

Selection and Utilization of Hypermedia in Pedagogy of Hearing Impaired Students in Kenya

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6.1 Abstract

Hypermedia has modified the pedagogy. Learning happens in situations, while technology focuses on the settings and programs which make learners be involved. This paper aims at investigating; influence of integrating hypermedia pedagogy of hearing impaired students and the benefits of selection and utilization of hypermedia technology into the classroom. The study has been done to incorporate technology in classrooms based on the constructivist structure context. Constructivism explains that learners construct their own knowledge and are active participants. 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 instrument was questionnaire. Data were analyzed using descriptive statistics which included; mean, standard deviation, frequencies and percentages. The hypothesis was tested using inferential statistics which was Chi-square. The results of the study showed that use of hypermedia had positive effect on motivation, retention, enjoyment, knowledge construction and self-directed learning. Secondly selection of hypermedia depends on its effectiveness. The findings of this study may create awareness and need for integrating hypermedia in teaching and learning which emphasize on student-centered approach, and 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.

Key words: *Hypermedia, Selection, Utilization, Pedagogy, Geomorphology, Hearing Impaired*

6.2 Introduction

Disability is both cause and consequence of poverty, people are more likely to become disabled, and people with disabilities are among the poorest and most vulnerable groups of the global population. Therefore learning and education of the hearing impaired (HI) is so essential because this is a way of eradicating poverty. Several researchers have performed studies in an attempt to find out if the utilization of technology into the classroom helps students, and if so, what factors contribute to a positive outcome (Dawson, Cavanaugh & Ritzhaupt, 2008). Hypermedia provides students with greater autonomy and responsibility in their quest for learning. Several studies (Gracia & Gracia, 2005; Greene, 2007) have indicated that students play a more active role in the educational process with the use of hypermedia learning systems. Hypermedia influences the five senses in communication and is believed to raise achievement in learning. Therefore HI learners can either choose to play or mute the hypermedia during teaching learning process and this makes learning enjoyable, self-spacing and interesting. Hypermedia is the most suitable element for HI learners to enhance their understanding. Hypermedia that relates with animation, graphics and texts can attract the HI learners to explore the content of hypermedia (Nazri & Suailia, 2010). The important thought to keep in mind is that the interest of researchers on the effects of utilizing technology in education has been flourishing in the past years giving teachers the ability to explore these new waters and adapt their teaching accordingly. To unlock productivity in the millennial generation, schools must align their learning process to appeal to the needs and expectations of the millennial generation. The generation expects rapid access to information and knowledge, high interaction and collaborative learning. What if we took different approach to learning? Students can customize a learning plan that helps them remember rather than adapted traditional technology which emphasizes more on memorization and imitation. All of these factors create an increase in student interest and engagement with the subject being studied, and high student attention to independent research. The teacher takes the role of a facilitator who directs students to an achievable goal. Thus hypermedia is commonly seen as valuable student-centered pedagogical approach (Savery, 2006). Teachers work with students in such a way that there is an increase in critical thinking skills and the use of

the computer as a learning tool. Another positive and desirable effect of bringing technology into the classroom is the increase in collaboration among teachers and students. The forgoing description of the computer-based classroom represents an authentic learning experience that fosters student responsibility. Research data demonstrate that hypermedia provide learning environment which is more enjoyable. These students often go beyond the requirements set forth for any given assignment and show increased academic engagement. Increase in motivation leads to a sense of pride and empowerment, a characteristic of the participants (Mouza, 2008).

All the benefits of utilizing technology presented so far converge on student achievement on subject areas and evaluations. How do students in hypermedia-based 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 (Wenglinksy, 1998; Means, 2010; Shapely, Maloney, & Caranikas-Walker, 2010). The importance and necessity of this technology in assisting HI students learn more effectively have been established in many studies. Hashim et al. (2013) pointed out that problems that hard-of-hearing students face in the traditional classroom provide opportunities for the hypermedia movement. 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.

6.3 Objectives of the Study

- i. To determine the influence of integrating hypermedia in pedagogy of HI.
- ii. To find out the benefits of selecting and utilizing hypermedia technology into the classroom.

6.4 Research Hypothesis

Ho: There is no significant difference between learners taught using hypermedia and those taught without in Geomorphology.

6.5 Theoretical Framework

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 rekindle 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. To produce student who have excelled academically at a minimum cost, schools must themselves set to use learning approaches which provide many opportunities for constructivist learning through the provision and support for resource-based, student centered settings and by enabling learning to be related to context and practice. The theory emphasizes the learner exploring, experimenting, doing research, asking questions which promotes critical thinking and problem solving skills. 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.

6.6 Methodology

In an attempt to explore and identify the influence of integrating hypermedia into classroom instruction, a mixed method approach was used to obtain a comprehensive views and experiences of the respondents. This employed a quasi-experimental design where four special schools for the deaf in Kenya were used. The four schools were randomly a signed to experimental and control groups using a table of random digits. One school from each group was pretested and after one month all the schools were post tested. Questionnaire was used to collect the opinion of the respondents and Geography achievement test to measure and compare the achievement of the learners. A total of 79 students and 10 teachers were sampled. Descriptive analysis was used to summarize data, which was presented in tables. Inferential statistic involving chi-square for testing hypothesis was employed.

6.7 The Results and Discussions

6.7.1 The Influence of Hypermedia in Teaching and Learning Geomorphology

Constructivists support the use of computer-based tools which rekindles the learning of HI. These learners can design and construct their own knowledge. Computer has become a motivational tool (Nyarko, 2007). Constructivism teaching method is student-centered method espoused theory of knowing and learning. It advocates for anchored instruction task based learning, discovery learning and scaffolding. Constructivists maintain that knowledge is not received from outside but constructed in our heads, that learning is a process of people actively constructing knowledge.

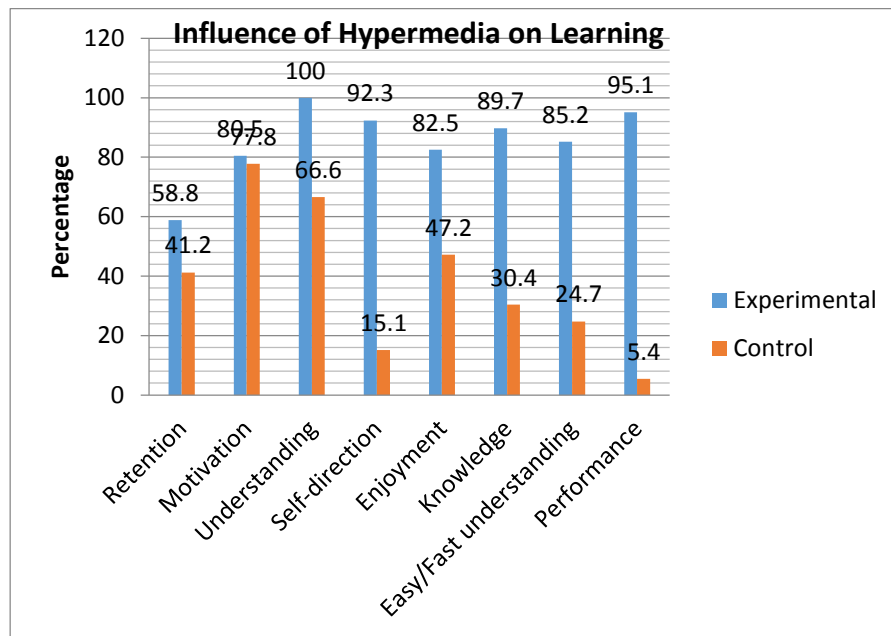


Fig 6: Influence of Hypermedia in Learning

6.7.2 Use of Hypermedia Promotes Retention in Learning

Figure 1 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. Learners make practical choices of tools and media that will shape the way they learn, express themselves and perform (Drayton et al., 2010). 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. Teachers interested in keeping full attention of the learners are advised to be keen in new instructional techniques such as hypermedia.

Posttest results revealed that students taught through traditional technique scored lower grades (41.2%) than those by hypermedia. 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).

6.7.3 Use of Hypermedia Creates Motivation in Learning

Figure 1 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 Geomorphology 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. Educational literature has proven the positive effect of using technologies as a support tool for enhancing learning efficiency (Kaiser & Grim, 2006).

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., 2006). Therefore this technique does not motivate learners, hence low academic achievement.

6.7.4 Use of Hypermedia Promotes Understanding in Learning

The results from experimental group in figure 1 reports that the highest influence on hypermedia use is understanding, learners agreed 100% that hypermedia leads to greater understanding of the topics covered

on Geomorphology. 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 C 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 method with sign language does not help students to understand the complex concept for example in Kenya resulting features from glacial action is not real because 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.

6.7.5 Use of Hypermedia Make Learning Enjoyable

The figure 1 reveals that 82.5% of 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.

6.7.6 Use of Hypermedia to Promote Self-direction Learning

Figure 1 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. Traditional teaching method does not allow manipulative work. Teachers spend most of their time teaching and learners listening. In teaching HI it is important for teachers to be aware that their perception is visual. 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.

6.7.7 Use of Hypermedia Makes Learning Easy, Fast and Interesting

Majority of experimental group 85.2% in figure 1 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. 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 Alexander & Jetton (2013) who 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. 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.

6.7.8 Use of Hypermedia Encourage Knowledge Construction by HI Learners

Figure 1 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 students 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 Educ Psychol 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 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.

6.7.9 Use of Hypermedia Improved Performance for HI Learners

Hypermedia highly influenced performance. Figure1 reveals that experimental group 95.1% agreed that hypermedia improve performance in Geomorphology in Geography. This is because learning materials for HI should include texts and visuals of high quality. Hypermedia improves performance because with hypermedia teachers need not to draw diagrams, they show picture, animate some objects to explain critical

concepts, even play some video of real time. All these multimedia applications can have productive teaching, creates interest and motivate, leads 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 difference 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 which is authoritative and boring, where the teacher is the custodian of knowledge.

Table 6: Chi-square on Influence of Hypermedia in Learning Geomorphology

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

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 when students are exposed to hypermedia and when students are exposed to conventional learning of Geomorphology. Results in table 1 reveal that most of students 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 only when pedagogically appropriate methods are used, they sometimes fail to be successful for HI students.

However the students accepted that hypermedia can enhance their role as students, by promoting construction of their own knowledge and 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 6.1: Influence of Hypermedia in Teaching Geomorphology

Influence of Hypermedia		Frequency	Percent (%)
Teach effectively	Yes	8	80
	No	2	20
Valuable for HI	Yes	8	80
	No	2	20
Better teaching of concept	Yes	8	80
	No	2	20
Excites	Yes	7	70
	No	3	30
Better understanding	Yes	9	90
	No	1	10

N= 10

Teachers were asked to indicate a yes or no if hypermedia can influence their teaching effectiveness. Table 2 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 student's 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.

Teachers were further asked to indicate difficulty level of using hypermedia. Table 3 gives response. The results reveal that hypermedia is interesting (70%) and increases understanding (80%). The use of moving pictures and linking different pictures to text fields to related subjects give good possibilities to describe concept. Ma, O'Toole & Keppell (2008) postulate that students will be engaged at a deeper level and appreciate the student-centered learning approach offered by hypermedia with more senses of appreciation. Kindler (2006) stated that hypermedia stimulates interest and assist students to enjoy and understand lessons easily.

However most teachers agreed that hypermedia takes too much time to prepare (70%) and therefore it is difficult to use (70%). 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). Hence teachers have refused to accept technology utilization (Liu & Huo, 2007).

Table 6.2: Teachers Reasons for Using Hypermedia

Level of use	Level of non-use	
	Frequency	Percent
Easy to use	3	30
Interesting	7	70
Valuable	6	60
Increase understanding	8	80
Easy class control	6	60
Does not take much time	3	30

Level of use	Level of non-use	
	Frequency	percent
Difficult to use	7	70
Boring	3	30
Worthless	4	40
Decrease understanding	2	20
Diff. class control	4	40
Takes too much time	7	70

N = 10

6.8 Conclusion

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 therefore teachers should be encouraged to select and utilize it in their instruction. However in order for technology to be used effectively in the classroom, teachers have to make sure that they select instructional media that can rekindle learning of their students. The media should be used as part of an approach that involves the students in the activity. Constructivist approaches which highlight learner-oriented learning have supported for a long period that students are required to be engaged in the process of acquiring knowledge.

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