypermedia therefore nearly all student have experience with hypermedia.

4.4.7 Use of Hypermedia Encourage Knowledge Construction by HI Learners

Figure 4.2 reveals that experimental group 89.7% agreed that they were able to construct their own knowledge. It is an effective way of learning that allows learners to construct their own learning. They were able to build upon their own knowledge or rewind and fill in learning gaps. Thus students are able to construct their own knowledge in a way that suits their internal learning structure, providing deeper and more permanent understanding. From constructivist point of view, individualizing learning allows students to use their current life experience worldview activity to
build their own knowledge. The finding is supported by several researchers, Dabbagh & Blijid; Stobel & Van Barneveld (2009) report that learners are expected to take charge of their own learning and they are at liberty to direct their own learning process.

However EducPsychol Rev (2007) asserts that use of hypermedia involves many techniques which the teacher has to be aware of and able to solve especially distraction. Hypermedia utilizes a variety of teaching and learning tool that enhance learning for HI students using different learning experiences. It can keep student’s attention and can individualize learning in terms of pace and information. Morris & Finnegan (2008) support this finding conversely, students who successfully navigate hypermedia believe they have ability to control environment of the course.

4.4.8 Use of Hypermedia Improved Performance for HI Learners

Hypermedia highly influenced performance. Figure 4.2 reveals that experimental group 95.1% agreed that hypermedia improve performance in Landform in Geography. This is because learning materials for HI should include texts and visuals of high quality. Hypermedia improves performance because teachers did not need to draw diagrams, they showed picture, animated some objects to explain critical concepts, even played some video of real time. All these multimedia applications have productive teaching, create interest and motivate, leading to learning that promotes interactive and quality delivery of classroom instruction. Hence leads to improved performance. Michael et al. (2008) support the finding; learners can obtain the knowledge they need for efficient learning. SEG Research (2008) affirms that students learn more effectively with focused attention than split attention. This is
because human brain will have more processing loads to integrate and re-arrange all
different sources of information.

For control group, only 5.4 % agreed that use of hypermedia can lead to knowledge
construction. This is because most of them have no experience with hypermedia. They
think that hypermedia works in the same way as conventional where teachers use
textbooks, diagrams, picture to show the process of Landform. This method is
authoritative and boring and does not articulate interventions that address the deficits
of achievement and enhance performance. Teacher is the custodian of knowledge.

Table 4.18: Chi-square on Influence of Hypermedia on Learning Achievement
on Eternal Landforms

<table>
<thead>
<tr>
<th>Attribute</th>
<th>$\chi^2$ value</th>
<th>Df</th>
<th>SD</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypermedia;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhance my role as student</td>
<td>21.216</td>
<td>2</td>
<td>.833</td>
<td>0.000</td>
</tr>
<tr>
<td>Promote retention</td>
<td>10.839</td>
<td>2</td>
<td>.723</td>
<td>0.013</td>
</tr>
<tr>
<td>It easy, faster and interesting</td>
<td>7.608</td>
<td>2</td>
<td>.857</td>
<td>0.022</td>
</tr>
<tr>
<td>Construct own knowledge</td>
<td>16.414</td>
<td>2</td>
<td>.820</td>
<td>0.000</td>
</tr>
<tr>
<td>Self-directed learning</td>
<td>12.614</td>
<td>2</td>
<td>.838</td>
<td>0.002</td>
</tr>
<tr>
<td>Motivates</td>
<td>4.370</td>
<td>2</td>
<td>.723</td>
<td>0.112</td>
</tr>
<tr>
<td>Deepen understanding</td>
<td>19.926</td>
<td>2</td>
<td>.833</td>
<td>0.000</td>
</tr>
<tr>
<td>Improves performance</td>
<td>12.479</td>
<td>2</td>
<td>.824</td>
<td>0.002</td>
</tr>
<tr>
<td>Enjoy lesson with hypermedia</td>
<td>11.061</td>
<td>2</td>
<td>.832</td>
<td>0.004</td>
</tr>
</tbody>
</table>

N= 79

Nevertheless, hypermedia technique must be accompanied by other teaching
strategies. Responses with p-value greater than alpha imply that there is no
relationship between influence of learning on learners who were are exposed to hypermedia and those exposed to conventional learning. Results in table 4.18 reveal that most of learners felt that hypermedia does not promote retention 0.013 and motivate 0.112, and is not easier, faster and interesting 0.022. All these have p-value greater than alpha. They showed dissatisfaction with the use of hypermedia. Working with hypermedia is complex and it requires skills. Farah (2011) supports the finding stating, usability issues as disorientation, distraction and cognitive overload can occur. Friedman & Friendman (2011) further assert, while this learning can be superior to traditional face-face instruction when pedagogically appropriate methods are used, they sometimes fail to be successful for HI students. Some learners prefer static medium such as textbooks, illustrations, wall charts and pictures. These provide individualized learning, they can use textbook to do assignment at their own time without teacher’s presence. Olaleye (2010) contradicts this statement, currently the primary method of teaching Geography is via textbooks and sign (lectures). These static media do not adequately represent, visualize or convey abstract information such as Landforms.

However some students accepted that hypermedia can enhance their role as students, by promoting construction of their own knowledge hence deepens understanding. All these had p-value of 0.000 significantly less than alpha. Consequently, the results indicate that the students enjoyed hypermedia lessons 0.004, it improves performance 0.002 and self-directed learning 0.002. Teachers have found hypermedia more effective on learners because students were able to identify a greater variety of hypermedia features rather than focusing on only a few general features like less experienced learners did (Mchonigal, 2011).
Table 4.19: Influence of Hypermedia in Teaching External Landform Processes

<table>
<thead>
<tr>
<th>Influence of Hypermedia</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach effectively</td>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Valuable for HI</td>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Better teaching of concept</td>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>Excites</td>
<td>Yes</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td>Better understanding</td>
<td>Yes</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>1</td>
</tr>
</tbody>
</table>

N= 10

Teachers were asked to indicate a yes or no if hypermedia can influence their teaching effectiveness. Table 4.19 indicates that hypermedia has influence on teaching by all responses being positive with over 70% and above. The results revealed that hypermedia is valuable tool for HI (80%) and helps teachers express their teaching strategies in better ways (80%), it excites the teachers (70%) and this leads to better understanding (90%) of the concept especially abstract topics such as slow mass wasting. Hypermedia can capture complexity of HI classroom which is normally overloaded with sign language, lip reading, paying attention and visual interpretation. Deaf students often perceive that they often receive distorted message. Hashim et,al. (2013) pointed out that problems that hard-of-hearing students face in traditional classroom provide opportunities for electronic learning media. This finding is supported by Savery (2006) who says that hypermedia represents constructivist and is
seen as valuable student-centered pedagogical approach. This is further supported by Robler & Dering (2013) who report that hypermedia promotes learning while motivating students, using combination of text, video, music, graphics and sound effect excites.

4.5 Institutional Support on use of Hypermedia

The objective of the study was to examine the institutional support on use of hypermedia in teaching external landform processes in mixed special secondary schools. The study queried the institutional support on use of hypermedia in teaching external landform processes. Interview schedule was used to collect data which was reported in a narrative way. To identify and explore possible support given to teachers on the instructional endeavor, rigorous interviews (N= 4) were conducted and the results of the respondents captured. The interview was conducted to ascertain the support given by school administration in relation to instructional media. Interviews were held with the principal. These were under five sub-themes which were supported by relevant quotations from the interview. They include teacher and school preparation for professional development, budget for instructional media, budget allocation for ICT instruction, policy guidelines on use of instructional media and teachers’ confidence on use of ICT related instructional media. Specifically cost and availability of the media, teacher’s workload, adapted environment and facilities were some of the concerns raised. The responses were written down coded and transcribed as follows;
4.5.1 Quotes from Principals (RSP) Relating to Teacher and School Preparation for Life Long Professional Development

The principals were asked how teachers and schools could be prepared for life-long professional development. They responded differently as follows;

IRSP\textsuperscript{1}; it is the responsibility of the teachers to be creative and hardworking towards technological initiative.

IRSP\textsuperscript{2}; teachers are not willing to spend extra time preparing instructional materials.

IRSP\textsuperscript{3}; assistive instructional technology are expensive and individual schools cannot afford to buy most of them therefore learning resource centers (LRC) should be established in educational assessment resources centers (EARCs) for easy access to instructional material for the HI.

From the responses given, it is evidenced that principals have no influence over their teachers on the type of technique they should employ in pedagogy. Teachers’ preference may be influenced by skills and media experience by the teacher. It was observed that teachers do not have adequate technological knowledge and skills. This is evidenced from responses given. This calls for professional development to sharpen their skills especially in ICT which keeps on changing. The finding is in line with Angeli & Valandes (2009) who report that using hypermedia for instructional integration requires knowledge and skills which are different from simply using computers. Wagner et al. (2006) further affirm that teachers do not have adequate technological knowledge and skills to serve increasing number of students with disabilities.

The principals were probed further on what could be done to solve this problem. They gave the following suggestions;
IRSP² said that ‘recently TSC withdrew special duty allowance for teachers who do not have diploma and above in special needs education. The government or teachers service commission (TSC) should reward and motivate special teachers by giving them special duty allowance regardless of the level of special qualification.

4.5.2 Budget Allocation for ICT Instructional Media

The researcher asked the principals how much money is given by the government for the purchase of instructional media. Most of them were skeptical.

IRSP¹; there is no specification for money allocated for ICT instructional media, it all depends on urgency and BoM’s priority.

IRSP²; what is given is not enough hence I always give ICT last preference.

IRSP³; high cost of living makes it difficult for the parents to pay for the maintenance of computers.

In responding to question on how much is allocated for instructional materials especially ICT, principals were not specific and the budget for instructional materials is not uniform despite that the ministry has specified how the disbursement should be spent. There is specific account for (SMSIC) the purchase of instructional materials, but most of the schools do not value ICT instructional materials hence this is not considered in the budget.

Most of the principals were skeptical, they did not indicate the percentage allocated for ICT. Internet is one of the components of ICT for instructions, all the schools in the study had internet connectivity but did not have data bundles and therefore teachers are not able to use hypermedia because it requires internet to function.

From the principals it is evidenced that the findings are similar to the results of Rhema & Miliszewka (2010) who revealed that little government funding is among
challenges facing ICT. These findings are further supported by that of Eu report (2012) studies reveal lack of instructional materials yet effective teaching contributes to 75% of good academic achievement hence adapted ICT in pedagogy cannot be realized in a dilapidated instructional environment.

4.5.3 Policy Guidelines on the use of Instructional Media in Schools

Principals were asked if there is any policy guiding the use of instructional media in schools, these were the response;

IRSP\textsuperscript{1}; there is no strict policy guidelines on use of instructional media. We purchase what is deemed necessary and affordable.

On the issue of policy guidelines regarding the use of ICT related instructional media, most of the schools did not have ICT policy guidelines but those which had did not recognize the need of using ICT for instructions. However the MoEST in 2005 developed Kenya education sector support program (KESSP) which recognized technology and integration of ICT in education to enhance educational process. The national ICT policy captured this intention as priority. ICT is mostly used for administrative purposes and not for instruction. Strong policies documented goals and objectives governing use of instructional media should be put in place as suggested by the government. The finding is supported by Zamfirov & Saeva (2013) who assert that lack of organizational, school and government policy leads to low use of technology for deaf education. Republic of Kenya (2007), there is inadequate support in terms of funding and policy framework. Slobodzian (2009) reaffirms Heard-of-hearing are heterogeneous, they differ on the level of impairment and therefore catering for them is a great challenge.
Principals were further asked to give suggestions or recommendations concerning technology policy. All those interviewed (N=4) claim that the government should provide ICT tools for instruction to all schools so that they can move together just like instructional books are specified. This is evidenced by pilot Digi schools which are using digitized content, all these schools are moving together and no school is left behind.

IRSP\(^3\) gave suggestion that at teacher training institutions, ICT integration skills for instruction should be emphasize because most of the teachers are techno savvy in other areas but not in instruction. Shin et al. (2009) assert, teacher preparation effort is a challenge to technology integration into classroom instructions and lack of modeling was a disabler (Toma, 2007). Teachers cannot integrate technology if they have not received support from the school leadership by training personnel and purchasing the media.

**4.6 The Effect of Hypermedia on Learners’ Attitude**

The objective of the study was to establish attitude of leaners towards the use of hypermedia in teaching/learning external landform processes.

An attitude questionnaire was designed to collect data for the purpose of answering this question. The respondents were learners. The questionnaire contained closed items in form of matrix questions. The matrix questions were interpreted using the likert scale with the key as follows; 1= Strongly Agreed (SA), 2= Agree (A), 3= Undecided (U), 4= Disagree (D) and 5= Strongly Disagree (SD). Learners were asked to rate their satisfaction on use of hypermedia. On a Likert scale ranging from 1-5, 1 and 2 showed satisfaction, 3 neutral, 4 and 5 dissatisfaction. Chi-square was used to test the hypothesis.
Table 4.20 reveals that both groups are satisfied with the use of hypermedia. Hypermedia is an effective learning tool as reflected by the learners. They responded in the same way that they can remember best by picturing in their mind (75%, 98.75%). Pictures are mirror for learning. Many learners grasp well the concept when illustrations and pictures are integrated in learning process. Hypermedia is a valuable media for teaching learners with hearing impairment. Many learners showed interest and therefore Geography teachers should integrate hypermedia in their instruction to motivate and encourage HI to learn more effectively. The finding is supported by Abu Khtwa (2012) who observes that hypermedia is self-explanatory with logical sequence in terms of their format and artistic demonstration.

They further agreed that hypermedia support learning according to their needs. Experimental group strongly agreed (97.5%) that hypermedia Support their learning according to their needs. Individual differences can be accommodated by having alternatives in learning for example in hypermedia instructions learners will be engaged at a deeper level and appreciate the student-centered learning approach with more sense participation (Keppell, 2008).

Experimental group which had experience with hypermedia agreed 98.4% that it facilitates creativity. From the results it can be concluded that learners have positive attitude towards use of hypermedia. And positive attitude enhance achievement. The finding concurs with Akcay et al. 2006; Shapley et al. (2010) there is some evidence that attitude towards technology relates positively with achievement. Therefore positive attitudes are associated with high level of hypermedia experience. They enjoyed and preferred hypermedia formats than traditional methods probably because of their increased motives and attitudes (McGowan, 2009).
Osborne et al. (2013) emphasized that how materials are delivered in classrooms can affect students attitude.

However majority of the learners both experimental and control (53.7%, 53.2%) agreed that they cannot work comfortably with hypermedia. They lack technological skills to comfortably use hypermedia in their classrooms. Hypermedia entails application of many medium in single application, it requires use of internet which is sometimes slow or unavailable this cause discomfort and discouragement to the users.

It is also noted that students learn differently, hearing impaired learners have various difficulties in learning and different appropriate aids which address various disabilities. As such there is no one teaching strategy or technique that is successful for all of them. The finding is in line with Morris & Finngan (2008) stating that students have negative attitude towards hypermedia tended to have difficulties locating content and resources and often felt lost in the course.
Table 4.20: Attitude of Learners on use of Hypermedia

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Control group %</th>
<th>Experimental group %</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use hypermedia to;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remember by picturing in my mind</td>
<td>75</td>
<td>23.7 2.3 98.5 0.3 0.2</td>
</tr>
<tr>
<td>Demonstrate what I have learnt</td>
<td>52.9</td>
<td>24.5 22.5 87.8 7.3 4.9</td>
</tr>
<tr>
<td>See information on the screen images, text, graphics and animations</td>
<td>64.9</td>
<td>21.6 13.5 92 7.5 0.5</td>
</tr>
<tr>
<td>Support my learning according to my needs</td>
<td>55.9</td>
<td>26.5 17.6 97.5 0.2 2.3</td>
</tr>
<tr>
<td>Develop understanding</td>
<td>55.6</td>
<td>19.4 25 97 2.4 6</td>
</tr>
<tr>
<td>Positively change the learning climate in classroom</td>
<td>43.2</td>
<td>16.2 40.5 87.4 12.2 0.4</td>
</tr>
<tr>
<td>Work comfortably</td>
<td>53.2</td>
<td>14.9 31.9 53.7 10 37.3</td>
</tr>
<tr>
<td>Facilitate independent learning</td>
<td>64.9</td>
<td>18.9 16.2 94.6 2.8 2.5</td>
</tr>
<tr>
<td>Acquire knowledge and skills</td>
<td>44.4</td>
<td>19.4 36.1 87.6 11.2 1.6</td>
</tr>
<tr>
<td>Facilitate creativity</td>
<td>55.9</td>
<td>8.8 35.3 98.4 0.8 0.8</td>
</tr>
</tbody>
</table>

Further, a chi-square test was calculated to ascertain whether difference exists between the groups. It was done to test the hypothesis which stated that ‘’there is no statistically significant effect of hypermedia on learners’ attitude towards
The finding revealed that there is statistically significant effect of hypermedia on learners attitude towards Geography, thus accept the alternative hypothesis.

The results in table 4.21 showed significant difference, the experimental group had positive attitude towards use of hypermedia. They agreed that hypermedia support learning according to their needs, develop understanding, positively change the learning climate in classroom, help them acquire knowledge and skills and facilitate creativity. All these statements had a p-value of 0.000 less than the alpha of 0.05. Hypermedia provides multiple instructional materials which presents meaningful concept to the HI learners. Li-Ling et al. (2013) support the finding “hypermedia has revolutionized the traditional style of education and opened new opportunities” and it is believed that hypermedia can increase potential learning, can increase learners’ responsibility for the process of teaching and learning, greater collaboration of students in educational process and better quality learning (Compell, 2010). Dabbagh et al. (2009) further state that “learners have the ability to direct their own learning process.

However learners accepted that seeing information on the screen images, text, graphics and animations does not positively change their attitude. In conventional learning teachers often use illustrations such as posters, diagrams, graphics accompanied with words. These are static media which do not enhance understanding. Edger Dale asserts that print media enhance retention by 10%. The finding is in line with Fgatabu (2013) who found that sign language had great effect on performance and attitude on learners with hearing impairment.
Table 4.21: Chi-square test between the Students’ Attitude and use of Hypermedia

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Df</th>
<th>$\chi^2$-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use hypermedia to;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remember by picturing in my mind</td>
<td>2</td>
<td>6.481</td>
<td>0.039</td>
</tr>
<tr>
<td>Demonstrate what I have learnt</td>
<td>2</td>
<td>11.318</td>
<td>0.003</td>
</tr>
<tr>
<td>See information on the screen images, text,</td>
<td>2</td>
<td>9.941</td>
<td>0.007</td>
</tr>
<tr>
<td>graphics and animations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support my learning according to my needs</td>
<td>2</td>
<td>19.107</td>
<td>0.000</td>
</tr>
<tr>
<td>Develop understanding</td>
<td>2</td>
<td>19.926</td>
<td>0.000</td>
</tr>
<tr>
<td>Positively change the learning climate in</td>
<td>2</td>
<td>22.638</td>
<td>0.000</td>
</tr>
<tr>
<td>classroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work comfortably</td>
<td>2</td>
<td>0.460</td>
<td>0.015</td>
</tr>
<tr>
<td>Facilitate independent learning</td>
<td>2</td>
<td>10.460</td>
<td>0.005</td>
</tr>
<tr>
<td>Acquire knowledge and skills</td>
<td>2</td>
<td>20.789</td>
<td>0.000</td>
</tr>
<tr>
<td>Facilitate creativity</td>
<td>2</td>
<td>21.176</td>
<td>0.000</td>
</tr>
</tbody>
</table>
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study as directed by the five hypotheses. The chapter also provides the conclusions and recommendation obtained from the findings. It also gives suggestions for further study.

5.2 Summary of the Findings

The study investigated the effect of hypermedia in teaching and learning of external landform processes in Geography on academic achievement for the hearing impaired students in mixed secondary schools in Kenya. The summary of the finding are presented according to the objectives;

5.2.1 Achievement of Control and Experimental Groups on External Landform Processes

From Geography Achievement Test, it was established that there was relationship between use of hypermedia and conventional/KSL on the aspect of achievement. Experimental group had a mean of 53.85 and control 44.60, the experimental (M=45.2; SD=8.0), (M=53.85; SD=9) has shown higher standard deviation meaning that they have performed better than control group (M=47.13; SD=8.5), (M=44.60; SD=8.5), their grades have improved drastically. Further t-test was performed, the t-test p-value is 0.001 less than alpha 0.05α. This reveals that there is a statistically significant difference in the posttest means of experimental group and control group. Therefore the null hypothesis was rejected. This finding of high mean from experimental leads to conclusion that hypermedia is effective in improving achievement in Geography.
The results revealed achievement between boys and girls exposed to hypermedia lesson in external landform processes, it was established that hypermedia has effect on gender performance. Previously boys in control (M = 44.64; SD = 7.4; t (35) = 4.4, p < 0.05) performed better than girls (M = 41.57; SD = 9.3) but when hypermedia was used it is evidenced that there was no significant difference in achievement, t-test gave a p-value of 0.756. The p-value is greater than the set alpha 0.05, therefore the null hypothesis is retained. This means that there is no difference in the posttest in external landform processes using hypermedia technique due to gender. Thus hypermedia can improve achievement regardless of gender, performance is individual. Therefore teachers should use hypermedia to reduce any gender difference in achievement in Geography.

The study established the most preferred learning style, experimental group (73.17%) agreed that visual is a better way of learning and control group (36.84%) preferred demonstration.

Further, a chi-square test was performed to compare the most preferred learning style among the groups, χ² (2, N = 79) = 12.2, p = 0.002 and the result indicates that a significant difference was found between experimental and control groups on learning style. The control group considered demonstration as the best option, the p-value was 0.002 less than 0.05, the significant level. Therefore visual was the most preferred learning style.

The best media was found to be hypermedia amongst control (34.21%) and experimental group (51.21%) agreed. Print was last for both groups, control had 18.42% and experimental 9.76%. From an open-ended question why the media was
most preferred, they gave various reasons for their choices. *For example many said ‘the media is interesting and enhances understanding’.*

### 5.2.2 Determinants on Use of Hypermedia in Teaching External Landform Processes

Considering these factors, the findings emerged with facts that on media selection, effectiveness (90%) is the most important factor teachers should consider on the integration of instructional media. Cost of hypermedia was ranked moderate (70%), media selection should be cost effective. Environmental factor is insignificant, 70% of teachers rated it low, less important factor in implementation of technology. This suggests that there are other reasons that influence integration of hypermedia.

Learners were asked to indicate effectiveness of hypermedia, the result shows that students from both groups accepted that hypermedia is good with control group rating at 71.05% and experimental 85.36%. After using hypermedia the results revealed that experimental group was impressed with the use of hypermedia as indicated by higher percentage.

A chi-square test results $\chi^2 (1, N = 79) = 4.4$, $p = 0.35$ shows that most students agreed that hypermedia is an effective media in teaching and learning process because there is no significant difference between the experimental and control groups. However there are those who said that it is poor, control had 21.05% and experimental 9.75%. During hypermedia presentation (70%) teachers indicated that learners were active, they also agreed 50% that use of hypermedia greatly changes their teaching technique. It emerged that access (60%) to hypermedia is the most difficulty encountered in thinking about selecting materials/activities for teaching Geography. Access to instructional media is an important factor affecting selection of hypermedia for
instruction. The number of students in class was seen as insignificant, because class size was (50%) ranked last by many teachers.

5.2.3 The Influence of Hypermedia on Learning Achievement in External Landform Processes

The findings show that hypermedia had positive influence for learners who used it. It improved their achievement in Geography. It emerged that hypermedia motivates 80.5%, it encourages learning in a task-driven process, where learners are motivated to explore alternative resources, and subsequently promotes effective learning. Hypermedia promotes retention 58.8%, learners use it repeatedly, at their own pace, time, convenience and rewind to observe what was not understood. Animation as one of the hypermedia elements, emphasize important points on the topic covered.

Understanding is the highest influence on use of hypermedia, learners agreed 100% that hypermedia leads to greater understanding of the topics covered on external landform processes, and this improved their achievement drastically. It allowed them to determine the order in which they would like to access information, for example how specific content should be displayed, is it verbal or pictorial format representation? Understanding was further realized when questions involving labeling were scored by almost all experimental students as opposed to control.

Learners enjoyed (82.5%) learning because they were in charge of their own and individualized learning which offers learner-centered approach. They could explore it in multiple ways, thus could select and sequence information according to their personal needs and preference. It was established that hypermedia interest (85.2%) learners. Hypermedia is characterized by high level of interactivity, this motivates, interests the learners.
Knowledge construction (89.7%) was found to influence learning process and improved achievement. It is learning that allows students to construct their own learning. Learners make their own decision on which way to go. Learners were able to manipulate the media quickly and slowly at their own pace, hence able to fill in learning gaps. Hypermedia provided self-direction learning.

They agreed (92.3%) that hypermedia gave them opportunity to learn on their own. The HI students could access pictures and text in their own suitable way, these finally lead to improved performance in Geography. Thus the null hypothesis was rejected; there is significance difference between learners taught using hypermedia and those taught without hypermedia. Experimental group had p-value less than alpha while control had p-value greater than alpha.

5.2.4 The Institutional Support on Use of Hypermedia for Teaching HI Learners

There is evidence to suggest that school leadership is an important strategy that influences successful media integration. Most of the schools did not have enough instructional materials and the principals were skeptical to give reasons for this. Most of the principals were not specific and the budget for instructional materials is not uniform despite that the ministry has specified how the disbursement should be spent. It was established that there is no strict policy guidelines on use of instructional media.

It was also observed from the findings that teachers do not have adequate technological knowledge and skills and most of the schools did not have ICT policy but those which had did not recognize the need of using ICT for instructions. Therefore it was concluded that there is significant relationship between institutional support and use of hypermedia.
5.2.5 Attitude of Learners’ Towards Use of Hypermedia in Learning External Landform Processes

On a likert scale the result indicated that learners were positive and satisfied with use of hypermedia in their lesson. Both groups are satisfied with the use of hypermedia. They responded in the same way that they can remember best by picturing in their mind (75%, 98.75%). Hypermedia is an effective learning tool as reflected by the learners. However majority of the learners both experimental and control (53.7%, 53.2%) agreed that they cannot work comfortably with hypermedia.

A Chi square analysis was computed and the results showed significant difference, the experimental group had positive attitude towards use of hypermedia. They agreed that hypermedia support learning according to their needs, develop understanding, positively change the learning climate in classroom, help them acquire knowledge and skills and facilitate creativity. All these statements had a p-value of 0.000 less than the alpha of 0.05. Hypermedia provides multiple instructional materials which presents meaningful concept to the HI learners. However learners accepted that seeing information on the screen images, text, graphics and animations does not positively change their attitude. In conventional learning teachers often use illustrations such as posters, diagrams, graphics accompanied with words. These are static media and do not enhance understanding. The study found a significant difference between the attitude of experimental and control groups. The null hypothesis was therefore rejected.

5.3 Conclusion

The results from this study suggest that effects of using hypermedia in instruction for HI are positive over traditional instruction. Hypermedia based learning is more
effective on academic achievement than conventional/KSL ways of instruction. It has a great potential for the visual learners like girls than boys in regard to achievement. Therefore teachers of Geography should embrace use of hypermedia to cultivate a conducive environment that leads to high retention rate and motivation of HI learners in landform processes. However the effects may be varied depending on what type of instruction that hypermedia compares to.

The study found out that there was a significant relationship between determinants and use of hypermedia for teaching hearing impaired learners for example, media selection such as content, effectiveness, objectives and teacher characteristics such as ICT competency, attitude, self-efficacy and accessibility.

The results also suggest that principals have to develop a more collaborative approach when defining instructional policy, the study underpins the importance of adapting ICT related instructional media. Therefore it is pertinent that hypermedia contributes positively to the learning in HI schools and for it to be effective, it requires the conscious effort of all the species in the education ecosystem that is the MoEST, KICD, principal, teachers and students to make it work. As much as it is concluded from the study that hypermedia enhanced achievement, it is a complex way of learning.

It is also evidenced from the study that use of hypermedia in pedagogy provides a positive attitude and facilitates students’ learning. Therefore it is one technique of teaching that rises above the challenges of performance of the HI learners. Hence this condition suggests that teachers need support to develop new approaches to teaching and greater access to reliable technology that are herald to HI learners.
5.4 Recommendations

Based on the findings, discussion and conclusions herewith contained in the study, the following summative recommendations are made to the government, KICD, MoEST, teachers, principals and other relevant stakeholders in the education sector.

1. Teachers should embrace hypermedia in teaching and learning process to teach abstract topics in Geography and to develop a wide range of student’s skills as possible.

2. Schools and colleges should organize periodic training to in-service teachers on skills relevant to use of hypermedia and workshops for students to promote use of ICT in pedagogy. Schools should have computers to enhance use of computers in an inclusive of instruction.

3. Sensitize principals on provision of hypermedia facilities since it enhanced academic achievement of the learners in Geography.

4. The MoEST as a matter of urgency endeavor to provide educational materials such as display board, computers, LCD projector and other ICT equipment as per curriculum requirements.

5. Principals should motivate teachers on use of hypermedia in teaching Landforms in Geography.

6. KICD to digitize all HI contents because hypermedia had positive influence over the learning of the students.
5.5 Suggestions for Further Research

1. The research should be extended to all HI schools in Kenya to confirm if the conclusion drawn from this study, following the findings, is the true reflection of what is prevailing on the ground country wide.

2. To improve students’ performance in KCSE and teaching of Geography at secondary level, there is need to conduct further studies on different Geographic topics such as solar system to have full understanding of factors which contribute to problems in teaching and learning of these topics in secondary schools.

3. Teachers’ competency on use of hypermedia is an area not exhausted therefore it should be investigated whether it affects their choice of media in teaching.
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APPENDICES

Appendix A: Pre-Test on Internal Landform Processes (Form 2)

Instructions: Answer all questions

1. List three internal land forming processes which lead to formation of Lakes (3mks)

(b) Discuss examples of features formed through fissure eruption (6mks)

(c) Name any two lakes formed by faulting in Kenya (2mk)

2. Define folding (2mks)

(b) Explain the theory of continental drift (6mks)

(c) Name the type of fold (1mk)

(d) Identify the parts labeled S, A & N (3mks)
(e) Name two fold mountains found in Africa, Asia, N. America and S. America (2mks)

(f) With aid of well labeled diagrams, explain the process of the formation of fold mountains (10mks)

3. State four types of faults (4mks)

(b) Describe the effect of a rift valley on the following (i) Transport (ii) Agriculture (8mks)

(c) Describe how Block Mountains influence climate (6mks)

(d) Explain how compression forces can cause faulting (5mks)
(e) Name the parts marked H, G and N (2mks)  

(f) List four features formed as a result of folding (4mks)  

4. Explain how vertical and horizontal movement affects the rocks of the earth’s crust (6mks)  

(b) Giving examples explain the causes of earthquakes (10mks)  

(c) Describe how the following features are formed (i) A crater (ii) cumulo dome (4mks)  

5. Distinguish between a solfatara and a fumarole (6mks)  

(b) Giving examples, explain two ways in which volcanoes are formed (5mks)  

(c) Name two examples of batholiths in Africa (2mks)
(d) Name the parts marked 6, 7, 11, 12 and 15 (5mks) 6. .................................

7.---------------------------------------------------------------

11.--------------------------------------------------------------

12.---------------------------------------------------------------

15.---------------------------------------------------------------

(e) Name three places where geysers can be found (3mks)

1.---------------------------------------------------------------

2.---------------------------------------------------------------

3.---------------------------------------------------------------

Identify two effects of earthquake (2mks)------------------------------------------

-----------------------------------------------------------------------

GOOD LUCK
PRE-TEST ON LANDFORM PROCESSES (FORM 2)

Instructions: Answer all questions

1. List three internal land forming processes which lead to formation of lakes (3mks)
   - Downwarping
   - Folding
   - Faulting

2. (b) Discuss examples of features formed through fissure eruption (6mks)
   - Lava plateau
   - Surtseyan
   - Krafla

3. (c) Name any two lakes formed by faulting in Kenya (2mks)
   - Lake Nakuru
   - Lake Turkana

2. Define folding (2mks)
   - Bending of strata

(b) Explain the theory of continental drift (6mks)
   - Is the movement of the earth changing position and shape by erosion or volcanic adjustments

3. (c) Name the type of fold (1mk)
   - Anti-structure folds
(d) Identify the parts labeled S, A & N (3mks)

(e) Name two fold mountains found in Africa, Asia N. America and S. America (2mks)

(f) With aid of well labeled diagrams, explain the process of the formation of fold mountains (10mks)

(g) State four types of faults (4mks)

(b) Describe the effect of a rift valley on the following (i) Transport (ii) Agriculture (8mks)

- Agriculture - Escarpments provide good and wet climate for example around escarpment
(c) Describe how Block Mountains influence climate (6mks)

Result: Rainfall is forced on the windward side and the leeward side is left dry.

(d) Explain how compression forces can cause faulting (5mks)

This pushes rocks together.

(e) Name the parts marked H, G and N (2mks)

H = Fold
G = Valley
N = Fault
(f) List four features formed as a result of folding (4mks)
- Valleys
- Rifts
- Fold mountains
- Thrust faults

4. Explain how vertical and horizontal movement affect the rocks of the earth's crust (6mks)

<table>
<thead>
<tr>
<th>Leads to rocks being squeezed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forming .....</td>
</tr>
<tr>
<td>Granitic rock formations</td>
</tr>
</tbody>
</table>

(b) Giving examples explain the causes of earthquakes (10mks)

(c) Describe how the following features are formed (i) A crater (ii) cumulo dome (4mks)

<table>
<thead>
<tr>
<th>Crater formed at top of volcano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountain formed at in middle</td>
</tr>
</tbody>
</table>

5. Distinguish between a solfatara and a fumarole (6mks)

<table>
<thead>
<tr>
<th>Solfatara is formed by chemical action and susceded by earthquake</th>
</tr>
</thead>
</table>

(b) Giving examples, explain two ways in which volcanoes are formed (5mks)

<table>
<thead>
<tr>
<th>1. Eruptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Lava flow</td>
</tr>
</tbody>
</table>

(c) Name two examples of batholiths in Africa (2mks)

<table>
<thead>
<tr>
<th>Serengeti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyuir-Mu sali</td>
</tr>
</tbody>
</table>

46. Tectonic and compressional forces - Trembling of the ground - Examples folding, faulting volatellae
(d) Name the parts marked 6, 7, 11, 12 and 15 (5mks)

7. [Part Name]
11. [Part Name]
12. [Part Name]
15. [Part Name]

(e) Name three places where geysers can be found (3mks)

1. [Place Name]
2. [Place Name]
3. [Place Name]

Identify two effects of earthquake (2mks)

[Effect 1]
[Effect 2]

GOOD LUCK
Appendix B: Posttest on External Landform Processes (Form 3)

Instructions

Attempt all the questions in the spaces provided.

1. List four features resulting from wind erosion in arid areas (4mks)
   
   (b) Name the coastal parts marked A, B, D & S (4mks)  
   
   (c) Identify three types of coastal features formed through erosion and explain how each of them is formed (6mks)

2. Explain how Kenya has benefited from coastal landforms (8mks)

   (b) A, B, D, & S
   (c) Eroded cliffs, beaches, and estuaries
   (d) Agriculture, tourism, and fishery
(b) State and explain landforms produced by glacial erosion (12mks)

(c) Giving examples, explain how water in arid areas have resulted into formation of features (8mks)

3. Describe how different weathering process occur (6mks)

(b) Name and explain any four processes of slow mass wasting (6mks)

(c) Define glaciation (1mks)

4. With an aid of diagram, identify features of glacial deposition (5mks)
(b) Name the parts marked 1, 4, 6 & 9 (4mks)  

(c) Identify action of glacier (3mks)  

5. What is the significance of glaciation (8mks)  

(b) Identify lakes produced by glacial erosion and explain any three (10mks)  

(c) Explain the factors that are possible for rapid for mass wasting (8mks)
6. Name the parts marked F, M & W (3 mks) 

(b) Giving reasons explain why river rejuvenation occur (4mks)
POSTTEST ON GEOMORPHOLOGY (FORM 3)

Instructions

Attempt all the questions in the spaces provided.

1. List four features resulting from wind erosion in arid areas (4mks)
   - Wind, zeugia, milled sand, mushroom block
   (b) Name the coastal parts marked A, B, D & S (4mks)

   (c) Identify three types of coastal features formed through erosion and explain how each
   of them is formed (6mks)

2. Explain how Kenya has benefited from coastal landforms (8mks)
   - Fishing - marine fishing
   - Transport - establishment of harbours
   - Minerals - salt production
(b) State and explain landforms produced by glacial erosion (12mks)

Plucking - is a quarrying process where parts of rocks are
removed from the floor and sides of the valley, leaving them detached.

Abrasional - as the glacier moves, it scraped the floor and sides of the valley, rounding them.

(c) Giving examples, explain how water in arid areas have resulted into formation of features (8mks)

1. Washed -巧}
2. Inselberg - restoration

3. Describe how different weathering process occur (6mks)

Mechanical - breaking up of rocks into smaller particles
Chemical - reaction which takes place between minerals, water and gases
Biological - mechanical or chemical

(b) Name and explain any four processes of slow mass wasting (6mks)

1. Avalanches - gravitational fall of ice down the mountains
2. Soil creep - involves fine particles
3. Scler creep - slow movement of materials on hill

(c) Define glaciation (1mks)

Glaciation is the process of moving ice on surface of the earth.

4. With an aid of diagram, identify features of glacial deposition (5mks)
(b) Name the parts marked 1, 4, 6 & 9 (4mks)

(c) Identify action of glacier (3mks)

Erosion, deposition

5. What is the significance of glaciation (8mks)

Tourist attraction
Formation of lakes
Recreational
Source of rivers

(b) Identify lakes produced by glacial erosion and explain any three (10mks)

Ribbon, kettle, moraine, corrie, arete, cirque

Moraine - are materials eroded by glaciers downhill, these are deposited in front of a narrow hence forms a lake

Ribbon - are formed as a result of depressions caused by load of the debris

Cirque - when depression on the side of mountains are filled with water
(c) Explain the factors that are possible for rapid mass wasting (8mks)

- Landslides - sudden movement of the rock debris
- Mudslides - after heavy rainfall, materials move
- Avalanches - gravitational fall of ice
- Soil creep - slow movement of materials

---

6. Name the parts marked F, M & W (3 mks)

---

(b) Giving reasons explain why river rejuvenation occur (4mks)

- Change in base level due to fall in sea level
- Increase in the rivers flow: River capture
- Change in rock resistance
Appendix C: Questionnaire for Students

The questionnaire is for research purpose only and all response is going to be treated as confidential as possible.

Instructions

Please put a tick (✓) in one of the boxes provided under each question.

1. Gender:  Male  Female

2. Which of the following media is the best in learning process?
   Illustrations  Writing board  Print  Hypermedia
   And
   why………………………………………………………………………………………………………………

3. Which is the most preferred learning style?
   Demonstration  Visual  Observation

4. Which is the most popular instructional media used in your school by your teachers?
   …………………………………………………………………………………………………………………

5. How effective is hypermedia in learning process?
   Excellent  V. good  Good  Poor

PART II

Direction: Indicate the extent to which you agree with the following statements.

SA: Strongly Agreed
A: Agree
N: Not sure
D: Disagreed
SD: Strongly Disagreed
The questions are designed to ascertain how you prefer to learn and process information.

Respond to each question as honest as you can by putting a tick (√)

**In my class, I am able to use hypermedia to ****

<table>
<thead>
<tr>
<th>NO</th>
<th>STATEMENTS</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>SA</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Enhance my role as a student</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Remember something by picturing it in my mind</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Facilitate independent learning through access to education time, place and pace of my own choosing</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>4</td>
<td>Promote retention skills than lectures and illustrations</td>
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<tr>
<td>5</td>
<td>Make learning easier, faster and more interesting</td>
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<td>6</td>
<td>Critically interpret information presented</td>
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<tr>
<td>7</td>
<td>Actively construct my own knowledge in collaboration with peers</td>
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<tr>
<td>8</td>
<td>Support my learning according to my needs</td>
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<tr>
<td>9</td>
<td>Undertake self-directed learning</td>
<td></td>
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<tr>
<td>10</td>
<td>Facilitate creativity</td>
<td></td>
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<tr>
<td>11</td>
<td>As a preference to see information on a screen supplemented by images, text, graphics and animated</td>
<td></td>
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<tr>
<td>12</td>
<td>Provide motivation in learning activities</td>
<td></td>
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<tr>
<td>13</td>
<td>Demonstrate what I have learnt</td>
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<tr>
<td>14</td>
<td>Develop deep understanding about Geomorphology</td>
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<tr>
<td>15</td>
<td>Improve performance in Geography</td>
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<tr>
<td>16</td>
<td>Develop an understanding of the role and importance of hypermedia</td>
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<tr>
<td>17</td>
<td>Acquired knowledge, skills, abilities and attitudes to deal with hypermedia</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td>Enjoy lessons with hypermedia</td>
<td></td>
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</tbody>
</table>
Appendix D: Questionnaire for Teachers

Please use the spaces provided to answer all the following questions honestly as possible. Put a tick (✓) where appropriate.

**Determinants on use of Hypermedia**

1. Below are statements about the selection of media in teaching. Please indicate the extent to which they are related to use of hypermedia.

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives of the lesson</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Instructions:** Tick (✓) where appropriate

2. Hypermedia can extend the learning environment beyond the classroom?

Yes ☐ No ☐

Why

............................................................................................................................................................................................

3. Think about selecting activities / materials for teaching external landform processes, what challenges have you encountered? Rank according to challenges.

☐ Student’s preference to approach
Student’s individual difference
It is difficult to access the materials
Time allocation does not allow for organization of such activities
Books to guide such activity is not available
Student’s attitude does not allow presentation
Number of students in a class does not allow for such activities

4. Think of your own characteristics as a teacher, what prevents you from integrating hypermedia in pedagogy, rank them from the highest = 1 to lowest = 9

ICT competency
Leadership support
Technological support
Institutional characteristic
Attitude
Professional development skills
Teaching experience
Self-efficacy
Gender

PART II
Influence on use of Hypermedia

5. In teaching external landform processes, which technique do you employ most efficiently in class?

Illustrations  Hypermedia  Power point  Video

6. What observation have you made about your class on the role of student during hypermedia presentation?

Active  Passive

7. To what extent does use of hypermedia change your teaching method?

Not at all  Much  V. much
PART III

Attitude on use of Hypermedia

8. Using Geography as reference, rank your top five preferred instructional materials in accordance to your preferences

(1= Most preferred .................. 5= Least preferred

--------CD- ROM
-------- Hyper-studio
-------- SIGN- IT
-------- Hypermedia
-------- Power point presentation
-------- Blackboard (Chalkboard) or Whiteboard (markers)
-------- Field trip
-------- Illustrations (charts, posters)
9. Indicate the extent of your opinion by use of (√) to show how far the statement below apply to your school. Choose from the scale

**SA:** Strongly Agree  **A:** Agree **N:** Not sure **D:** Disagree **SD:** Strongly Disagree

<table>
<thead>
<tr>
<th>NO</th>
<th>STATEMENT</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I feel confident that hypermedia will help my students understand concept better</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Hypermedia is easy to use for teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hypermedia helps teachers to teach more effectively</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td>Hypermedia is a valuable tool for HI teachers</td>
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<td></td>
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</tr>
<tr>
<td>5</td>
<td>Using hypermedia in teaching leads to greater understanding of the abstract topics</td>
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</tr>
<tr>
<td>6</td>
<td>I feel confident I can use hypermedia in my lessons to meet certain learning goals</td>
<td></td>
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<tr>
<td>7</td>
<td>Hypermedia will positively change the way I teach</td>
<td></td>
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<tr>
<td>8</td>
<td>The idea of using hypermedia in pedagogy makes me skeptical</td>
<td></td>
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<tr>
<td>9</td>
<td>Hypermedia helps students learn because they express their thinking in better and different ways</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>I feel confident since hypermedia enhances learning activities for my students</td>
<td></td>
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<tr>
<td>11</td>
<td>The principal encourages me to integrate hypermedia</td>
<td></td>
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<tr>
<td>12</td>
<td>There are other teachers in my school who use hypermedia</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>The technical infrastructure in my school is adequate</td>
<td></td>
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</tr>
<tr>
<td>14</td>
<td>The use of hypermedia as a learning tool excites me</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>Hypermedia is not conducive to good teaching because it creates technical problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Whatever hypermedia can do, I can do equally well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Disability of the learners limit the effective use of hypermedia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>The scope of Geography and nature of curriculum limit the effective use of hypermedia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Time constrains limit my interest in using hypermedia</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>20</td>
<td>My preferred teaching technique (illustrations- charts, diagrams, posters) greatly enhances my teaching effectiveness</td>
<td></td>
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</tr>
</tbody>
</table>
Appendix E: Interview Schedule For Principals

1. How can we prepare teachers and schools for life-long professional development?
2. How can teachers design education with aspiring activities for learners?
3. What frameworks and approaches do we need for modern ICT use in the classroom?
4. How do you ensure that money given to special learners for instructional materials is used as per specifications?
5. How can teachers use resources and expertise to optimize the learning settings that they are responsible for and maximize learners achievement?
6. How much is budgeted for purchase of instructional media?
7. What percentage is allocated for ICT instructions?
8. Is there a policy guiding the use of instructional media in schools?
9. How confident are teachers in using hypermedia in pedagogy?
10. Do you have any comment or suggestion for the policy makers on use of ICT in the classroom?
Appendix F: Sketch Map of Kenya Showing the Counties
A TRAINING MANUAL FOR
HYPERMEDIA INTEGRATION IN
HEARING IMPAIRED SECONDARY SCHOOLS
GEOGRAPHY EDUCATION

TABLE OF CONTENTS

1.0 Introduction--------------------------------------------------------------- 1
1.0 Introduction

This training manual has been developed to guide teachers in teaching Geography to integrate hypermedia in HI education. The guide outlines the knowledge, skills and attitudes the implementers need to be equipped with in preparation for integrating hypermedia in their schools. Using hypermedia in teaching and learning is no longer just an option in this
digitally connected world. One of the major outputs from this media is that it contains quality educational resources for integration in teaching and learning. Training Guide on hypermedia Integration for Teaching and Learning has been developed to help teachers on the application of this resource. It is meant to supplement the traditional teaching capacities of teachers in enhancing the teaching / learning experience through the effective and appropriate use of ICT. The overall design of the hypermedia training program is based on the Stages of Learning Model and adapted to computer based instruction (CBI). According to this direct instruction model, effective instruction requires a match between CBI design and learner objectives as reflected in progressive, changing performance.

1.1 Guide details

The Guide details six sessions spread over a two-day period. Each session includes varied training activities and a host of supplementary materials.

• **Session 1** provides an overview of the entire program, including the goals and objectives of the training and a brief background on the hypermedia resources.

• **Session 2** reviews instructional design principles that are essential in crafting good lessons.

• **Session 3** clarifies teachers’ understanding of key hypermedia ideas and recaps of various instructional media available for classroom use.

• **Session 4** enumerates factors to consider in selecting appropriate instructional materials, as well as various points in the lesson where hypermedia resources may be integrated.

• **Session 5** allows teachers to navigate through hypermedia and provides hands-on practice in integrating the resource to enhance an existing lesson plan.

• **Session 6** gives opportunities for peer feedback, revision, and showcasing of enhanced lessons. Assessment opportunities are interspersed throughout the program.

2.0 PRE-TRAINING REQUIREMENTS

**Trainer Preparation**

The most important resource of any training or workshop is the trainer himself/herself. For this specific training workshop, he/she must be equipped with the following:

- Basic computing skills, which include knowledge of simple computer functions and commands, desktop applications, web browsers and online tools and some knowledge of troubleshooting.
- Pedagogical techniques and strategies to effectively deliver content.
- Familiarity with the material that is being shared.

Prior to training, must be aware of the various types of resources available as well as their use and application in the classroom.

2.1 Teachers Information
It is important to gather as much data as necessary about the teachers for the training design to match their needs. This is done at least one week before the training. The following questions must be answered:

- **Who will participate?**
- **What are their subject areas? Classes taught? How many years have they been teaching?**
- **Which specific resources available in the school match the participants’ subject areas and levels?**
- **What ICT skills do the teachers already possess?**
- **What are the needs and attitudes of the teachers towards ICT?**

### 2.2 Training Site Setup

Since the training involves hands-on activities, this requires the availability of a venue, certain equipment and materials as well as the accomplishment of specific tasks e.g Internet or wi-fi enabled, Windows operating system, Desktop computer or laptop, Video clips on Multimedia, Speakers, LCD Projector connected to the trainer’s computer, White screen

### 2.3 A 2-DAY SCHEDULE

<table>
<thead>
<tr>
<th>TIME</th>
<th>DESCRIPTION</th>
<th>ESTIMATED DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00-11.00</td>
<td><strong>Welcome and introduction</strong>&lt;br&gt;1. Presentation of training design&lt;br&gt;2. Background of ICT in instructions&lt;br&gt;<strong>The Elements of Good Instructional Design</strong>&lt;br&gt;Defining hypermedia&lt;br&gt;1. Hypermedia in Education&lt;br&gt;2. Why Integrate?</td>
<td>2hrs</td>
</tr>
<tr>
<td>11.30-1.00</td>
<td></td>
<td>2hrs 30min</td>
</tr>
<tr>
<td>2.00-4.30</td>
<td>1. Challenges to Integration&lt;br&gt;2. Presentation of Various hypermedia Media&lt;br&gt;3. Choosing Media Format</td>
<td>2hrs 30min</td>
</tr>
<tr>
<td>12.00-1.00</td>
<td></td>
<td>1hr</td>
</tr>
<tr>
<td>2.00-5.00</td>
<td></td>
<td>3hrs</td>
</tr>
</tbody>
</table>

### 2.3 Training Design

This training program was designed using the Technological, Pedagogical and Content (TPACK) Framework (Mishra and Koehler, 2006) derived from Pedagogical Content Knowledge (Shulman, 1986). The framework emphasizes that effective teachers should not
only possess mastery of their subject areas (content knowledge) nor teaching strategies and techniques (pedagogical knowledge), but also of appropriate technological tools and resources (technological knowledge). These three aspects are integrated and work in synergy to create a multi-faceted type of knowledge. It is as important to contextualize TPACK; that is, to understand its implications and applications in one’s immediate environment. This is the kind of layered understanding that must be cultivated in teachers and learners, which is what this Guide aims to do.

The trainer must then take this into account;

Why is there a need to conduct training at this time? (rationale)

What does the training intend to achieve? (learning objectives)

What will the training focus on? (topics)

How will the participants apply the knowledge they have learned? (target applications/outcomes)

3.0 ICT Tools for Instructions

ICT Tools are technological devices in form of hardware and software that help communicate, develop, disseminate, store and manage information. Copycat is a computer gaming, it is an interactive educational video used to develop sign language skills using gesture. Sign-language interpreters can be delivered using computer-generated signing avatars.

3.1 Digital Camera and Camcorders;

Camcorders are used to record demonstration lessons which are played back to learners and even teachers to promote learning. Digital cameras are used to take pictures. The teacher then downloads the pictures, imports them into Word or PowerPoint, manipulates the images, uses still images in an iMovie, create an iMovie and a Web photo gallery using Photoshop Elements. Teachers need to teach learners how to use a digital camera. Teachers use the camera to enhance lessons, for student assignments, for collaborative projects, to enhance their class Web pages, to display student work, to assist in teaching languages, to encourage effort through immediate recognition of achievement, and to record student progress. Use of digital cameras has been highly motivational and has contributed to greater integration of technology into the curriculum and is an effective method to improve communication.

3.2 Television
We use television every day without realizing that in itself is a hypermedia. We use it in
everyday life watching football, reading news headlines, watching movie and
listening to a single audio clip by themselves are linear. Hypermedia is much more on TV
we watch ballgame, printed headlines or weather offered, we also watch recorded
videos, music video or a rental movie or we may have even requested direction to the
nearest restaurant and seen them presented in an interactive format on TV screen. This is only one of the myriad of
examples of how we are living in a world of
hypermedia. Television provides teachers and learners an opportunity to access learning
resources that are located at distant places that may not be reached easily. It provides
demonstration of classroom management and best practices to help teachers to implement
new teaching techniques. Has potential to reach large numbers of learners. It also promotes
life skills i.e. careers in photography and video production.

3.3. Mobile phones

Mobile phone promotes collaboration among teachers and learners. Sign my word is a mobile
video game developed by the “seek and sign”. Teachers can use mobile phones for recording
video, taking photos and sending assignments.

3.4 Monitor

A monitor (or screen) is the most commonly used output device. They come in different sizes, shapes and
forms. Large monitors make observations easier and clearer. Modern operating systems can operate a dual
monitor set up.
3.5 Digital Projector

Is a device which connects to a computer and is used to project the video output from the computer to wallpaper or a screen. In classrooms they are used on a white screen or wall. Can be placed on a stand or mounted permanently on a ceiling hanger. Digital Projectors are used in classroom teaching, staff training sessions, making a presentation to the audience home cinemas.

3.6 Devices for Persons with Disabilities (PWD)

ICT is increasingly being used as a tool for improving the quality of life, efficiency and effectiveness. Different ICT tools assist people with disabilities by providing them with learning opportunities, capabilities and potential. Web Content Accessibility Guidelines (WCAG) 2.0 provides a wide range of recommendations for making Web content more accessible to a wider range of people with disabilities such as visually impaired hearing impaired, learning disabilities, cognitive limitations, limited movement, speech disabilities and photosensitivity. A combination of these web applications developed using these guidelines often make Web content user friendly to the learners.

The types of technology which are most beneficial to those with HI include CD-ROM.

3.7 Devices for PWDs in learning should be able to:

a. Provide text alternatives for any non-text content;

b. Provide alternatives for time-based media;

c. Create content that can be presented in different ways without losing information or structure;

d. Make it easier for users to see and hear;

e. Make all functionality available from a keyboard;

f. Provide users enough time to read and use content;

g. Make text content readable and understandable;

h. Help users avoid and correct mistakes;
i. Maximize compatibility with current and future user agents including assistive technologies.

### 4.0 What is Hypermedia?

Hypermedia involves use of animations, sound, text, video, images and pictures in a single application.

What exactly is hypermedia? It combines use of hyperlinks and multimedia sources to clickable media. It can be used as instructional aid tool by the teacher and as a self-guided learning by the student. Multimedia allows the user to access multimedia forms of media and text instantly and use those forms interchangeably and interactively. It goes beyond simple media or multimedia to provide an interactive approach that is not tied to a particular order or sequence.

### 4.1 Steps towards Hypermedia Integration

**Introduction:** Human beings have continuously been improving the way they live by developing new technologies to assist them perform various chores efficiently. Presently, hypermedia is the driver of classroom systems. This manual seeks to introduce changes in teaching and learning by empowering the teachers to conceptualize importance of integration and identify effective approaches for hypermedia in education.

### 4.2 Specific Objectives

By the end of this training, teacher should be able to:

a. Identify hypermedia tools for teaching and learning;

b. Explain hypermedia integration and its importance in teaching and learning;

c. Identify effective hypermedia approaches in teaching and learning;

d. Discuss how hypermedia can be integrated in teaching and learning.

### 4.3 Hypermedia Tools for Teaching and Learning

**Task: 1**

Guide the teachers to list as many tools as possible in their school that may be used for hypermedia integration. Highlight how the tools have been used in the teaching and learning process.

Allow them to share some of their experiences.

### 4.4 Importance of Hypermedia Integration in Teaching and Learning
Times change hence classroom practices and tools need to change because teaching is aimed at preparing learners to fit in a changing society. Many of the benefits of hypermedia-based instruction relate to its nonlinear and learner control capabilities which allow users to customize their approach to learning. A well-designed hypermedia program lets the user explore the instructional material through computer-managed linkages incorporating several media-text, graphics, video, still frames, animated demonstrations, sound, and audio. Hypermedia is a valuable tool which benefits the learners in the following way;

- Stimulate learner’s imagination
- Enhance memory of what is learnt. It is often said students retain 10% what they read 20% what they hear and 50% what they hear and see.
- Arouse learners’ interest – which is useful in focusing behavior and determining what the learner becomes.
- Promote active participation “I’m told I forget, I see I remember, I do I understand
- Promotion of learners self-esteem/confidence
- Enhance understanding of concepts while discouraging rote memory Time saving e.g. difficult concepts are easily explained - Audio Visual programmes especially make processes and explanations easy to follow.
- Help in skills development
- Information is disseminated faster and in a cheaper way.
- The process should have the potential to engage teacher/ learner interaction at the following levels within the learning environment: learner – content, learner – learners, Learner- teacher, teacher- teacher.

Task 2

Guide the teachers to discuss the challenges they anticipate in integrating hypermedia in the classroom.

Suggest how the challenges can be addressed effectively by teachers in their current capacity.

Allow them share the expected challenges.

5.5 Approaches to Integration of Hypermedia in Teaching and Learning

The approaches should include;

a. The level of the learners
b. The topic and concept to be taught
c. The appropriate ICTs available to be used
d. When and how to use the ICTs
e. How to involve the learners
f. How to evaluate the learning outcome

In view of this, hypermedia integration in teaching and learning is no longer an option. In HI schools, the areas in which hypermedia should be integrated are: Geography, Languages, Chemistry, Biology among others.

6.0 SAMPLE OF HYPERMEDIA INTEGRATED LESSON:
The use of hypermedia to teach coastal waves resulting features

Subject: Geography

Date: Wednesday: 8th June, 2016

Week Lesson No. 2

Time: 2.40 – 3.20p.m

Topic: External Landforms

Sub-Topic: Coastal waves and resulting features

Objectives:

By the end of the lesson, the learner should be able to:

i. Identify types of waves

ii. State the agents of waves

iii. Explain how coastal features are formed through the agent

   a) erosion (b) transportation (c) deposition

iv. Identify features formed as a result of coastal waves

   b) Give example of features formed as a result of coastal waves

v. Differentiate between features formed as a result of erosion and deposition

<table>
<thead>
<tr>
<th>Time</th>
<th>Teaching Activities</th>
<th>Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>3min</td>
<td><strong>Introduction</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recap the previous lesson</td>
<td></td>
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<tr>
<td></td>
<td>Define waves, briefly explain how waves are formed</td>
<td></td>
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<tr>
<td></td>
<td>oscillation of water friction of wind</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Picture showing wavelength</td>
<td></td>
</tr>
<tr>
<td></td>
<td>oscillation of water friction of wind</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Picture showing wavelength</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Learners listen, responding to teacher’s questions</td>
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<tr>
<td></td>
<td>-observation</td>
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</tbody>
</table>

| 25min | **Development** |
|       | **Step 1** |
|       | Types of waves |
|       | destructive and constructive waves |
|       | Pictures of a brealling wave |
|       | Learners listen, respond to teacher’s questions |

<table>
<thead>
<tr>
<th></th>
<th><strong>Development</strong></th>
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<tbody>
<tr>
<td></td>
<td><strong>Step 2</strong></td>
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<tr>
<td></td>
<td>Agents of waves</td>
</tr>
<tr>
<td></td>
<td>transportation, erosion, deposition</td>
</tr>
<tr>
<td></td>
<td>Learners responding to questions, taking notes, and identify work of waves</td>
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<tr>
<td></td>
<td>-observation</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>Step 3</strong></th>
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<tbody>
<tr>
<td></td>
<td>Discuss erosive work by waves e.g corrosion, hydraulic, attrition,</td>
</tr>
<tr>
<td></td>
<td>Discussions, responding to questions giving examples of resulting features</td>
</tr>
</tbody>
</table>
solution.
- Chalkboard
- Illustrations
- Explain how wave erosion occurs
- Give examples of landforms resulting from wave erosion e.g. cliff, arches, caves, stack, stumps, geos, blow-holes and geo, wave cut platforms

**Step 4**
Use LCD projector, laptop, display screen to show landform processes by wave action

Watching hypermedia, answering questions

5min **Conclusion**

Review key points of the lesson
- Maps
- Chalkboard

**Writing board plan**

<table>
<thead>
<tr>
<th>Rough work</th>
<th>Geography 8/6/2016 COASTAL WAVES AND RESULTING FEATURES</th>
<th>Illustrations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Summary of the work</td>
<td></td>
</tr>
</tbody>
</table>

**Self-evaluation**

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**7.0 HYPERMEDIA INTEGRATION CHECKLIST**

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>✓ or X</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner’s Context</td>
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</tr>
<tr>
<td>Is the resource appropriate for my students’ age, level, and backgrounds</td>
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<tr>
<td>Does it match their skill level? Does it accommodate their learning styles?</td>
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</tr>
<tr>
<td>Does it accommodate special needs my students have?</td>
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<tr>
<td>Is it parallel with the attitudes, values, and culture my students</td>
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<tr>
<td>Does the resource match the situation in which I will teach?</td>
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<td></td>
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<tr>
<td>Teacher’s Context</td>
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</tr>
<tr>
<td><strong>Am I familiar with this type of ICT?</strong></td>
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<tr>
<td><strong>Am I capable of using this resource?</strong></td>
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<tr>
<td><strong>Can I operate the equipment necessary in using this resource?</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>If not, is there someone who can help me with it?</strong></td>
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</tr>
</tbody>
</table>

**Accessibility**
- Can I/the school afford this resource?
- Is the necessary equipment available?
- Is the ratio of resource to students at least satisfactory?
- Is there an open resource similar to this resource which I could use instead?
- Is this resource safe to use? Does it come from a secure and reputable source?

**Pedagogical Use**
- Is there a place for this resource in my lesson plan? Will it serve a specific purpose?
- Is the use of this resource aligned with my objectives?
- Is the use of this resource aligned with my evaluation?
- Does this resource match my instructional method?
- Does this resource match my instructional activities?

**Content**
- Is the content accurate?
- Is it in a language that my students will understand?
- Are the ideas well-organized?
- Is the density and complexity of ideas just right for the level I am teaching?

**Quality**
- Are the text/visuals and video clips of the resource high-quality?
- Is it readable/visible from the ends of my venue?

**Learning Environment**
- Is the resource appropriate to my class size?
- Is the resource appropriate to the space where I will teach?

**Medium**
- Is the resource in a suitable media format?
- Do the features of this medium address the other factors mentioned above?
Appendix H: A Sample of a Lesson Plan

Subject: Geography  Date:  Wednesday:  8th June, 2016

Week Lesson No. 2  Time: 2.40 – 3.20p.m

Topic: External Landforms

Sub-Topic: Glaciation and resulting features

Objectives:

By the end of the lesson, the learner should be able to:

i.  Define the term glacier

ii.  Explain how glacial erosion takes place

   a) Identify features formed as a result of glacial erosion

   b) Give example of features formed as a result of glacial erosion

iii. Explain how glacial deposition takes place

   a) Identify features formed as a result of glacial deposition

   b) Give example of features formed as a result of glacial deposition

iv. Differentiate between glacial erosion and glacial deposition

<table>
<thead>
<tr>
<th>Time</th>
<th>Teaching Activities</th>
<th>Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min</td>
<td><strong>Introduction</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agents of erosion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-wind, water</td>
<td><strong>Learners listen, responding to teacher’s questions.</strong></td>
</tr>
<tr>
<td></td>
<td>-Pictures of various erosion features</td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
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<td></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Definition of glacier</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss the work of glacier erosion, transportation and deposition and identify work of glacier</td>
<td></td>
<td></td>
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<tr>
<td>-giving examples of resulting features</td>
<td></td>
<td></td>
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<tr>
<td><strong>Step 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Explain how glacial erosion occurs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Give examples of landforms resulting from glacial erosion e.g corrie (cirque), pyramidal peaks and arêtes, hanging valleys and U-shaped valleys, fiords and Roche mountanee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalkboard</td>
<td></td>
<td></td>
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<tr>
<td>-Illustrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Explain how glacial deposition occurs</td>
<td></td>
<td></td>
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<tr>
<td>-Give examples of landforms resulting from glacial deposition e.g morraines, erratics, drumlins, crag and tails, eskers and outwash plains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalkboard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illustrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use LCD projector, laptop and display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learners listen, responding to teacher’s questions and take notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learners responding to questions, take notes,</td>
<td></td>
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</tr>
<tr>
<td>Discussions, responding to questions</td>
<td></td>
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<tr>
<td>Answering questions and giving examples deposition landforms</td>
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</tbody>
</table>
screen to show
-landform processes by glacial action
-World map showing main areas where glacier are found e.g highlands, polar regions

Watching hypermedia, answering questions

5 min

**Conclusion**

Review key points of the lesson

- Maps
- Chalkboard

Learners’ respond to questions

Self-evaluation

Writing Board Plan

<table>
<thead>
<tr>
<th>Rough work</th>
<th>Geography GLACIATION AND RESULTING FEATURES</th>
<th>Illustrations</th>
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<td>8th/6/2016</td>
<td>Summary of the work</td>
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**Lesson notes**

**Definition:** Glaciation is the action of moving ice.

It is a process by which glaciers change and surface on a large scale

The work of glacier involves erosion, transportation and deposition

**Features of glacial erosion**

Glacial erosion takes pace in highland areas

Falling snow on top of mountains collect in hallows, accumulates to form ice.

The ice will spill out of hallows and start flowing downhill as glacier.
The glacier moves downhill and erodes the valleys through plucking and abrasion.

**Landforms produced by glacial:** corrie (cirque), pyramidal peaks and arêtes, hanging valleys and U-shaped valleys, fiords and Roche moutanee

**Features of glacial deposition**

Glacial deposition takes place at the lower part of the mountain slopes.

This occurs when glacier melts

**Examples:** moraines, erratics, drumlins, crag and tails, eskers and outwash plains
Appendix I: Tables Of Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>KSL</th>
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<th>Geography</th>
<th>Math</th>
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</table>
Appendix J: Research Permit

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do so may lead to the cancellation of your permit.

2. Government Officers will not be interviewed without prior appointment.

3. No questionnaire will be used unless it has been approved.

4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.

5. You are required to submit at least two (2) hard copies and one (1) soft copy of your final report, the Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT MRS. OBONDO GAUDENCE, ALSO KNOWN AS GADO NASIROMBA, HOMA-BAY, HAS BEEN PERMITTED TO CONDUCT RESEARCH IN BUNGOMA, MIGORI, NANDI, SIAYA COUNTIES ON THE TOPIC: EFFECTS OF HYPERMEDIA ON LEARNING ACHIEVEMENT IN GEOPHYSICS FOR HEARING IMPAIRED LEARNERS IN MIXED SPECIAL SECONDARY SCHOOLS IN KENYA.

PERMIT NO.: 1, NACOSTI/P/16/19435/10831
Date Of Issue: 2nd May, 2016
Fee Received: Ksh. 2000

Director General, National Commission for Science, Technology & Innovation

REPUBLIC OF KENYA
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Signature

Appllicant's Signature