

Adapted Hypermedia Shapes the Achievement of Geography: A Case of Hearing Impaired Students in Kenya

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Abstract: - The hearing impaired (HI) students often encounter communication problems in classroom. Yet some specific media can facilitate and enhance their learning. This study reports on the development of hypermedia educational instruction that supports HI student's achievement in Geomorphology. The objectives were to find out; the achievement of students exposed to hypermedia lesson in Geomorphology and gender disparity. 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 assumed a pragmatic research paradigm adopting mixed methods using quasi experimental approach involving Solomon four nonequivalent control group design. Simple random sampling procedure was used to obtain four schools, two for experiment and two for control group. Data collection instruments were pre-test, post-test and questionnaire. Data were analyzed using descriptive and inferential statistics. The results showed that use of hypermedia for teaching HI resulted in higher achievement, girls improved more than boys. These findings may create awareness and need for integrating hypermedia in pedagogy for improved performance, thus helping learners to focus attention that promotes teachers' instructional technique. The following recommendations were made; review of curriculum and digitize HI content, improve ICT infrastructure and facilities, teachers should exploit the potential of hypermedia to develop a wide range of student's skills.

Key words: Hypermedia, Geomorphology, Hearing Impaired, Achievement

I. BACKGROUND

The world is moving very fast into a digital multiple periods in an environment characterized by ICT with its tenets that can shape teaching and learning process. Disability has largely been invisible in the instructional implementation, and is rarely included in national policies and programmes. This has perpetuated a situation in which environmental barriers are still preventing persons with disabilities from accessing, participating and being fully-included in education activities.

Hearing impairments (HI) present challenges to quality education both pedagogically and logistically. Many of the learning strategies used by colleague students who can hear representations and processes of ideas are unavailable for students with HI, and teaching methods tend to be audio

based. Many HI learners across Kenya cannot benefit fully from a traditional instruction because of hearing impairment which limits their ability to actively participate in classroom learning activities. Sign is a visually-based, not auditory, code with a grammar different from that of written for example "processing land instead of land processing". Deaf students often miss out on secondary learning opportunities that are afforded to hearing peers (Parton, 2006). Fgatabu (2013) found that sign language has a great effect of performance on learners with hearing impairment. 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). Inclusive ICTs can enable persons with disabilities as agents and beneficiaries to fully access education, skills training, employment opportunities and among others. When information is available in various forms (alternative formats), it reaches everyone who may be interested. Hypermedia also caters to various learning styles and individual learning needs by providing information in a multitude of media formats.

It is evidenced that sign language techniques were the widely used as a learning resource in the school and that training skills affect the performance of learners with hearing impairment to a very great extent. These findings reinforce the theory that educational disparity between HI and hearing students is owe more by the teachers than the students themselves (Lang & Pagliaro, 2007). We believe hypermedia offers unique possibilities to improve access to and quality of education to students with HI. Semmel & Frick (2010), the change in academic achievement can be determined by observing gains on achievement in examinations and teachers view of the learner's change.

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. Bashir et al. (2014) denotes 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. Adoyo (2004) affirms that deaf students in Kenya have consistently trailed behind their hearing counterparts in academic performance. Therefore Adesina (2009) and Obanyan (2010) come to a conclusion that teachers are the key pointers and

determinant of a successive education. They make practical choices of tools and media that will shape the way students learn, express themselves and perform (Drayton et al., 2010). In years, secondary schools for the deaf have registered mean score of D- (2 out of possible 12) in Geography. Kiboss (2012) found that Kenyan high school student with hearing impairment scored lower in math tasks. Further, Kaimenyi (2014, March 3) in his press statement, indicated that "there is decline in Geography performance". 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). Other studies consider KSL as a medium of instruction may also contribute to poor performance because exams are set in English, switching between KSL to English may cause misunderstanding (Adoyo, 2001, 2004, Ogada, 2012). The previous research shows that hypermedia instruction embodies all instructional forms that accommodate the needs and disabilities of different hearing impaired learners (Andrei et al., 2013), therefore can alleviate this issue in physical Geography education. New technologies proved to be successful through many researches for improving the ability of handicapped children. It is important to identify the most effective strategies in the content delivery process to achieve objectives (Alias, 2010). Hashim et al. (2013) pointed out that problems that hard-of-hearing students face in the traditional classroom provide opportunities for the hypermedia movement. Northern Environmental Education Development (2011) presents new opportunities to develop resources such as hypermedia to shape teaching and learning. Debates still exist as to the pedagogical value of many hypermedia applications and, despite multiple experiments, researchers have failed to resolve many of the basic issues concerning the use of this technology for instruction. The objectives were to find out; the achievement of students exposed to hypermedia lesson in Geomorphology and gender disparity.

The study employed the theory of constructivism. The theory operates on the premise that adaptive instructional resources should be interactive and support learner centeredness and should shape the learning of the HI learners. The strengths of constructivism lie in its emphasis on learning as a process of personal understanding and development of meaning on ways which are active and interpretive. In this domain learning is viewed as a construction of meaning rather than as the memorization of facts. Constructivists suggest that methodologies such as hypermedia simulations are more beneficial to learners, allowing them to explore information freely and apply their own learning styles. The purpose of the study was to investigate the effect of adapted hypermedia on learning achievement in Geography for hearing impaired learners. In response to these, the broad objective was to investigate if hypermedia can enhance learning of Geography and the null hypothesis stating there is no significant difference between learners taught using hypermedia and

those taught without hypermedia was tested at significance level of 0.05α .

II. METHODOLOGY

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 a transformative procedure (Creswell, 2013). The study used quasi experimental design involving Solomons' four non-equivalent control group design. It was conducted in Kenya in. The target population were twenty hearing impaired mixed special secondary schools in Kenya. There are twenty principals, forty Geography teachers and 835 students. The four schools were randomly assigned to experimental and control groups. A total of 79 students and 10 teachers were sampled. Geography achievement test (GAT) was used to collect data. Validity was ascertained by the experts and reliability conducted in two schools through test-retest method. Descriptive analysis was used to summarize data, which was presented in tables. Inferential statistic involving t-test for testing hypothesis was employed.

III. LITERATURE REVIEW

3.1. Theories of Integrating Hypermedia in Teaching HI Learners

Mayer cognitive theory of multimedia learning puts emphasis on the strength of brain to store and recall well images as opposed to text. Technology has changed the way we teach and learn. 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. 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).

Gardner theory of multiple intelligent (MI) 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. 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. 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). In relation to this theory, visual cue is the most important element in developing the hypermedia for the HI learners (Faizah & Ariffin, 2010).

3.2. *Hypermedia Shapes the Learning for Hearing Impaired Students*

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). Therefore it is important to identify the most effective strategies in the content delivery process to achieve learning objectives (Alias, 2010). Further 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. It is evidenced that use of hypermedia in classroom is beneficial on many points. It can be more effective than traditional instruction by keeping students' attention, eases, students become more involved in learning process, and information is accessed more quickly. It is transforming the way we teach and learn by transforming the process and the outcome (Eysink et al., 2009). Hypermedia in the classroom holds potential as a tool to allow students to construct their own knowledge by making meaningful connections. It 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). Dangsaart et al. (2008) describe adaptive hypermedia as an alternative to traditional one-size fit-all approach. 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. However Paolucci (2007) suggest that the complexity of hypermedia in the classroom should be based on the subject matter, learners' characteristics and project objectives. Hence different learners will need different models of hypermedia.

3.3. *Achievement of Boys and Girls on Use of Hypermedia*

(Kluwin & Stinson, 2013) revealed that students with HI instructed in general education schools score highly pertains to academic achievements than their colleagues in self-contained schools. 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. Nwona (2015) noted imbalance against women in science and technology. In teaching Geography, research suggests that a strong masculine bias exists in the map reading (Gender Geography, 2010).

Zember & Blume (2011) reported that most studies show that girls perform better than boys in schools. But Agbuga & Xiang (2008) report that boys recorded high performance than girls in Geography. These studies suggested that boys were less anxious, more confident and like using hypermedia more than girls. The result is similar to that of Kubiato et al. (2012), the influence of gender was significant and the boys achieved statistically significant high scores. Francis et al. (2008) argue that girls are improving more rapidly than boys. 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. This is in line with Esiobu (2011) who reports that gender in global and technological perspective is no longer a significant impediment for performance. The African value based on gender is also fading away and giving way to global view (Adegbija, 2006).

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 is gap in test score in all subjects. This is attributed to methods of teaching and preferred learning styles (Skeleton, 2007). Research has demonstrated that different teaching methods produce different results therefore the identification of the best teaching strategy must be done if the best results must be achieved.

IV. THE FINDINGS AND DISCUSSION

4.1. *Integration of Hypermedia and Students Academic Achievement*

The experimental group was exposed to hypermedia and control taught by regular method of teaching (RMT). The finding recoded high mean scores gain (47.07%, 42.13%) by the experimental group who achieved statistically significantly higher scores in the GAT than control group as revealed in table 1. 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.

TABLE 1: GAT PRE-TEST, POST-TEST MEANS AND STANDARD DEVIATION

Variables	N	Pre-test		Post-test	
		Mean	Sd	Mean	Sd
Conventional C ₁	15	48.07	9.1	47.07	8.6
Conventional C ₂	23	-----	-----	42.13	8.7
Use of hypermedia E ₁	21	43.62	8.0	54.71	8.5
Use of hypermedia E ₂	20	-----	-----	53.2	9.3

N= 79

To establish whether there is any significant difference in achievement between students exposed to hypermedia and those taught through conventional method. The achievement of the students on concept is attributed to several factors. To minimize on the effect of intervening variable, it was important to establish behavior of two groups and compare the results with the group whose entry behavior were not established. Pre-test was administered to two groups, one from control and the other from experimental. Before the use of any media, the entry behavior must be established. Pretest itself is an intervening variable because it prepares the subjects for what is expected at the end of the exercise. However pre-test did not have significant. As shown in table 1, there is no evidence on the means that the subjects had prior knowledge. Pre- test had a mean of 48.07 and posttest 47.07, and experimental pre-test mean was 43.63 and posttest 54.71. The increase in mean was probably due to treatment for one month. Hypermedia is an instructional media capable of improving achievement especially for the HI learners who are visual learners. It allows the students to engage more fully with the subject matter at hand and facilitates deep understanding. The finding concurs with Schmidt et al. (2009) who affirm that hypermedia has ability to develop important understanding and reasoning skills such as critical thinking, problem solving and prioritization.

4.2. Pre-Test Data Analysis

Table 2 reveals Geography means score of experimental and control groups on pre-test GAT. Means scores were analyzed using t-test for independent samples analysis. The results indicates that control had (M=48.07; SD=8.6) and experimental registered (M= 43.6; SD= 8.0). These scores are relatively low, this could be attributed to the fact that topics are abstract and terminologies are difficult to explain effectively in KSL. 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 2: Pre-test Data Analysis

Group	Mean	Standard deviation
Control	48.07	8.6
Experimental	43.6	8.0

Data in table 3 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 3: t-test of Pre-test Means between Experimental and Control Group

Variable	Df	Sig. (2 tailed)	Mean difference	Std err difference	95% interval of the diff	
					Lower	Upper
Pre-test	34	0.130	4.45	2.86	-1.372	10.268

The study carried out the t-test on the means of experimental and control to find out whether the means are significantly different. Since the 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 which 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 4a: Pre-test between Control Boys and Girls

Gender	N	Mean	Sd	df	t-value	p-value
Male	12	46.58	9.6	34	0.73	0.942
Female	3	54	2.65			

P > 0.05, Not Significant

On comparing the means of control boys and girls, the statistic output in table 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 0.05. 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 0.05 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 method of teaching. 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 4.7b 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 Kubiako et al. (2012), the influence of gender was significant and the boys achieved statistically significant high scores.

Table 4b: Pre-test between Experimental Boys and Girls

Gender	N	Mean	Sd	Df	t-test	p-value
Male	14	44.64	7.4	35	4.4	0.000
Female	7	41.57	9.3			

$P < 0.05$, Significant

Table 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.

4.3. Posttest Analysis of Data

After a period of four weeks of learning Geomorphology, a posttest was administered to all the groups. This time the means were relatively high as compared to pretest. Experimental had a mean of 53 and control 47.1 as table 5 indicates. This could be attributed to the teaching instruction that had been used. Research has demonstrated that different teaching methods 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).

Table 5: Posttest Means at Group Level

Group	N	Mean	SD
Experimental	38	53	9
Control	41	47.1	8.5

It is evidenced from table 5 that students who were taught by use of hypermedia achieved statistical significantly higher scores in the GAT compared to those taught through regular teaching method. Table 5 reveals the results of different groups that sat for the posttest. Experimental group had a mean of 53 and control 47.1. This descriptive analysis shows a probability of experimental group being superior in achievement. However this can only be confirmed by an inferential statistic that will be carried out at a later stage.

Table 6: Posttest Means and Standard Deviation at School Level

School	Posttest	SD
Experimental (pre-test)	54.71	8.5
Experimental	53.20	9.3
Control (pre-test)	47.07	8.6
Control	47.13	8.7

The results as per schools are shown in the table 6 as follows; experimental pre-test had a mean of 54.71, experimental posttest only recorded a mean of 53.20. 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. However this is subject to confirmation after inferential statistic is carried out on the data as illustrated in table 7.

Table 7: t-test of Posttest and Pretest Difference

Variables	Df	Sig. (2 tailed)	Mean difference	Std err difference	95% confidence interval difference	
					Lower	Upper
Pre-test / posttest	35	0.000	6.056	1.377	3.261	8.850

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 7 reveals. The t-test p-value was 0.000 as table 7 indicates. The t-test p-value is lower as compared to the set alpha of 0.05. This shows that there is statistically significant difference in the pre-test and posttest. The findings that high achievement was recorded on the posttest GAT could be due to some groups being given treatment. 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 achievement in learning (ICM, 2012).

Table 8: t-test of Posttest Means between Control and Experimental Groups

Variables	df	Sig. (2 tailed)	Mean Difference	Std err Difference	95% confidence interval difference	
					Lower	Upper
Posttest	77	0.001	6.870	1.952	10.157	2.983

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 methods of teaching. The t-test p-value is 0.001 less than alpha 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 achievement in learning Geomorphology in Geography by HI learners. This is because hypermedia enhances ranges of sensory stimuli in instructional circle, seeing and doing play important role in achievement. Moreover opportunities to learn from classmates are often lessened due to communication. Several research have supported this finding for example the findings of earlier studies of 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. Nearly 40 hypermedia studies found that compared to traditional lecture, learning improvement were higher for the groups that used 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).

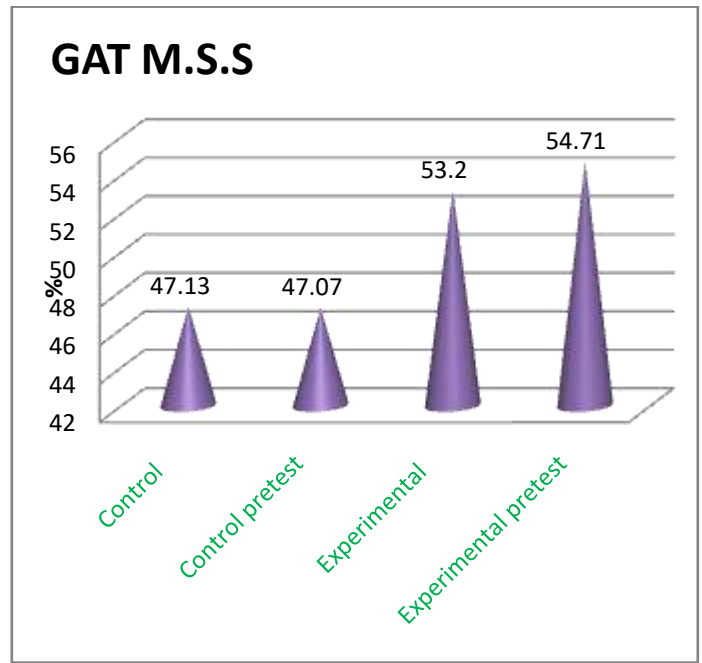


Figure 1: GAT Means by Groups

Control underperformed 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. Adoyo (2004) indicated that poor performance of HI is attributed to inappropriate teaching techniques. Teachers are not presenting the curriculum material in a logical form that is accessible to deaf students. They struggle to provide them instruction after class learning support (Liu & Hong, 2007). Zhang & Zhou (2006) further assert, the traditional mode of teaching is sign method, which has been criticized for being tiring, boring, authoritative and emphasis on memorization. Slobodzian (2009) affirms that extra learning resources may not be accessible in class and there is a widespread lack of accessible interactive materials (Parton, 2006).

Table 9: t-test Posttest Means between Experimental Girls and Boys

Variables	Df	Sig. (2 tailed)	Mean Difference	Std err Difference	95% confidence interval difference	
					Lower	Upper
Posttest	77	0.756	0.712	2.284	-3.836	5.259

Table 9 reveals that no significant different exists between posttest Geography means score of girls and boys. An independence sample t-test for the group gave a p-value of 0.756. The p-value is greater than the set alpha 0.05. This means that there is no difference in the posttest in Geomorphology using hypermedia technique 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 students exposed to hypermedia technique. Thus students perform independent of gender when taught using hypermedia. It also suggests that teachers should integrate hypermedia to teach students 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 is 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 10: t-test Posttest Means between Control Girls and Control Boys

Variables	Df	Sig. (2tailed)	Mean Difference	Std err Difference	95% confidence interval difference	
					Lower	Upper
Posttest	77	0.002	0.521	0.130	0.289	0.452

The t-test value was 0.002 as indicated in table 10. The p-value is less than the alpha which was set at 0.05α . On the analysis it is found that the difference in means of control boys and control girls is statistically in favor 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. This finding is supported by Abigail (2007) asserts that there are biological differences in brain development, this determines the difference in thinking process between boys and girls. Therefore adapted hypermedia is an alternative to traditional approach to 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.

V. CONCLUSIONS

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. It has a great potential for the visual learners like girls than boys in regard to achievement. It is also evidenced from the study that use of hypermedia in pedagogy provides individualized learning 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. As much as it is concluded from the study that hypermedia enhanced achievement, it is a complex way of learning. The effects may be varied depending on what type of instruction that hypermedia compares to. 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 Geomorphology.

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