UNIVERSITY OF CAPE COAST

MULTIMEDIA INSTRUCTION AND STUDENTS LEARNING AT BASIC SCHOOLS FOR THE DEAF IN EASTERN REGION, GHANA

COSMOS WUANKA

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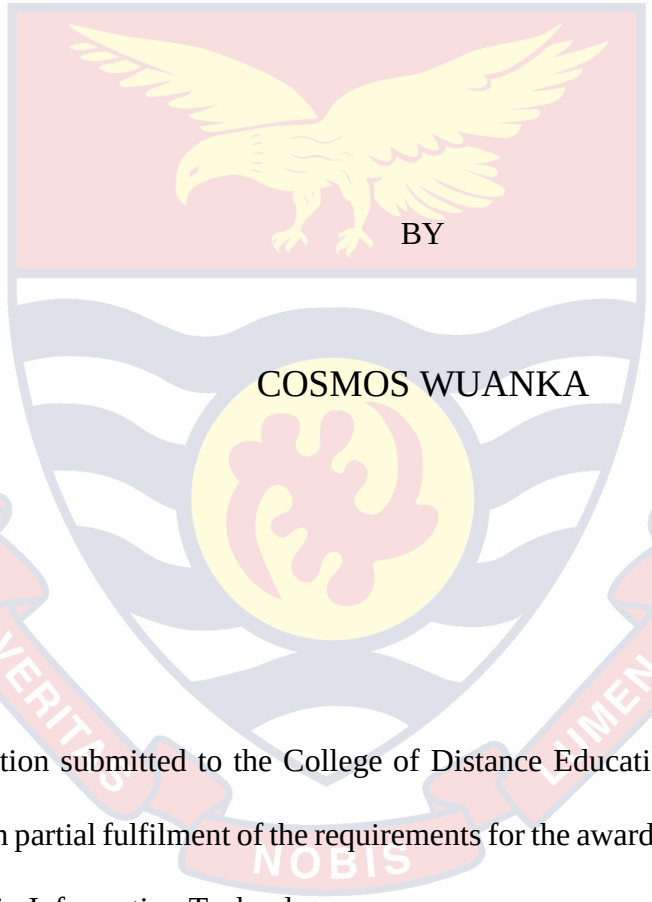

BY

COSMOS WUANKA

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JULY, 2017

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere

Signature: …… Date: ……

Candidate's Name……

Supervisors' Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature: …….. Date: ……

Name: Dr. Paul Nyagorme

ABSTRACT

Impact of multimedia instruction in various educational settings has been documented globally. However, very little has been done within the context of special education in the developing countries, precisely Ghana. This research presents findings on multimedia instruction and its effects on students learning at Basic Schools for the Deaf in Eastern Region, Ghana. Three Basic schools for the deaf were analyzed in a descriptive design through a questionnaire with 104 participants from the schools sampled from a population of 142 teachers. Finding from the research revealed that teachers have positive attitude toward multimedia instruction and the use of multimedia increases the quality of students learning. However, 91.2% of the respondents do not integrate multimedia instruction in their teaching and that availability of Computer Laboratories has no significant influence on multimedia instruction because the labs were not well resourced hence, teachers prefer to have multimedia instruction in their classrooms although the classrooms do not have sufficient multimedia technologies to support multimedia instruction. Other barriers identified were a lack of school policy on use of IT, and lack of training showed that the basic school for the deaf were under resourced and thus teachers face challenges integrating multimedia instruction into their teaching. The study recommends an IT Policy in the schools for the Deaf and in general for the Special Needs Schools in Ghana with focus towards equipping each classroom with multimedia technologies with a vision of one classroom one computer, projector or smartboard and training of teachers in multimedia instruction.

KEY WORDS

Hearing impaired

Schools for the Deaf

Special needs

Multimedia

Multimedia instruction

Multimedia Resources

Information Communication Technology (ICT)

Integration of information Communication Technology

Constructivism

Universal theory of learning

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DEDICATION

To Mr. Samuel Wuanka and Madam Salomey Kanda, Cecily-Rose, Precious, Pascal, Ella, Houesinnon Jeannette and Asong Paulina.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Nowadays, the world is witnessing a hyper information and technological revolution that is changing our way of life. The cornerstone of this revolution, the integration of technology and most importantly, computers are transforming the way we learn, communicate and do business with a never-ending string of innovative application of the computer continuing to affect virtually everything we do. Chen, Looi, and Chen (2009) stated that "There is much consensus that technology is now an inevitable and integral part of our everyday life, work, and home experiences. Concurrently, the call for schools to move to a more technologically integrated approach to teaching and learning has been resonating among ministries or departments of education in various countries" (p. 470). True to this assertion, many countries responded by including information technology into their school curriculum and Ghana has not been left out of this and it can be seen that Information Communication Technology become an examinable subject at the basic school level from the year 2009 to date.

It is no gainsaying that technology is needed in every classroom regardless of what type of classroom it is. Every class need to use some sort of technology to advance their students' knowledge and speed up the learning process. Saxena (2014) notes that technology is used more in a special education classroom than in any other classroom setting because of all the different types of students and their learning needs that need to be met in order to make education successful for them.

However, in Ghana there is little evidence of the extent to which information technology is being used in the education of special needs students. The Persons with Disability Act, Act 715 passed in 2006 enshrines persons with disabilities in Ghana to have the right to education. In response to this legislation, inclusive education policy has been enacted with the objective of meeting the Millennium Development Goals (MDGs) by the year 2015. With the year 2015 already in retrospect, and the MDGs replaced by the Sustainable Development Goals (SDGs), questions are still being asked on the quality of education of the hearing impaired, nine years after the policy formulation. The full implementation of the policy has been postponed to 2021 in order to solve challenges encountered in the pilot project.

An objective of the Inclusive Education Policy among others is to serve as the leverage for the total overhaul of the education of the special need child in Ghana amidst the incorporation of accessibility and integration of technology and instructional media. The document is founded on the premise that every child has the right and can learn. (MOE, 2013)

The strategic focus of the Inclusive Education (IE) Policy includes improving equitable access to quality education for all children of diverse educational needs; provision of requisite teaching and learning materials; capacity development for professional and specialized teachers and managers as well as improvements in education service delivery. (MOE, 2013)

> The inclusive education approach is to create an education system that is responsive to learner diversity and to ensure that all learners have the best possible opportunities to learn.

> IE is based on the value system which holds that all persons who attend an educational institution are entitled to equitable access to quality teaching and learning, and which transcends the idea of physical location but incorporate the basic values that promote participation, friendship and interaction. (p. 5)

The policy further took into consideration the Principle of Universal Design for Learning which offers; Multiple means of representation, to give learners various ways of acquiring information and knowledge; Multiple means of expression, to provide learners alternatives for demonstration of what they know; and Multiple means of engagement, to tap into learners' interests, offer appropriate challenges, and increase motivation. (p. 8). From this premise, it is imperative to ask what is or are the means of offering this Multi-Multi-Multi rhetoric as far as the special schools are concerned? Is technology the answer? Can multimedia instruction such as PowerPoint facilitate this? What about the human and material resource factor?

The delivery and management of education of special needs child is a delicate matter. In the case of the hearing impaired, a lot of weight holds on the classroom teacher.

Some of the strategies outlined by the policy in ensuring that the education of the special need child meets global standard are more visionary and good intentions than realistic as current trends in the special schools are a far cry from it. The strategy aims of the IE Policy (2013) among others are, to;

> Transform existing special education institutions into resources to assist the mainstream system. (The expertise of special educators and special schools can support regular teachers and mainstream schools at district, school and classroom levels).

> Promote the deployment of special educational needs coordinators to all schools to coordinate special educational needs activities within school reforms context.
> Ensure that schools, curricula, assessment procedures and teaching and learning materials are accessible and fair for all. (p. 16)

There is lingering question still here that needs finding out. What is the state of the existing special education institutions; in this case the hearing-impaired schools as far as the strategy of the policy is concerned? Are they fully equipped to serve as resource centres to assist the mainstream system? Is the classroom teacher in such existing school for the hearing impaired equipped with the relevant multimedia teaching and learning resources and is capable of using them to enhance the education of the pupils in an institution of that kind in the Eastern Region?

> " …. all though many policy makers currently support full inclusion in education, meant to fully integrate all disabled students into the regular schools many deaf students complain that they did not benefit from such system…. Inadequate sign language interpreters and assistive technology that could enhance effective communication are missing in the educational sector…. In an environment without equipment, the deaf student is physically present but may be mentally and socially absent" (deaf dumb person hold press conference to highlight problems. ghananewsagency.org)

Implementation of the Inclusive Education Policy (2013) mandated the Ghana Education Service among others;

> Making annual budgetary provisions for carrying out set of activities defined in the annual work plans. Should provide all schools with adequate and requisite teaching and learning materials including assistive devices for all learners especially, those with special educational needs, annually. (p. 23)

However, a visit to basic schools for the deaf in the Eastern Region is indicative of absence of assistive devices that would have improved the quality of

education of the special need child and reduce the labour of the classroom teacher in searching for means to make abstract terms tangible to the special child. Truly in an environment of this kind, the hearing-impaired pupil will be physically present but mentally and socially absent. Oppong (2003) made a point on what is involved in special needs education of the deaf in his assertion that the successful education, socialization and effective enculturation of students with special needs demand the use of some special equipment, special materials and specially trained teachers. "Whereas regular students access formal education, social integration, and effective enculturation through incidental learning, chalk and voice language, audition for example, the deaf cannot" (p. 108). This confirms why hearing impaired students require a specially trained teacher, special methods of teaching, multimedia technologies and resources and specially designed curriculum to enable them function well in society. There is the need therefore to investigate the existence of some of such facilities or resources and how they are being used and effects on students in the Schools for the Deaf in order to understand better how these inputs can help improve education of the deaf.

Nine years ago, Government noted the importance of Information Communication Technologies (ICTs) as tools to accelerate the development of the country to the next level hence the formulation of the ICT in Education Policy (MOE, 2008). The policy noted that effective use of ICTs can among other things:

> Provide multiple avenues for professional development of both pre-service and in-service teachers, especially through distance education;
> Facilitate improved teaching and learning processes;
> Improve teacher knowledge, skills and attitudes and even inquiry;

Improve educational management processes;
Improve the consistency and quality of instruction both for formal and non-formal education;
Increase opportunities for more student centred pedagogical approaches;
Promote inclusive education by addressing inequalities in gender, language, disability;
Widen the traditional sources of information and knowledge;
Foster collaboration, creativity, higher order thinking skills;
Provide for flexibility of delivery; and
Reach student populations outside traditional education systems. (p. 8)

The potential of ICTs as a bridging gap in the education of the special need child cannot be farfetched. Knowledge of computers and application of information technology has gradually become a global language and proficiency is a pre-requisite in many professions nowadays and success of any industry, institution and country. For example, the use of visual learning materials can be quite effective in enriching the classroom experience for students by enabling them to observe situations and processes which are otherwise difficult to portray inside the classroom. With integration of multimedia instruction, hearing impaired pupils can travel the world over from their classroom, be physically, mentally and socially present during class. Who are the hearing impaired and why they differ?

The term hearing impairment denotes inability to hear with or without amplification. A child with hearing impairment may experience significant problems with normal speech and social development. Hearing impairment may be congenital or acquired temporary or permanent, organic or non-organic, peripheral or central, mild, moderate, severe or profound. It can also be conductive, sensory neural or mixed. The categories of students whose impairment fall between 25 dB (decibels) and above are termed the hearing impaired and those above 70 dB that

is, severe and profound range are the deaf. Even though there are various categories or degrees of hearing impairment victims have, the special schools they attend in Ghana are called schools for the Deaf or the Schools for the Hearing Impaired. In particular, hearing impairment occurring early in life is likely to affect the development of speech, behaviour, attention, academic attainment, social development and emotional development (Querishi, 2010). There are fourteen schools for the hearing impaired in Ghana. In spite of the students' disability they are just like any other normal pupils aside being kept in segregated schools.

The oversight responsibility of these schools for the deaf falls under the Special Needs Education Division of the Ministry of Education. The schools run a normal educational duration for the nursery, kindergarten and primary with a four-year Junior High School programme. Some of the schools also have vocational institutes and deaf-blind departments. They are residential schools run on a boarding system with Ghanaian Sigh Language (GSL), the mode of Communication and Instruction. The curriculum run in these schools is the same as the normal schools and at the end of the basic schools, the pupils write the Basic Education Certificate Examination (BECE). Teachers are expected to teach pupils based on the syllabus and ensure that their pupils pass the final examination. However, the Basic School Certificate Examination result of hearing impaired schools has seen very little improvement and at most times among the bottom three.

A summary of the current state of education in most of the schools for the Deaf is presented in the findings of Obosu (2012).

> The Schools for the Deaf repeat teaching techniques that resemble those of regular schools and use teaching methods that mimic a phonetic-base

> literacy approach such as the "chalk and talk" method of teaching. The Schools for the Deaf still use conversional teaching pedagogies which do not make more room for the practice of visual teaching and so the deaf attain academic progress with much difficulty. Deaf students use the same curriculum as their regular counterpart. They write the same sets of examinations both at the basic and the secondary levels with much the same expectation as their hearing counterpart amidst some learning difficulties such as the use of English Language. The textbooks used in the Schools for the Deaf are the same as those used in regular schools. These textbooks do not appeal to the visual literacy of deaf students who are visual learners. *Visual teaching as a strategy for teaching the deaf has not been well supported in the various Schools for the Deaf in Ghana*. [Emphasis added] Imitation of activities and experiences typical of the hearing with rare and timid use of visuals still run deep in such schools. (p. 122-123).

Judging from the state of the teaching and learning at Schools for the Deaf, current trends in fast technological changes necessitate that schools for the Deaf need to adapt to it by leveraging on them. Babiker (2015) noted that educational institutions must recognize that the world has changed. Educators and students have needs that our current delivery system is not meeting. He emphasized that we face financial impediments that are unlikely to disappear quickly, as well as both global and private competition. Doing more of what we are currently doing will not solve these problems. He suggests, to survive these challenges, there is a need to discover new ways to deliver education to our students. Integrating multimedia instruction into teaching can contribute to solving some of these problems, if we really want to make use of visual teaching an effective tool to enhance learning in the schools for the Deaf.

Statement of the Problem

As part of achieving the Millennium Development Goals, and hence advancing to the Sustainable Development Goals, Government, pushed hard to implement inclusive education fully by the close of 2015. However, certain aspects

of the policy as regard accessibility of instructional media and integration in educating special needs children seems unrealistic. Among other challenges, funding, inadequate system capacity, and data necessitated postponement of the target after piloting it in selected districts across the country.

In as much as inclusive education policy has not been fully implemented nationwide, existing special need schools would remain as main centres for educating special need children. It is in the light of this that efforts must be made to provide the schools with multimedia instructional resources and equip teachers with skills to use these technologies in preparedness for the policy implementation so that they would become fully fledged resource centres to assist the mainstream schools.

The education of special need children especially the deaf child among others is a tiring and frustrating work. Where instructional media and technologies are lacking, the only means of explaining abstract concept to pupils with hearing impairment is through visual aids devices and these are lacking on a visit to most of the classrooms of basic school for the deaf in Eastern Region. Teachers have little means to demonstrate concepts such as information processing, or fertilization and other abstract concepts to their learners due to lack of multimedia or lack of knowledge on accessibility of multimedia and use of instructional technologies to aid lesson delivery.

Moreover, majority of concepts do not have signs as the Ghanaian Sign Language is still at an infant stage with no dedicated online portal to access videos of Ghanaian Sign Language. In absence of this, the alternative American Sign

Language is used. However, there seems to be little or no provision of budget for internet accessibility for the hearing impaired special schools in the Eastern Region to access online contents. The state of availability of information communication technology tools or resources such as computers and projectors and computer labs and their quality in most of the schools and ICT skill level of teachers in these schools to integrate multimedia instruction is unknown. In addition, the ICT for Development Policy made no provision for training of teachers in the schools for the deaf although it acknowledged its immense role in special needs education but rather relegating them to the status of regular school teachers.

In light of these, there is a gap in knowledge on the state of integration of multimedia instruction in special needs education and its effects on pupils as far as schools for the deaf in the Eastern Region are concerned.

Purpose of the Study

The purpose of the study is to explore the extent of integration of educational technology, in essence, multimedia instruction and its effects on students with hearing impairment in Basic schools for the Deaf in the Eastern Region of Ghana.

Objectives of the Study

The following objectives are to guide the study.

1. To find out attitudes of teachers toward multimedia instruction in Basic Schools for the Deaf in Eastern Region.

2. To find out the relationship between availability of computer labs and multimedia instruction by teachers in the Basic schools for the Deaf in Eastern Region.
3. To find out effects of multimedia instruction on student learning at Basic schools for the Deaf in Eastern Region.
4. To identify challenges teachers in Basic Schools for the Deaf in Eastern Region face in incorporating multimedia instruction in their teaching.

Research Hypothesis

1. Ho**:** There is no statistically significant difference in attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region.
2. Ho: There is no statistically significant relationship between availability of computer labs and multimedia instruction by teachers in the Basic schools for the Deaf in Eastern Region
3. Ho**:** There is no statistically significant effect of multimedia instruction on hearing impaired students' attention during lessons at Basic schools for the Deaf in Eastern Region.
4. Ho: There is no statistically significant difference in challenges faced by teachers in integrating multimedia instruction in Basic Schools for the Deaf in Eastern Region.

Significance of the Study

Technology is being integrated into mainstream education and efforts has been made by many researchers to find out its impact and the barriers and solutions

for its success but little has been investigated as regards educational technology in special needs education, precisely education of hearing impaired students in Ghana. This study will aim to shed light on extent to which technology, precisely, multimedia instruction in the form of PowerPoint is being used in the classrooms of hearing impaired students, its impact, barriers and the way forward.

It will also throw light on how challenges being encountered incorporating technology into the education of hearing impaired students can be addressed. Subsequently it will serve as a document for policy makers in their efforts to bridge the digital divide between the mainstream schools and the special needs schools as regards integration of technology in education in Ghana.

The study will also draw the attention of philanthropists, non-governmental organization and other agencies in providing funds, ICT equipment and logistics for the education of the special needs children. Finally, it will serve as a reference material for further research on ways of improving the education of special needs children especially, hearing impaired as regard the use of technology in their education.

Delimitation

Ideally, data collection for the study should have covered the 14 special schools for the hearing impaired in Ghana so that responses or findings could form ideal representation but for prolific work to be done, data collection for the study was limited to three Basic schools for the Deaf in the Eastern Region namely, Kibi School for the Deaf, Koforidua School for the Deaf and Demonstration School for the Deaf, Mampong Akuapem.

Besides focusing the data collection on the three schools, the study does not focus deeply on technology as tool for learning. In essence the study focused mainly on multimedia instruction precisely, visual (video, graphics, animations) and text aspect in the form of PowerPoint instructional tool.

Limitations

The limitations of this study warrant discussion with suggestion on the need for caution when interpreting the results. A limitation of the study is that the results might not be true representation of the situations in all the Basic schools for the Deaf in Ghana and findings cannot be generalized to all the special schools in Ghana nor the General Basic Schools. However, the findings present an insight to the perception of the state of technology deployment, effect and challenges in the aspect of educating special need children who are deaf and study in residential schools for the Deaf in Eastern Region.

In addition, regarding the design and instrument used, findings cannot be correlated as the fact of effect of multimedia instruction on students with hearing impairment since the instrument measured perception thus, some respondents might present favourable impressions to save face regarding their deployment and utilisation of technology in educating students in the Schools for the Deaf. The sample used for the study although not quite large, respondents' failure to submit questionnaires influence the extent to which the data can be generalized because the return rate was average.

Lastly, the researcher has a bias toward information technology in education and could influence the depth of other areas that might interest others but were not covered in this study.

Definition of Terms

Hearing impaired: The condition of being unable to perform as a consequence of physical and mental unfitness (American Heritage Dictionary, 2011).

Multimedia: The existing combination of computer hardware and software that allows you to integrate video, animation, audio, graphics, and text resources to develop effective presentations on an affordable desktop computer (Fenrich, 1997) Multimedia Instruction: Presentation involving words and pictures that are intended to foster learning (Mayer, 2001)

Attitude: A predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation.

Organization of the Study

The report of the research is in five chapters. Chapter One includes background to the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation, limitation, definition of terms and organization of the study.

Chapter Two describes literature review which used the theoretical and conceptual framework as well as empirical studies. The third chapter describes the methodology that was employed to collect data for the study. The methodology includes research design, population, sample and sampling procedure,

instrumentation, data collection procedure and data analysis. Chapter Four presents the results and discussion of findings, whereas chapter Five provides the summary of the findings, conclusions, recommendations and suggestions for future studies.

CHAPTER TWO

LITERATURE REVIEW

Overview

This chapter deals with review of related literature. My aim is to link my findings on the study to empirical research of others as well as cover gaps that may exist. The review will be under the following headings;

1. Theoretical framework
2. Constructivism
3. Universal Design for Learning
4. Implication of Constructivism and Universal Design of Learning on the Study
5. Conceptual framework of Learning Environment, Processes and Outcome
6. Information technology resources in the constructivists' classroom for multimedia instruction
7. Multimedia in education and effects on teaching and learning
8. Attitudes of teachers towards use of multimedia instruction
9. Barriers to integrating multimedia technologies in teaching
10. Summary of chapter

Theoretical Framework

A theory is a well substantiated explanation of some aspect of the natural world and organized system of accepted knowledge that applied in variety of circumstances to explain a specific set of phenomena. A theory thus is a set of believes that guide behaviour. Creswell (2009) defined theory as "… interrelated

set of constructs (or variables) formed into propositions or hypotheses that specify the relationship among variables (typically) in terms of magnitude or direction" (p. 51). Theories play roles in research in varied ways and it is an important question for researchers to answer in their research. A theory might be used in research as an argument, discussion or rationale to explain the phenomena (Creswell, 2009). I am confident that basing the current research on existing theoretical framework would give depth to the angles from which the research problem can be viewed. The theoretical framework of the research is based on constructivist's theory of learning led by Lev Vygotsky and the Universal Design theory of learning.

The constructivism theory of learning

Constructivism is a theory of learning that explains how people might acquire knowledge and learn. The constructivists' view of learning sees knowledge as a constructed entity. This view of knowledge challenges the view that knowledge is given and absolute. The constructivists approach is based on the premise, "by reflecting on prior experiences, we construct our own understanding of the world we live in" (Vygotsky, 1978). Thus, individuals use their own mental construct to make sense of their experiences. Our experiences can determine how we react to new situations because this mental construct is relative to one's schema.

Constructivism relies on meaning making; personalization of knowing thus Resnick, (1989) notes, the general sense of constructivism is that, it is a theory of learning or meaning making, and individuals create their own new understandings on the basis of an interaction between what they already know and believe and ideas and knowledge with which they come into contact with. Lowerison, Sclater,

Schmid and Abrami (2006) supports the view of Resnick by arguing, a fundamental belief of constructivism is that, "any idea, developed and discovered by the learner, is valid, and that multiple representations and interpretations of knowledge are encouraged" (p. 467). In addition, Swan (2005) is of the view that constructivism refers to "… set of psychological theories that share common assumptions about knowing and learning. Although constructivist theories have implications for pedagogy and instruction, they are not theories of either" (p. 2). Giving a short definition of constructivism, Koohang, Riley and Smith (2009) state it as "… active construction of new knowledge based on a learner's prior experience" (p. 92). All these definitions and explanations provides insight into constructivism as being individualist, mentally constructed and multiple representation and reproduction.

In contrast to the views held about constructivism, Thompson (2000) suggest that, "constructivism is not a theory but a model of knowing, and constructivism may be used to build a theory of learning. Nonetheless, Richardson (2003) asserts, "the view of constructivism as a learning theory has guided most of the development of constructivist pedagogy" (p. 1624).

Lev Vygotsky, one of the early advocates of the constructivist theory was convinced that social interaction plays a central role in the development of cognition. He notes, "culture was determinant of individual development" (Vygotsky, 1978). Humans are the only species to have cultures and every human child develops in the context of a culture. Therefore, human cognitive development is affected to a larger or lesser extent by the culture in which individuals are caught, including family and school environments.

The contribution of environment or culture to child development is held in many folds. Vygotsky (1978) was of the view that, culture seems to make two kinds of contributions to children intellectual development. Firstly, children acquire much of the content of their thinking (cognition) from it and, secondly, they acquire the processes or means of their thinking from it. This process or means he referred to as the "tools of intellectual adaptation." In short, "culture teaches children both what to think and how to think" Doolittle (1997). However, the process of this 'thinking' is in no way the same. In this way, children are very likely to model their behaviour on the observed behaviour of their parents, peers, and in some cases, media. Learning is therefore dependent on social interactions and within these environments, effective learning occurs with tolerance of the views of others and collaboration. This assumption of Vygotsky of social influence in learning works precisely in the deaf environment. As it can be seen that a deaf culture develops among pupils who are deaf and studies in residential schools. The child takes the mode of communication from his peers and from there on a great influence is played on his life in how he relates to others and most importantly how he writes and learns.

One of the notable aspect of learning that Vygotsky (1978) highlighted was that, a child learns better with the help of an adult. However, he did not assign much importance to the stages of development of a child, but was more interested in the potential for cognitive development. This, he believed, is limited to a certain time span which he called "the zone of proximal development." At any given time in a child's development, he or she will be more susceptible to certain new knowledge.

Commenting on a principle arising from constructivism in this regard, Taber (2011) suggests that, "students will build their new knowledge upon partial, incorrect or apparently irrelevant existing knowledge unless carefully guided." (p. 48). He went on to elaborate, "students have pre-conceived ideas or obtained ideas from secondary sources which is no match with the established version of knowledge presented in a curriculum." (p. 48). Perceptibly, if new knowledge is not forthcoming then the child would have probably reached an optimal point of his or her knowledge. In order for the child to increase his or her knowledge, an adult (for example a teacher) would have to scaffold a child to new heights of learning in a particular domain. This Zone of Proximal Development (ZPD) as Vygotsky (1978) sees it, is "the distance between a student's ability to perform a task under adult guidance and or with peer collaboration and the student's ability solving the problem independently." (p. 86). It is in this zone that learning occurred and he suggests, instruction should be tied more closely to the level of potential development than to the level of actual development.

Commenting on the Zone of Proximal Development, Taber (2011) contradicted Vygotsky (1978) by arguing, "meaningful learning only takes place when learning is pitched beyond what is currently known and understood, but within reach of existing knowledge and understanding" (p. 52) and that "the zone" is not a one-coat-fit-all around existing learning but is an individual characteristic. This suggestion of Taber is implicit that, the task of teaching demands varying technique and methods of delivery to reach diverse learners because the same

method which may be routine for one pupil, suitable for another, may well be a nightmare for another even with scaffolding.

Constructivism as a learning theory suggests, "effective teaching need to be both student-centred and teacher-directed" Taber (2011, p. 57). In this way, it is more important to understand the subjective reality of the learner than the objective reality of external rules or events (Lowerison, et. al., 2006, p. 467). This calls for individualized teaching and learning and a central theme in special education because knowledge unlike information cannot be transmitted from one mind to another nor constructed exactly by two individual minds.

The task of moving pupils from the zone of actual development (current skills, knowledge and understanding) to the zone of proximal or next development is the task of every classroom teacher and educational technologies that could be used to enhance this must be sought and applied. For most student at special schools such as hearing impaired, considerable input is needed by the teacher to direct learners. This assumption is supported by Taber (2011) who observed that the skill and knowledge of the effective teacher cannot be underestimated. For effective teaching means, "operating a series of parallel interactions with groups and individual learners" (p. 55). In the same vein, Diezmann, Carmel, Watters, and James (2002) also shared the view that effective teaching involves establishing learning environments and situations that enable learners to engage with the content.

In the special school, such as the hearing impaired, in the absence of resources, direct instruction is mostly used. In commenting on the effectiveness of

direct instruction, Taber (2011) noted that, "its quality is dependent on the quality of the learning resources and the teacher's knowledge and understanding of their rationale and design as well as teacher motivation as regards the profession" (P. 55).

There are other views from which constructivism is assumed. Others have contended constructivism as being a theory of learning and not a theory of teaching. For instance, Richardson (2003) held the view that "the elements of effective constructivist teaching are not known" (p. 1629). Driscoll (2005) also supported this by concluding "there is no single constructivism theory of instruction" (p. 386). However, Richardson (2003) advances a suggestion based on previous research that, "good teaching is constructivist teaching." In this regard, effective teaching is constructivist teaching because as a teacher understands that the best way of acquiring knowledge is based on personal construction, he is at an advantage of enabling an environment where learners can acquire those canonical knowledges.

Unlike other developmental psychologists such as Jean Piaget's who proposed child development necessarily precedes learning, Vygotsky (1978) felt social learning precedes development. He states; "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inter-psychological) and then inside the child (intra-psychological)" (p. 57). In essence, Cognitive development depends on association with people and tools**.** Tools are real; pens, paper, computers; or symbols: language, math systems, and signs; thus, multimedia.

The Universal Design for Learning Theory

The Universal Design for Learning Theory (UDL) is an educational framework based on research in the learning sciences and creative uses of digital technologies that guides the development of flexible learning environments that can accommodate individual learning differences.

Recognizing that the modes in which individuals learn can be unique, the UDL framework, initially proposed by David H. Rose, Ed. D. of the Harvard Graduate School of Education and the Centre for Applied Special Technology (CAST) in the 1990s, advocate producing curriculum from inception that provides: Multiple means of representation to give learners various ways of acquiring information and knowledge, Multiple means of expression to provide learners alternatives for demonstrating what they know, Multiple means of engagement to tap into learners' interests, challenge them appropriately, and motivate them to learn. Gordon (2016).

In defining Curriculum, the UDL literature, identified four parts: instructional goals, methods, materials, and assessments. UDL is intended to increase access to learning by reducing physical, cognitive, intellectual, and organizational barriers to learning, as well as other obstacles. UDL principles also lend themselves to implementing inclusionary practices in the classroom.

The emphasis being placed on equal access to curriculum by all students and the accountability required by Individuals with Disabilities Education Act (IDEA, 2004) and No Child Left Behind legislation has presented a need for a practice that will accommodate all learners. UDL can be used in the support of

students with disabilities as well as students with varying learning differences. UDL presents all educators and students an exciting opportunity to use strategies and technologies that bridge the gap in learner skills, interests and needs.

By accommodating students' different learning styles and disabilities, UDL is able to transform instructions into a more engaging meaningful experience. In education, this means developing course content, teaching materials and delivery methods to be accessible to and usable by students across the broadest diversity ranges. From the UDL theory, Curricula and course material is considered to be universally designed if: Students can interact with and respond to curricula and materials in multiple ways, Students can find meaning in material (and thus motivate themselves) in different ways, Web-based course material and learning materials are accessible to all, Information is presented in multiple ways to suit their needs.

The Universal Design for Learning Theory present seven generic principles that can be adapted to mirror the educational setting. Whilst the examples provided are not exhaustive, they provide an understanding of the aim of each principle:

Equitable educational experience;

Instruction is understandable and relevant to all students, and accessible to students with a diverse range of abilities. Information is available in various formats at the same time and same cost (i.e. workbooks are available on disk, in print form and on the internet) and Assessment is carried out in a flexible manner.

Flexible material and instruction;

Students can choose how they access material (i.e. formal lectures are supported by online material, labs and tutorials are available at different times of the day and week). Material is designed to accommodate the widest range of users and Material is adapted to suit all learning paces (i.e. lecturers pause after key points)

Predictable structure and instruction;

Material is easy to understand and logically sequenced, according to importance, Instruction occurs in a predictable manner and format. Material such as notes and websites are offered in a clear, easy-to-read format and Feedback is adequate and timely.

Perceptible information;

Information is communicated in multiple ways (i.e. visual and auditory). Websites follow the World Wide Web Consortium (W3C) guidelines and Information is compatible with assistive technology.

Mistakes are tolerated;

Learning hazards are minimised (i.e. a homepage link on all web pages allows the user to return to home if they make a mistake). Instruction anticipates variation of skill and ability. Advanced notice about important tutorials and lectures is provided and Students are encouraged to get help with proof-reading documents.

Eliminate unnecessary physical effort;

Non-essential physical effort is minimized. Students have the opportunity during class to change their posture or position (i.e. rest breaks are provided for longer sessions)

Physical accessibility;

Instruction is equally available to students with different physical characteristics and communication needs. Thus, the UDL offer and opportunity for teachers to imbibe constructivism and technology into their teaching in the special need classroom to ensure that each pupil benefit fully from education.

Implications of Constructivism Theory and Universal Design for Learning Theory to the study

Evidently, constructivism and Universal Design for Learning theory have implication for the education of special needs children in Eastern Region and in this case the Basic schools for the Deaf. The schools for the Deaf must be an environment where students are given opportunities to feel included to explore the world around them in diverse ways since constructivism in its true spirit has no hindrance.

The hearing-impaired student unlike his normal counterpart in the regular school has limited access to information and thus his or her zone of proximal development is limited and need extra support in the form of scaffolding to go beyond his limits. This can be best achieved in learner centred environment. The National Research Council of the U.S. defines learner-centred environments as

those that "pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring with them to the classroom."

Constructivism would help students develop thinking skills, communication and social skill, encourage use of alternative methods of assessment, helps students transfer skills to the real world and promote intrinsic motivation to learn among others.

In this modern times of fast access to information, technology in education can be adapted to ensure that the curriculum which is used in the school for the deaf, same as the general schools, is fully accessible to students through utilising the universal principle of learning which would offer the pupils multiple means of engagement in the classrooms.

The multiple means of engagement for the students can be achieved through usage of several multimedia resources to teach abstract concepts; these have the inclination to raise children's developmental levels quickly as well as retaining their interest in the classroom thereby improving the quality of their education.

Conceptual framework of Learning Environment, Process and Outcome

Conceptual framework is defined as "a network, or plane of linked concepts that together provide a comprehensive understanding of phenomenon" (Jabareen, 2009, p. 51). Jabareen further explains, each concept of a conceptual framework plays an ontological or epistemological role in the framework and concludes "Conceptual frameworks are not merely collections of concepts but rather constructs in which each concept plays an integral role. They provide not a causal analytical setting but rather, an interpretative approach to social reality and that they

are not determinist frameworks" (p. 57). In essence, conceptual framework gives a deep insight into issues, and relationships among them as relates to a research objective or hypothesis.

The conceptual framework for this study is based on Phillips, McNaught, and Kennedy, (2010) Learning Environment, Learning Processes and Learning Outcomes (LEPO) framework. The framework conceptualises learning as having three components: The Learning Environment, the Learning Process and the Learning Outcome.

The concept indicates that learning environment facilitates learning process and these leads to learning outcomes which in turn determines learning environment. It further view teacher as constructors of the learning environment, facilitators of the learning process and evaluators of learning outcomes whiles students work within leaning environment created by teachers, interact with learning process and demonstrate learning outcomes as well as interacting with their teachers.

The use of multimedia and multimedia technologies fall within this framework as there is a relationship between their effectiveness and process of use and the learning environment. A diagrammatic representation of the LEPO framework is presented below.

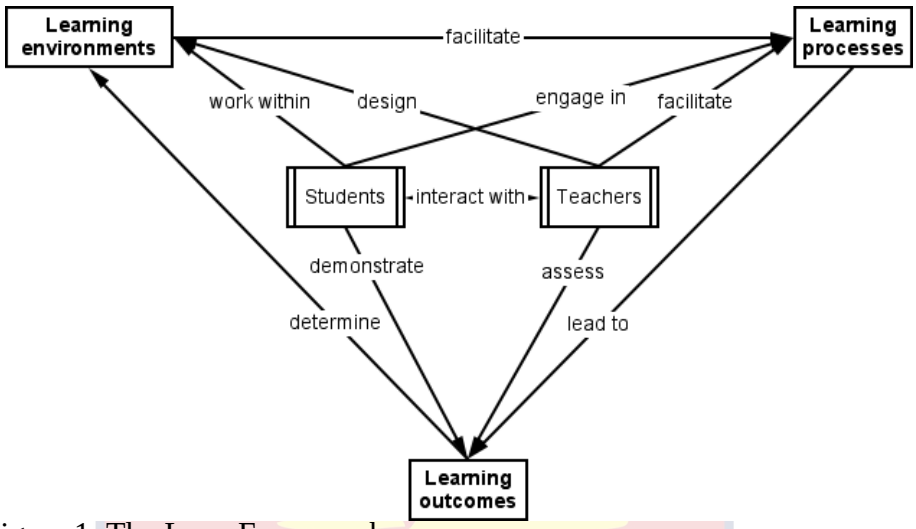

Figure 1. The Lepo Framework

Learning Environment

In the LEPO framework, Phillips et. al (2010) note that the learning environment provides the context in which the student works. Among its characteristics are the campus setting, the structure of the program and the student's individual units of study. It is informed by the desired learning outcomes, and it specifies the content and resources (both traditional and electronic) which support this design. It also encompasses physical and virtual spaces, and the nature of the technology-enhanced environment. Furthermore, the learning environment stipulates the teacher's design of the learning and assessment activities which will facilitate the learning processes undertaken by students.

In addition, they stated that a predominant characteristic of learning environments is that they are designed, and they can therefore be described and this description can be informal, and sometimes detailed. They further stated that when a learning environment is well defined, it is easier to evaluate whether it functions as it was designed, and therefore whether it can lead to the desired outcomes. They

drew a comparison of the learning environment with the 'teacher-constructed world' component of Laurillard's conversational framework of 2002.

Moreover, they laid emphasis on the importance of individualized learning considerations in the design of the learning environment. This call resonates well in the area of special education as this could determine the process the pupils would be taken through to achieve the learning outcome.

Learning Processes

On the learning process in the LEPO framework, the authors defined Learning Processes as the ways in which students engage with the learning environment and the learning activities embedded in it. In addition, they also viewed it as all cognitive activities that contribute to learning, as well as the manner in which these activities are carried out whether individually, in groups, teacher or student-directed. "The learning processes refer to what the student actually does, whether intended or not. It may vary according to the intentions of the teacher (and of the student)" (p. 5). They cited Anderson (2005) to describe the characteristics of the learning processes in the LEPO framework which drew heavily on Laurillard's (2002), conversational framework where students engage with ideas, concepts or resources to develop conceptual knowledge; interact with the learning environment designed by their teacher; and discuss their conceptions with their teachers and other students. Notable elements in the learning process of the framework are social practice which is fundamental form of learning, interaction between student and technology be it computer assisted learning or computer acting as facilitator of the process.

In effect, the Learning process aims to create experts out of novice and generalized learners to specialized learners. They recognize that the learning process can be done in institutionalized setting or non-institutionalized setting and in addition, the learning processes are basically at the level of pupils' personal cognitive construction or through social engagement with others. They also noted that in an institutional context, learning processes cover formal learning or assessment activities and informal learning activities out of scheduled classes with varying amounts of teacher mediation with the overall aim being the learning outcome.

Learning Outcomes

The process of teaching and learning aims towards a desirable outcome whether personally set goals or institutional goal and Phillips et al. (2010) consider the learning outcomes as the things students are able to demonstrate as a result of their engagement in a course of study and comprises both discipline-specific and generic skills. In addition, they emphasize learning outcomes that correspond to knowledge obtained by students which is the product of the learning processes.

In defining what constitute knowledge, the authors cited Wikipedia's definition of learning and cite examples of knowledge from several authors such as 'knowing', including cognitive and conceptual understandings (Bloom's cognitive domain: Anderson & Krathwohl, 2001; Bloom, 1956; Krathwohl, 2002) and physical behaviours and skills (Bloom's psychomotor domain: Harrow, 1972), professional skills, a range of literacies and learning skills, as well as societal beliefs and values (partially involving Bloom's affective domain: Krathwohl, Bloom, &

Masia, 1964). However, they identified a confusion as regard the distinction between learning outcomes and learning objectives. They note that, objectives are what is intended that one is able to do after a course of study, and outcomes are what one can actually do. In this regard, they cite Allan (1996) who distinguished three types of learning outcomes which are; "subject-based outcomes, which subsume learning objectives and which are complex, discipline-based which are capable of being assessed; personal transferable outcomes, including acting independently, working with others, using information technology, gathering information, communicating effectively, organisational skills; and generic academic outcomes, [such as] making use of information, thinking critically, analysing, synthesising ideas and information" (p. 107).

While advocating for the depth of the framework, the authors are cautious to leave room for consolidating by stating, "the LEPO framework, while inclusive of all aspects of learning, is largely pedagogically neutral, in that it does not prescribe how students and teachers interact with learning environments, processes and outcomes. At the same time, it is a very broad framework, seeking to include other models and frameworks as subsets of the LEPO whole" (p. 7).

Technological Resources in the Constructivists' Classroom for Multimedia Instruction

The LEPO framework identified that an important place in achieving the learning process and outcome is the learning environment. This learning environment in general term is nothing more than the formal classroom. Based on the theory of constructivism, it is important that the learning environment be model

based on current advances in teaching and learning and one of these advances is the placement and use of technology as mediums of delivering instruction to learners. It is notable that constructivism and technology focus on creating a learning environment that focus on the individual as such they complement each other. Within this context, how is technology employed in the constructivism classroom?

A fundamental aspect of educational communication technology is "change" (Spector, 2008, p. 21). 'Change' being the only thing permanent, today's technology would be tomorrow's gadgets and as Bob Dylan puts it in his song, forever young of 1974, may we have a strong foundation when the winds of change shift.

The way students are educated keep evolving as new discoveries through research are made. The education system of the day is to create an environment where students are free to reconstruct their knowledge through relating existing schema with new schema. Nunan (1999) observed that, constructivism encourages students to learn through personal experiences rather than being fed by teachers. In support of this, Duffy and Cunningham (1996) intimated that, "knowledge building is inherently a social-dialogistic process." However, knowledge is not obtained only by teaching but by others' help and suitable learning materials from constructivism way under certain social cultural backgrounds and teachers should put new and effective modes, ways, and designing thoughts into multimedia teaching practices. Thus, there need to be a shift from the traditional classroom; a classroom dominated by teacher imparting knowledge directly aligned with information in textbooks, to the constructivist classroom.

It is obvious that traditional system of education has not produced much of the desired outcome. Chan (2008) observes that in the traditional classroom, "students are provided with only one fixed view of complex issues and one set of truths" (p. 5). This assertion of Chan echoed Shaw (1949) words that, "schools and schoolmasters, as we have them today are not popular as places of education as teachers, but rather prisons and turnkeys in which children are kept to prevent them disturbing and chaperoning their parents" (pp. 89-90). This could not be more than an apt description of the segregated school system for persons with disability with the schools for the deaf as no exceptions because many a parent simply see such institutions as dumping grounds for their disabled children with little or no input into how they are educated or trained or how their children feel in the classrooms.

However, in a constructivist pattern, the emphasis of learning is the acquisition of high-order thinking and problem-solving skills, with less emphasis on the assimilation of isolated facts. A constructivist approach supports an environment where teachers and students learn together and share knowledge. Constructivist principles include discovery learning, authentic classroom tasks and social discourse as part of learning. By this approach, the teacher is the facilitator and resource provider, and the students are agents over the classroom environment and learning.

In a constructivist classroom, the teacher regulates specific learning objectives and outcomes for all students. The teacher's role has changed from information provider to problem presenter, resource demonstrator and question

poser (Nicaise & Barnes, 1996; St. Pierre-Hirtle, 1996; Randolph & Everston, 1994). By this a change from a sage on the stage to a guide on the side.

A summarised five dynamic instructional features that support the possibility of integrating technology within the classroom was presented by Perkins (1992) who observed that in the classroom, students are encouraged to construct, evaluate, manipulate, and present their ideas that are the focus of a pedagogy based upon constructivist principles. In addition, St. Pierre-Hirtle, (1996) and Sandholtz, Ringstaff, and Dwyer, (1997) shared similar view in their assertion that students are active seekers and constructors of knowledge. They come into the classroom environment with innate goals, and curiosities. students are expected to learn in a constructivist manner that engages them in analysing their current beliefs and practices, considering alternatives, and experimenting with new theories and practices.

Nowadays, it is obvious that the shift to constructivism is happening at pace with technology development. Lowerison, et. al. (2006) note, "the belief is that computer technology has the potential to transform a passive learning environment into one that is more active and under the control of the learner. However, this is largely dependent on how the computer technology is used" (p. 46). This is in support of the view held by Driscoll (2005) who contends, constructivism is gaining in popularity at the same time interactive, user-friendly computer technologies are becoming more obtainable. Although Driscoll contended that, other media can also be effectively employed within constructivist pedagogy, she adds, the computer

offers an effective means for implementing constructivist strategies that would be difficult to accomplish in any other media.

It is obvious that within the constructivism classroom, the computer is regarded as the main technology for making the classroom dynamic because of the many uses to which the computer and its accessories can be put.

Resources for Multimedia Instruction

Any profession for that matter, teaching, cannot be successful without resources. Resources are prominent part of the classroom and a classroom rich in teaching and learning resources have influence on both the teacher and the pupils. Various explanations have been given to teaching resources. However, Poljak, (as cited in Roncevic, 2009, p. 59) explain teaching resources as "didactically formed original reality." She went on to say, "teaching resources represent sources of knowledge i.e. carriers of information. Teaching aids are tools for work. Teaching aids are transmitters of information." In this regard, it is conclusive that media and multimedia are teaching resources and aids in the process of teaching and learning because they are both carriers and transmitters of information.

For decades, manuals and textbooks has been the main resource for teachers to use to aid their instruction however, from the 1980 through the 1990s, the pendulum of schools' adoption of computers was swinging from analog media to digital media as the primary source of instructional material in schools, colleges, and corporate training centres (Molenda, 2008, p. 16). Despite this, traditional formats such as textbooks, overhead projectors, and video cassettes continue to be used by all teachers right up to the present. Molenda cited Dolezalek (2004, p. 34)

to support his argument stating their study's findings; "three-fourth of all corporate trainers reported that they use manuals and textbooks and over one half used video cassette."

Modern instructional program necessitates the use of comprehensive instructional resources. Ronsevic (2009) observed that, "media and multimedia as teaching devices and aids can be bought, rented, formed or, for the needs of the class, procured in other ways" (p. 119). However, she sounds a caution on her point, citing (Mikic, 2001, p. 249) who points out, "multimedia does not supplant the teacher, but serves as an excellent complement to the spoken word, blackboard, textbook, teaching transparencies, geographical maps, etc."

The complexity of today's knowledge, variety of skills and diversity of attitudes makes a single source of delivering this knowledge insufficient. In view of these, Smith (1972, p. 113) asserts, "the standard text book is being relegated to a secondary position as teachers and curriculum specialists began to advocate more non-book materials (for example, teaching machines and programmed materials, motion picture films, 8 mm single concept films, video tapes, audio tapes, recordings)

In many schools in Ghana one of the sources of teaching and learning materials is Ministry of Education through the Ghana Education Service. This is comparable to the findings in the study of Kuen-fung, (2000, p. 179) who noted in his study that one source of multimedia resource for special need teachers in Hong Kong is the Education Department. He gave a list of a number of software provided by the education department which include a variety of topics for teaching special

needs children. However, he stated that the supply and variety did not meet the increasing demands in IT teaching. However, unlike the findings in Kung-fung where the education department supplies Multimedia Resources to the schools in Hong-Kong, similar case cannot be said of the Ministry of education in Ghana as even the common school syllabus is not supplied to schools in soft-copy format and there are several schools especially the less endowed and those in the rural areas which lack basic ICT tools such as computers and projectors for viewing and beaming these materials.

Aside computers, smartboards or interactive whiteboards (IWB) are the current trends in delivering multimedia instruction. It is a large interactive display in the form factor of a whiteboard. It can either be a standalone touchscreen computer used independently to perform tasks and operations, or a connectable apparatus used as a touchpad to control computers from a projector. They are used in a variety of settings, including classrooms at all levels of education, in corporate board rooms and work groups, in training rooms for professional sports coaching, in broadcasting studios, and others. In some classrooms, interactive whiteboards have replaced traditional whiteboards or flipcharts, or video/media systems such as a DVD player and TV combination. Even where traditional boards are used, the IWB often supplements them by connecting to a school network digital video distribution system. In other cases, IWBs interact with online shared annotation and drawing environments such as interactive vector based graphical websites. Brief instructional blocks can be recorded for review by students - they will see the exact

presentation that occurred in the classroom with the teacher's audio input which can help transform learning and instruction.

A lot of these resources can be got from external support as found in Kuen-fung (2000). His findings showed that a number of schools made attempts to get external support for multimedia resources to support their school. This case is similar in our education system where school administrations fall on the social responsibility of corporate institutions to get their schools equipped with ICT tools. Mention can be made of the recent "Blackboard ICT Teacher" whose lack of resources forced him to draw the Microsoft word application interface on the blackboard in order to teach his pupils and the result being several organisations running in to support his school with computers and accessories.

Technology in Special Need Education

The Special Education Needs (SEN) code of practice states, "Children have special education needs which calls for special educational provision to be made for them." A pupil's special education need may arise from physical disability, sensory impairment, behaviour or emotional problems or cognitive differences. The degree of difficulty may range from mild to severe but learning opportunities should be available equally to all. These children are one of the most vulnerable groups of children in our society and information communication technologies (ICT) can play a very important role in their education and indeed ICT is increasingly being used internationally to enhance their learning with the potential of computers to reduce or eliminate some of the learning difficulties associated with disability.

The use of computers in education of children with Cerebral Palsy, Down's Syndrome, Muscular Dystrophy, Spina Bifida, Blindness, Deafness as well as those with Specific Learning Difficulties in language, reading or mathematics helps them to overcome social and communication skills (INTO.com). Non-articulating children and those with speech difficulties benefits from touch talkers and communication aids which enable them to communicate independently and the use of peripheral devices to compensate for the absence of motor control is particularly beneficial for children with physical disabilities. The website in its Appendix A stating the experiences of teachers in special education and ICT in Ireland reported that teachers found that, pupils with learning disabilities working on mathematics on the computer not only motivate them to greater effort but also offers them privacy in their work. That, mistakes made in private are not open to the whole class witnessing failure as it sometimes happens with blackboard work. Moreover, the more difficult pupils are gainfully employed at the computer which prevents them from distracting the class whiles the class teacher works individually with the other children or on small group instruction. Thus, the use of ICT in special education provides motivation for pupils and an avenue for privacy where mistakes can be made without hindrance of being ridiculed. Software such as word processors help pupils with ineligible writings to present their work neat and offers the teacher an opportunity to edit the works where necessary.

In addition, Information Technologies make significant difference to the life and learning of children with learning difficulties. (ICTSEN, 2009). The document noted four main ways in which the importance of ICT in special education can be

seen to meet the special educational needs of pupils. These are; Assistive ICT which is an ICT device resource or service that aids the individual to improve or enhance any skill that without scaffolding would hinder his or her functional ability. For example, it stated Switch Technologies. It also identifies Augmentative ICT which aids the individual to do something that they could not otherwise do, for example Speech and Communicator devices. It continued that in effect, these two categories overlap and they enhance the individual's interaction with their environments and are most likely applied to physical and sensory disabilities.

The third is Remedial ICT which is a device, resource or service that provides support to the individual for a specific cognitive or behavioural need. Elaborating on this device, it stated that Integrated Learning Systems (ILS) such as "Success Maker" (a computer software) delivers individualised learning, Mathematics, Reading, Writing and Spelling with each student having a learning programmed continuously tailored to personal needs. It enables all the students to progress at their own level and pace and are free to achieve within the security of their own private learning space. Lastly, Diagnostic ICT which is also an ICT device, resource or service that provides information to teachers that facilitates the identification of a special educational need and possibly suggests remedial courses of action. It gave an example such as Special Needs Assessment Profile. Elaborating on software that plays important roles in special education, the document stated that Concept Mapping Software such as, "Inspiration" provides means by which students that needs support organizing their studies and learning

can show what they understand and prepare the content of their studies for later revision.

Students with visual impairment benefit from having recording of lessons and this has been enhanced by contemporary MP3 audio (Motion Picture Experts Group 3) recordings which are discrete, tapeless and immovable parts with the recordings transferable to a computer, copied to a CD (Compact Disc) for later use and achieving. Grammar checkers enable students with writing difficulties (especially those with dyslexia) to check their work and be more confident in public presentation.

Skills for Multimedia Instruction

What really makes multimedia usage effective? To make something effective, there must be some accepted or acknowledged guiding principles to which users can fall on to achieve their ends. To this end, this literature review will look at the fundamental principle of multimedia usage of Mayer (2005) Multimedia Principle and Multimodal Discourse Analysis.

The ability to integrate multimedia into teaching require some amount of skill or knowledge by the user. Although multimedia can be accessed from online repositories, the ability to use them effectively to achieve the desired impact require that teachers know how to use them or how to set up the technologies that are necessary for their deployment. There are cases where educators chose to create their own multimedia resources for instance PowerPoint Slides and Courseware, drills and practices, simulations and educational games, etc. However, these too would require some amount of knowledge on multimedia principles. Vorvilas

(2014) stated that, the modern teacher must be equipped with visual literacy skills and knowledge for being capable of interpreting the several multimodal meanings conveyed by multimedia materials. He continues that, the task is not an exception for teachers but multimedia designers must also be equipped with visual literacy skills for promoting multimodal meanings that make their learning materials more coherent and effective. This is probable because often times, teachers source out designing of multimedia material to instructional designers or other people with skills to create it for them. Vorvilas (2014) suggests Multimodal Discourse Analysis (MDA) could be a helpful tool towards this direction.

In Multimedia Discourse Analysis, people use particular meanings to communicate with each other in specific social contexts. These meanings are created through complex visual, verbal aural, gestural, three-dimensional and other semiotic resources (O' Halloran, 2008). MDA examines the ways several multimodal resources are integrated and interact with each other in specific social contexts (classrooms, online environments, etc.), in order to trigger several communicative functions (e.g. Unsworth, 2006; Jaipal, 2010; Karalis & Vorvilas, 2011). O'Halloran (2008) identified four kinds of meaning semiotic resources can release as regard multimedia learning materials which are;

a. Experiential meaning, which concerns the ways the human experience of the world is visually or verbally represented in a multimedia message.

b. Logical meaning, which concerns the informational linking between multimedia components.

c. Interpersonal meaning, which concerns learners' engagement and interaction with multimedia representations.

d. Textual meaning, which concerns the ways multimedia components are spatially and temporarily co-deployed on the multimedia representations' layout.

Based on the above, it behoves on teachers who would create their own multimedia resources to be aware of the meaning that would be derived from the various media communication to prevent possible cognitive overload by pupil.

In short, the Multimedia Principle underscored the importance of combination of words and graphics to learning rather than just text or graphics alone. The idea draws largely from assumption that learners learn better when they engage in relevant cognitive processes such as attending to the relevant material in the lesson, mentally organizing the material into a coherent cognitive representation and mentally integrating the material with their existing schema. The multimedia principle states, "students learn better from words and pictures than from words alone. Learners build picture-based and word-based representations in their minds; they build systematic connections with them. If words alone are presented, students make a verbal mental model. Due to the absence of pictures, they are less likely to make a visual mental model, and an association between the visual and verbal mental models is deficient" (Mayer, 2001).

Multimedia Instruction and Effects on Teaching and Learning

In common usage, multimedia refers to an electronically delivered combination of media including video, still images, audio, and text in such a way that can be accessed interactively. Multimedia is content that uses a combination of

different content forms such as text, audio, images, animations, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material.

Multimedia is also seen as any combination of text, graphic art, sound, animation, and video that is delivered by computer. (Vaughan, 1993). Elaborating on the forms of multimedia, Vaughan (1993) notes "When you allow the user – the viewer of the project – to control what and when these elements are delivered, it is interactive multimedia. When you provide a structure of linked elements through which the user can navigate, interactive multimedia becomes hypermedia" (p. 3). He continued that Multimedia can be recorded and played, displayed, inter-acted with or accessed by information content processing devices, such as computerized and electronic devices, but can also be part of a live performance. Thus, multimedia devices are electronic media devices used to store and experience multimedia content. One notable such device is the computer.

As humans, we learn basically through sight because a picture conveys much than spoken word. In this regard, Abrams (1996) observed that humans are primarily visual learners and suggests that one of the strengths of multimedia is its ability to integrate pictures, video and animation with text and sound. Abrams suggests that this multi-sensory approach helps different students learn in different ways. Riley (1996) supported Abrams' assertion by emphasising the importance of the methods in which multimedia are integrated into curriculum.

In a study on emerging technologies in training and development, Riley advocate considerations beyond the simple use of video, text, and audio be made when developing curriculum. In a chapter titled "Evaluating Interactive Multimedia," Reeves (1990) observed that "Interactive Multimedia can be designed to present a focal event or problem situation that serves as an "anchor or focus for learners' efforts to retrieve and construct knowledge" (Gayeski, 1993 p. 105). Technology, like any phenomenon has impacts on the ways we do things and it is important to examine these and find ways in which we can leverage on them whiles minimizing the negatives that comes along with them.

The drive behind the implementation or use of technology is important as it serves as basis for its evaluation. To this end, Ringstaff and Kelley (2002, p. 2) stated that in order to understand the impact of technology on education, it is helpful to consider the purposes to which technology is applied. In this regard, the authors stated two main purpose to which technology is applied in the classroom. They cite Reeves (1998) who identified the purpose as "learning with and learning from" computers. "When students are learning from computers, the computers are essentially tutors but in learning with computers students use technology as tools that can be applied to variety of goals in the learning process" (p. 2). At this point it is helpful to find out the effects of multimedia in the two roles of learning with and learning from computers as far as teaching is concerned.

Numerous researchers attempt to measure the effects of different types of instructional techniques on students' learning using various multimedia instructional methods including static and animated text, graphics and non-linear

structure (Crosby & Stelovsky, 1995); multimedia based CD-ROM (Issa., Cox, & Killingsworth, 1999); videotape (Smith & Shillam, 2000); non-interactive computer assisted instruction-PowerPoint (Susskind, 2005); Web-based multimedia tutorials (Buzzell, Chamberlain, & Pintauro, 2002); computer generated animations (McGregor, Fraze, Baker, Haygood, & Kieth, 2003); interactive CD-ROM (Price, Lukhard, & Postel, 2005); online training course (Feinstein, Dalbor, & McManus, 2007; Kim & Kim, 2005); webquest (Hassanien, 2006); virtual learning environments (Dale & Lane, 2007); and podcasting (Dale, 2007).

By integrating various technology-based instructional methods in their courses, many researchers attempt to identify effects of these methods on students' learning. Typical measurements are comparing pre-test and post-test scores of treatment groups (Buzzell, Chamberlain, & Pintauro, 2002; Crosby & Stelovsky, 1995; Issa et al., 1999; Jaffe, 1989; Price, Lukhard, & Postel, 2005; McGregor, Fraze, Baker, Haygood, & Kieth, 2003; Smith & Shillam, 2000) and analysing students' academic performance (Barlett & Strough, 2003; Erwin & Rieppi, 2000; Richardson, 1997; Susskind, 2005). Different results on students' knowledge acquisition were reported in studies comparing pre-test and post-test scores. Some studies concluded that students' knowledge increased after they were exposed to technology-mediated instructional methods (Crosby & Stelovsky, 1995; Issa et al., 1999; Kim & Kim, 2005; Smith & Shillam, 2000), while others found no significant differences between pre-test and post-test scores of treatments group (Buzzell et al., 2002; Jaffe, 1989; McGregor et al., 2003).

Another important indicator on effect of technology mediated instruction is not only students' knowledge acquisition but also their comprehension gain scores which provide an insight on how much students comprehend materials. In this regard, Crosby and Stelovsky (1995) measured effects of technology-mediated instruction on students' learning, compared to traditional lecture type instruction. In their study, an instructor gave the same lecture to students in both sections and had them complete a pre-test. Students in one section received the only traditional instruction, while students in the other section received technology-mediated instruction by using multimedia. After all instructions, students were asked to complete a post-test. The researchers found that "students performed better when they were instructed using technology such as multimedia courseware" (p. 161). Similar findings were found by Issa, Cox and Killingsworth (1999). They tested the effect of multimedia-based CD-ROM on students' learning improvement, compared to the traditional classroom format. Student knowledge improved more with lessons of multimedia-based CD-ROM than with the traditional classroom format.

Other findings show that multimedia in teaching have an educative role in that they stimulate developmental changes in the pupil (Roncevic, 2009, p. 45). She argues, "The necessities of using multimedia computers are appropriate computer equipment that works and computer literacy of the teacher and pupils." In this way, some school are likely not to feel the impact of multimedia technology if the necessities are not addressed.

The developmental changes that multimedia can trigger in children can be cognitive and social. Cognitively, children have access to varied source of information and socially they can be carried to virtual world or environment. Ogunbote and Adesoye (2006) expressed the view that multimedia technology adds new dimension to learning experiences because concepts were easier to present and comprehend when the words are complemented with images and animations. They elucidate further that, it has been established that learners retain more when a variety of senses are engaged in impacting knowledge; and the intensity of the experience aids retention and recall by engaging social, emotional and intellectual senses.

Another way of finding the effects of instructional methods is by assessing students' attitudes toward the instruction (Barlett & Strough, 2003; Buzzell et al., 2002; Kim & Kim, 2005; Richardson, 1997; Susskind, 2005). Most of these studies reported students' attitudes toward instruction as becoming more favourable when exposed to new technology-based instructional material.

In an examination of the effects of non-interactive computer-assisted instruction on students' self-efficacy and attitudes in an introductory psychology course, Susskind (2005), allowed 51 students chose which section of an introductory psychology course to attend, so they were not randomly assigned to conditions. Section one was taught via a traditional instructor-led lecture with notes on a whiteboard, and section two received the same lecture except that the notes were presented by PowerPoint presentation software. A survey was conducted with students to assess their classroom motivation. Then, the lecture format was

switched so that students in section one could have lectures with PowerPoint presentation software and students in section two could experience the traditional lecture. A second survey was administered to both sections. Also, students in the two groups were asked to answer 15 items that reflected their attitudes toward the course and their self-efficacy beliefs. Students displayed more positive attitudes toward PowerPoint lectures; they claimed that when PowerPoint was used, the lectures were more organized and their main points were emphasized more. Students also believed learning was more effective when PowerPoint accompanied lectures; they showed improvements on self-efficacy concerning note taking capabilities.

From a constructivist perception, McCombs, (2000) also support the impact of technology in the classroom by arguing, computer technology has the potential to support diverse needs and capacities within the student population and to allow students greater control over their learning. Laurillard, (2002) also held similar view of a potential for deeper processing of information, especially if the computer is used to replicate authentic activities. He however warned, having computer tools available is, by itself, not enough. The tools have to be paired together with appropriate pedagogy to be effective.

In addition, the use of new technologies in the classroom provides real-world opportunities for students to learn to operate in an information age. "Traditional education environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society" (Yelland, 2001). Yelland asserts, organisations that do not integrate the use of new

technologies in schools cannot seriously claim to effect changes in their students for life in the twenty-first century. Bingimlas (2009) cited Grimus (2000) to have supported the argument of impact of technology integration by pointing out that, "by teaching ICT skills in primary schools the pupils are prepared to face future developments based on proper understanding" (p. 236).

A study conducted by Kuen-fung (2000) on the impact of information technology on special education in Hong Kong provided a summarized finding on the benefits of using multimedia technology in teaching special need children. Among his findings includes the benefits such as, increasing learning and performances, providing frequent and immediate feedback and reinforcement, increasing motivation, challenging and non-threatening learning atmosphere, providing stimulating, attractive, interesting and colourful stimulus, offering personalised and self-paced instructions, providing detailed records of student achievement, enhancing better interaction, promoting full participation in the learning activities, attracting student's attention and concentration lessening demands on teaching time, arranging adequate drill and practice, strengthening peer co-operation and imagination, being highly adaptive to individual needs, remedying the deficit skills, acting as a communication tool or rehabilitation aid, promoting confidence in manipulating the environment, enhancing self-esteem of handicapped children relating their learning to daily life experience, offering individualised learning opportunities across the school curriculum and promoting the subject teaching effectiveness (p. 177).

In the area of classroom interaction, multimedia plays a part in supporting face-to-face teaching and learning in the classroom. This is possible nowadays with access time to information over the internet increasing in proportion to the devices that are capable of accessing information over the internet as many telecommunication companies are investing in 3G and 4G (Third and Fourth Generation) wireless technologies. This view is supported by Bingimlas (2009) who advanced that "The use of computers can help students to become knowledgeable, reduce the amount of direct instruction given to pupils and give teachers an opportunity to help those students with particular needs" (p. 236).

Another area of impact of multimedia is skill mastery. Kumar and Agarwal (2013) indicate that, multimedia facilitates mastering basic skills of a student by means of drill and practice. It helps in problem solving by means of learning by doing, understanding abstract concepts, provide enhanced access for teachers and students in remote locations, facilitate individualized and cooperative learning, helps in management and administration of classroom activities and learning content, and simulate real life problem handling environments. Multimedia Technology is used and experimented by various educational institutions of all levels all over the world in their own designed modes.

Moreover, findings have also supported the view that multimedia technologies improve pupils' motivation and individualised learning (Grabe & Grabe, 2007, Abrams, 1996, Pappert, 1997). Technology plays a role in students' skills, motivation and knowledge and ICT can be used to present information to students and help them complete learning tasks (Grabe & Grabe, 2007). A similar

view of positive effect of multimedia in education is held by Pappert (1997). He identified positive effects which includes enhanced motivation and creativity when pupils are confronted by the new learning environments, a greater disposition to research and problem solving focused on real social situation, more comprehensive assimilation of knowledge in the interdisciplinary ICT environment.

Findings have also shown that the interactive and multimedia nature of modern computer systems has provided the opportunity for software developers to create increasingly more stimulating features. Many studies have found that students like to use computers and are likely to develop more positive attitudes towards their learning and themselves when they use computers (Schacter, 1999). Cradler and Bridgforth, (2002) suggest that though computer systems alone do provide the opportunity to create a wide range of interesting learning experiences, it is also likely to help to maintain students' interest and interest a wider range of students. They suggest for instance, the interactive and multimedia features within software can be used to help students grapple with concepts and ideas and students can more readily be provided with similar information and experiences within a variety of contexts. Reeves (1990) also claims that multimedia may help to construct knowledge situated or anchored in meaningful and relevant contexts and thereby help learners to construct useful rather than inert knowledge. These supposes that students can be given a wider scope of experiences to learn from thereby expanding their schema.

Multimedia use also effects the classroom interactivity and is evident in Stemler (1997), review of literature. He stated that "By allowing students to interact

with and control the flow of information, multimedia distinguishes itself from older multiple-media formats such as books and video" (p. 343). Stemler further stated that interactivity also offers the possibility of immediate feedback for learners allowing them to shape the educational experience to their own needs. He identified several promising attributes of multimedia applications in education. Stemler suggests that with multimedia, the learning process becomes active rather than passive. "True interactivity implies that the learning process is, in some degree, modified by the actions of the learners" (p. 340). The implication being interaction between learner and content is perhaps the major difference between traditional instruction and multimedia instruction.

Thus, multimedia and its related technologies are dynamic tools, the potential of which depends on the user. The findings of Kozma and Anderson (2002) is in support of impact of multimedia use in classrooms. They suggest that ICTs can transform schools and classrooms by bringing in new curricular based on real world problems, providing scaffolds and tools to enhance learning, giving students more opportunities for feedback reflection and building local and global communities that include students, parents, teachers practicing scientists and other interested parties. A research study by Ghavifekr, and Rosdy (2015) shows that technology-based teaching and learning is more effective as compared to traditional classroom. From their perspective, it is because, using ICT tools and equipment will prepare an active learning environment that is more interesting and effective for both teachers and students. The results are in line with a research finding by

Macho (2005) that proved using ICT in education would enhance students' learning.

Other researchers also explored the influence of digital media representation on learning. For example, Alty, Al-Sharrah, and Beacham (2006) showed that the sound-and-diagram media combination significantly outperformed text-and-diagram and text-only presentations. Similarly, Arguel and Jamet (2009) experimented with static pictures and video presentations to investigate their influence on learning outcomes. They found that students who had learned from a combination of video and static pictures performed better in the assessment than those learning only from video presentations.

Despite these positives, Multimedia instruction and its related technologies has its downsides. In the study conducted by Lowerison, et al. (2006) the authors found no significant relationship between actual computer use in general or perceived effective computer usage on course evaluations. The authors advanced reasons for this unusual finding among others, "students may now view technology use in the classroom as being routine." Moreover, they observed, its probable students reached the point where effective technology use in teaching is expected and no longer seen as something that enhance learning. It may also be the case that technology is not being used in an appropriate manner, that is, as a transformative, student-centred tool for learning.

Findings from an experimental study by Jenkinson, Stewart and Cameron (2007) cited in Jenkinson (2009) which comprised of respondents' time-limited exposure to one of two treatments: e-learning modules with static graphics vs.

animated graphics, preceded by a pre-test and followed by a post-test showed no significant difference between treatments in the quantitative data, except significant differences regarding students' perception of the effectiveness of the media that were identified in the qualitative data.

Criticism on the way technology is deployed in the classroom also exists. Those who argue against it assert that "form has been elevated over content" (Tufte, 2003). Others too argue that technology has replaced "clear thought with redundant animations, serious ideas with ten-word bullet points, substance with tacky, confusing style" (Coursey, 2003). These tend to have negative effect on students experience of the learning process.

Moreover, PowerPoint has been denounced for its negative impact on "dialogue, interaction and thoughtful consideration of ideas," (Cyphert, 2004) and for its influence on the superfluous and irritating presentations. In a more serious jab at the modern phenomena in the classroom, Davies, Lavin, and Korte (2010) asserts, "technology is used by some to accomplish a one-directional transmission of knowledge, enabling students to once again be passive and avoid participating in the learning process." The authors went on to clarify that, "in such cases, technology-based presentations, while perhaps more entertaining than stand-alone lectures, suffer from the same shortfalls as the traditional delivery mode. Technology, it seems, can serve as a crutch for the instructor. Perhaps technology has become the new, intangible version of the podium which to hide behind." They conclude, "if the "what" (i.e., content) is being sacrificed for the "how" of the presentation, it is likely that not all learning objectives are being met."

The findings of Kuen-fung (2000) on effect of Multimedia in special education while acknowledging the effectiveness of technology in the classroom, was cautious to emphasise controversy that may arise by stating that the nature and extent of IT's contribution in helping the special needs children is not clear or explicit. "Actually, whether the development of IT technology can meet individual needs is the core problem" (p. 177).

A study conducted by the London Institute of Education evaluated the educational and operational effectiveness of the London Challenge element of the adoption of the use of interactive whiteboards in the London area under a program called "the Schools Whiteboard Expansion project." At Key Stage 3, interactive whiteboards here associated with little significant impact on student performance in Mathematics and English and only a slight improvement in Science. In the same schools, at Key Stage 4, use of interactive whiteboards was found to have negative effects for Mathematics and Science, but positive effects for English. The authors cite several possible causes for the Key Stage 4 findings, including: a Type II statistical error, disruption to teaching methods leading to reduced pupil performance when IWBs were installed, or a non-random deployment decision of IWB installation resulting in a skew of the data.

Teacher Attitudes and Multimedia Instruction

However good a thing is, it adoption depends on a lot of factors. One of such is the attitude of the person exposed to it and in the area of education, any educational system would be successful if the teacher has the right attitude towards teaching. Since the development of the personal computer, its potential of leading

change in different spheres of human endeavour has been noted. One of such is education. However, the adoption of computer technology into education and preferably the classroom has not been rapid.

The rate at which information technology (IT) is integrated in classrooms is determined by attitudes of teachers because the individual teacher is the one who makes decisions on the classroom practices, and the use of technology based on their teaching philosophy. Agbatogun (2010) explain attitudes as, "precursors of behaviours and behavioural intents" (p. 56). Attitudes also refer to one's positive or negative judgment about a concrete subject. Attitudes are determined by the analysis of the information regarding the result of an action and by the positive or negative evaluation of these results (Ajzen & Fishbein, 2000). Thus, our attitudes are inherent predispositions to behaviour. "A teacher's proficiency with computers will affect his or her willingness to integrate technology into the curriculum" (Hernandez-Ramos, 2005, p. 47). It must be worth noting that simply having ICT in schools will not guarantee their effective use. Regardless of the quantity and quality of technology placed in classrooms, the key to how those tools are used is the teacher; therefore, teachers must have the right attitude towards technology (Kadel, 2005).

The importance of having an idea of teachers' proficiency with computers is emphasized by Agbatogun (2010) who observed that "Having an assessment of teachers' computer attitudes has a direct link with the tendency to understand and determine their technology adoption and integration capabilities in the education system." (p. 56).

Our ability to acquire high level computer literary is inherent in our positive attitude towards it. The findings of Francis, Katz and Jones (2000) shows that positive disposition towards computers is a prerequisite as well as a catalyst to acquiring a high-level computer literacy and successful pedagogical use of technology (Francis, Katz, & Jones, 2000). This implies having a natural flair for technological gadgets would be advantageous when it comes to learning to use the computer or infuse it into one's daily activity and in the case of teachers, into their pedagogy.

However, a survey of Cohen (1993) on 381 rural special educators indicate that, computers were still not well integrated into the reading, spelling, or writing curricula, even though the machines were provided. Apart from proficiency, attitudes towards technology appear to be an important factor in its adoption. Though Cohen survey was carried out decades ago and could likely rise doubts of the prevalence of the phenomenon in the current era of computer revolution, there is still the likelihood that several school in the developing countries especially the less endowed and rural school could still be facing the same problem. This is evidenced in the findings of Barfi (2015) in his survey of 150 teachers' attitudes towards the use of IT in Basic Schools in Cape Coast Metropolis. He found that although teachers have high proficiency levels in using IT they have poor attitudes towards it. He however failed to advance reasons or probe the reasons for such poor attitudes of the teachers.

Nowadays that technology is fast permeating schools leading to a gradual paradigm shift, teacher attitudes towards IT are critical in the process of its

development. It is obvious that teachers attitude toward the familiarity with IT may determine the style of teaching in a constructivist classroom and I believe that a full understanding of IT is likely to induce change of teacher attitude.

Empirical evidence of teacher attitudes toward IT ranges from decades to the present day support the view of familiarity or understanding of IT correlates with positive attitudes towards it. Troutman (1991) compared attitudes toward personal and school use of computers in a survey of 292 pre-service teachers. Teachers who felt secure in their own personal use of computers also were positive toward the use of computers in schools. Okinaka (1992) examined the factors that affect teacher attitudes towards computer use and found that teacher attitudes towards computers were more favourable when they understood how to use the computer effectively and were informed of the power of computers in the classroom. This presupposes that education and exposure also stimulate computer use.

In the area of special education, Moore (1994) analysed the impact of computer placement and training on special education teachers' attitudes and their perceptions on the role of computers for instruction. The teachers received a 4-month practicum covering the integration of the computer into instructional programs and the use of computers in the special education classrooms. In the evaluation, the teachers had a positive view of the computer, as not only a powerful motivating and reinforcing tool, but also as a generally useful tool for themselves and their students. In this way, participation in the practicum which leads to a new-

found enthusiasm for computers demonstrates that teachers' attitudes can be altered.

However, the challenge of adopting IT may cause anxiety, amongst teachers. Tien-Chen (2008, p. 2) cited North and Noyes (2002) to have explained that, Computer anxiety is caused by exposure to computer technology. Tien-Chen went on to reference Howard (1986, p. 18) who defined computer anxiety as "fear of impending interaction with a computer that is disproportionate to the actual threat presented by the computer." Agbatogun (2010, p. 57) cited Raub (1981) to have described computer anxiety as "the complex emotional reactions that evoked in individuals described who interpreted computers as personally threatening." Chua, Chen and Wong (1999) defined computer anxiety as fear expressed towards computers while using it or when an individual is about to use it. The above definitions and explanations highlights the possibilities that computer anxiety may arise from teachers lack of self-efficacy because naturally people rarely in the first case try new things they have no expertise in.

Notwithstanding, there are possibilities of lowering computer anxiety and even overcoming it. Agbatogun (2010) cite Mclnemey et al. (1990) who found that increased computer experience generally lowers the level of anxiety. It was also found that computers would cause less anxiety when they are a source of self-directed exploration. It is conclusive here that, Self-confidence could be linked with computer ownership.

Another way of lowering computer anxiety is through training. Training has positive effect on change in anxiety. This is evidenced in Kolehmainen (1992) who

reports changes in computer anxiety after training and notes, "experience with computer equipment and the use of computers reduced anxiety most of all" (p. 3). His finding shows that training had positive effects on attitudes toward new technology; inducing positive views on human-interaction and the use of computers in the future. Moreover, Agbatogun (2010) cite Philips et al. (1999) who investigated over 1000 teachers for one year, on their use of portable computers at home and at school. The findings showed such use to be successful, in terms of confidence and competence enhancement. All teachers gave time and commitment to learning on how to use their machines. Consequently, they gained confidence and increased their IT skills. As a result, certain IT activities became a natural and regular part of their work.

In Hong Kong SAR (Special Administration Region), Lee (1999) collected the views of 160 primary school teachers on the use of IT in school. Several teacher concerns were identified. These included the lack of time to explore and experiment and the need for personalized/customized on-site training with ongoing support. These Hong Kong teachers were also concerned about the ease of access to facilities. Lee (1999) concluded that teachers were very positive toward the use of IT in their teaching. However, they responded negatively when asked how to achieve a level of IT integration within their own teaching.

> The outcomes of this activity highlight the fact that in the eyes of these teachers, IT development in schools is difficult and often led by enthusiasm rather than detailed planning. The responsibility on school management to initiate, implement, monitor and evaluate development is huge and we should not assume the procedures and tools to achieve this are automatically in place (Lee, 1999, p. 186).

Many empirical studies support the view that training and exposure to IT improves teachers' attitudes toward computer instruction (Kolehmainen, 1992; Okinaka, 1992) and that teachers with confidence in their own computer skills are more favourably disposed toward computer-aided instruction in the classroom (Troutman, 1991). The discussion reveals that situations leading to increasing understanding, growing expertise, familiarity with computer use, opportunities for participation will induce teacher's attitudes towards using IT to change positively.

Integrating Multimedia Instruction in Education

Much as technology use has permeate every aspect of our life from education to business and government, efforts are still being made to understand it and to integrate it sufficiently in several countries especially the developing world. Integration of technology is seen as the use of technology tools in general content areas in education in order to allow students to apply computer and technology skills to learning and problem solving. The International Society for Technology in Education (ISTE) defined it as "curriculum integration with the use of technology involves the infusion of technology as a tool to enhance the learning in a content area or multi-disciplinary setting." It contends that effective technology is achieved when students are able to select technology tools to help them obtain information, and present it professionally with the technology becoming an integral part of how classroom functions. That is, it should be accessible as all other classroom resources with the focus in each lesson or unit being the curriculum outcome not the technology.

Integration of technology also involves the use of technology resources such as computers digital camera, CD-ROMs, software applications, the internet among others in daily classroom. (edutopia.com). It further states "technology integration is achieved when the use of technology is routine, transparent, when a child or a teacher does not stop to think that he or she is using computer or researching via the internet." Integration is further achieved when technology tools support the curricular goals and help the students to effectively reach their goals.

In contrast, integration of technology is also viewed from an angle of what it does not refer to. To clarify what the term integration means, "one must first understand what it does not mean" (Boni, 2007). He went on to assert "integration is not the use of managed instructional software where a computer delivers content and tracks students' progress. It is not having students go to the computer lab to learn technical skills whiles the classroom teacher stays behind to plan or grade papers. It is not using the internet to access games sponsored by toy manufactures or popular television shows. It is not using speciality software for drill and practices day after day, and integration does not replace a teacher with a computer" (p. 20). What then is integration of technology to him? Boni (2007) is of the view that, "integration of technology is when classroom teachers use technology to introduce, reinforce, extend, enrich, assess and remediate student mystery of curricular targets." He continued that, "it is a choice that generally includes collaboration and deliberate planning and always requires a classroom teacher's participation" (p. 20). It cannot be legislated through curriculum guides nor will it happen spontaneously. Furthermore, it needs someone with a vision such as an

administrator, a teacher or a specialist to model, encourage and enable technology integration but specifically only a classroom teacher can integrate technology with content area teaching.

In a situation of this kind, it is worth admissible that there would be no one-size-fit-all approach to implementing technology in the classroom. This conclusion is supported by Andresen and Brink (2013) who notes, "from the point of view of school organization, the integration of multimedia in the process of teaching and learning demands reflexive, pragmatic and experiential approaches, which place teachers, ICT school coordinators and other educational personnel at the centre of innovation" (p. 7). With the help of multimedia, the teacher shifts from being a transmitter of information and the single source of knowledge to one among many sources of knowledge and a facilitator of the learning processes.

Barriers/Challenges to Integration of Multimedia Instruction in Education

The use of ICT in the classroom is very important for providing opportunities for students to learn to operate in an information age and hence studying the obstacles to the use of ICT in education especially classroom practices may assist educators to overcome these barriers and become successful technology adopters in the future.

The act of integrating ICT into teaching and learning is as complex a process and one that my encounter a number of difficulties. These difficulties are known as "barriers" (Shoepp, 2005). A barrier is defined as "any condition that makes it difficult to make progress or to achieve an objective (WordNet, 1997) as cited in Shoepp (2005, p. 2)

Different categories have been used by researchers and educators to classify barriers to teacher use of ICT in the classroom (Bingimlas, 2009). He stated several studies which have divided the barriers into two categories namely extrinsic and intrinsic barriers. He emphasized that what the researcher meant by extrinsic and intrinsic differed. He cited Ertmer (1999) to have referred to extrinsic barriers as first order and cited access time, support, resources and training as examples and intrinsic barriers as second-order and mentioned attitudes, beliefs, practices and resistance.

Another category of barrier to use of multimedia instruction in the classroom is material and non-material (Pelgrum, 2001). Pelgrum stated that the material conditions may be insufficient number of computers or copies of software. The non-material obstacles include teachers' insufficient ICT knowledge and skills, the difficulty of integrating ICT into instruction and insufficient teacher time. Commenting on teacher level barrier such as confidence, Bingimlas cited Becta (2004) to have proposed that it is a major factor that inhibits uptake of multimedia instruction by teachers in the classroom. Several researchers have also researched the reason for teachers' lack of confidence with the use of ICT. Beggs (2000) asserted that teachers fear failure due to a lack of confidence. On the other hand, Balanskat, Blamire, and Kefala, (2006) found that limitations in teachers' ICT knowledge makes them feel anxious about using ICT in their classroom and thus does not give them confidence to use it in their teaching. Similarly, Becta (2004) as cited by Bingimlas (2009) concluded their report with the statement "many teachers who do not consider themselves to be well skilled in using ICT feel

anxious about using it in front of a class of children who perhaps know more than they do" (p. 7). Truth is, teachers go a long way to avoid what they fear they do not know than what they know.

Another barrier related to teacher confidence is lack of competence as found by Newhouse (2002). He found that many teachers lacked the knowledge and skills to use computers and were not enthusiastic about the changes and integration of supplementary learning associated with bringing computers into their teaching practice.

A second category of barriers found by researcher to integration of ICT by teachers is school level barriers. In this category, lack of time, lack of effective training, lack of accessibility, and lack of technical support were identified. Bingimlas (2009) cited Sicilia (2005) to have found that the most common challenge reported by teachers in her study was lack of time they had to plan technology lessons, explore the different internet sites, or look at various aspect of educational software.

On lack of effective training, Pelgrum (2001) found that there were not enough training opportunities for teachers in the use of ICTs in a classroom environment. Similarly, Beggs (2000) found that one of the top three barriers to teacher's use of ICT in teaching students was lack of training. He asserts that the issue of training is certainly a complex one because it is important to consider several components to ensure their effectiveness of the training. (Becta, 2004). These issues are time for training, pedagogical training, skills training and an ICT use in initial teacher training.

With lack of accessibility, Sicilia (2005) found that the main barrier was lack of accessibility of computers. The author gave reasons such as computers had to be booked in advance or they could not book them in a row when they wanted to work on several projects with the students. In contrast, Becta (2004) report indicates that the issues of inaccessibility of ICT resource is not always merely due to non-availability of the hardware and software or other ICT material within the school but may be the result of one of a number of factors such as poor organisation of resources, poor quality hardware, inappropriate software, or lack of personal access for teachers. Pelgrum (2001) also found that factors related to accessibility of ICT were insufficient number of computers, insufficient peripherals, insufficient number of copies of software and hardware and insufficient simultaneous internet access.

Under technical support, Bingimlas (2009) cited Korte and Husing (2007) who argued that ICT support or maintenance contract in schools help teachers to use ICT in teaching without losing time through having to fix software and hardware problems. In Becta (2004) report, it stated that if there is a lack of technical support available in a school, then it is likely that technical maintenance will not be carried out regularly, resulting in higher risk of technical breakdown.

This assertion of the above researchers is a true reflection of what is happening in the Ghanaian Basic schools and is evidenced in Karbo (2009), Gavor (2010), Yeboah (2015) findings that lack of knowledge about ways to integrate ICT in lesson and lack of training opportunities for ICT integration knowledge acquisition, and lack of resources are some of the barriers facing Ghanaian teachers

in integrating ICT into their pedagogical practices. From the foregoing if these barriers are not considered while initiating plans for integration of ICT into the classroom the process of making education high tech would remain at a snail mail pace.

Strategies/Planning for Multimedia Integration in Education

Despite the challenges facing educators in integrating technology into their teaching, the issue need not be left unattended and many strategies have been used to resolve them because education reform is occurring throughout the world and one of its tenets is the introduction and integration of ICTs into the education system Jhurree (2005). He further stated that, "the successful integration of ICTs into the classroom warrants careful planning and depends largely on how policy makers understand and appreciate the dynamics of such integration" (p. 467). He further cited Papert (1996) to have suggested among some researchers that, technology will change the educational landscape forever and in ways that will engender a dramatic increase in the performance of learners. Unlike those extreme advocates, he continued that, "there are others who adopt a balance approach and are convinced of ICT's potential to enhance the teaching and learning process if properly integrated" (p. 467). He mentioned Hepp, Hinostroza, Laval, Rehbein (2004), Pelgrum and Law (2003).

There is consensus that an IT policy must be all encompassing. Hepp, et al. (2004) indicated that, "in order to have long lasting effects, an ICT policy should preferably not be designed in isolation. Rather it should be part of a more comprehensive effort towards improving the equity and quality of an educational

system" (p. 2). Similarly, Levine (1998) emphasized the need of having a plan that is based on real school needs and one that is realistic, achievable and effective. He was emphatic, the plan should be produced not for the sole purpose of putting technology in the classroom but to reflect the effective technology deployment to produce enhanced learning environments.

Finally, Hepp, et al. (2004) have been cautious to emphasize that, "there is no universal truth when it comes to applying ICTs in education" and that "there is no advice that can be directly applied without considering each country or school's priorities and long term budgetary prospects and commitment" (p. v). Pelgrum and Law (2003) also suggests, "in developing countries, ICT should be combined with more traditional technologies such as print and broadcasting radio to achieve better effectiveness" (p. 92).

Chapter Summary

In order to make multimedia instruction an active part of pedagogy, there is the need for teachers to use computer technology under the guidance of a theory such as constructivism of personalization and meaning making of knowledge because constructivism as a learning theory suggests, "effective teaching need to be both student-centred and teacher-directed" (Taber, 2011, p. 57).

Within the special needs education system, the Universal Design for Learning Principles of designing curriculum which encourage producing curriculum from inception that provides: Multiple means of representation to give learners various ways of acquiring information and knowledge. Multiple means of expression provide learners alternatives for demonstrating what they know, means

of engagement to tap into learners' interests, challenge them appropriately, and motivate them to learn among others can be adopted and these can best be achieve to higher level with use of multimedia instructional technologies to set a good learning environment, learning process and learning outcomes because the literature review show many empirical evidence of impacts of technology in education for that matter multimedia instruction on pupils comprehension, knowledge retention, (Crosby & Stelovsky, 1995; Issa et al., 1999; Kim & Kim, 2015; Smith & Shillam, 2000), motivation and individualised learning (Grabe & Grabe, 2007, Abrams, 1996, Papert, 1996), stimulation of development changes in learners (Roncevic, 2009, p. 45) and easier presentation of concepts to learners (Ogunbote & Adesoye 2006), students' self-efficacy (Suskind, 2005) among others to confirm that technology teaching is more effective than traditional classroom of chalk and talk or a sage on a stage.

Nevertheless, educators have argued to be aware of the dangers of elevating technology over the contents to be taught (Tufte, 2003) and overloading students with animations in place of serious ideas (Coursey, 2003) and the possibilities of hiding behind technology to convey a one directional method of teaching which would make students passive and avoid participating in class.

However, challenges of teacher attitude, perception, and skills have influence in adoption of IT for that matter, multimedia instruction into teaching. Barriers such as lack of training, unavailable resources, lack of technical support, inaccessibility of resources, time, among others have held educator back in fully integrating technology in their teaching as well.

The review of literature stressed on the need to have training for teachers, provide them with needed resources and enact a school policy (Hepp, Hinostroza, Laval, & Rehbein 2004; Kozma, & Wagner 2003, Pelgrum, & Law 2003; Levine, 1998) based on needs and anchored on national objectives of information technology in education.

To arrive at a deeper understanding of how the schools for the deaf in Eastern Region are incorporating multimedia instruction in their teaching and effects on students, a quantitative study will be implemented. Specifically, the research will attempt to find out multimedia resources in the school for the deaf, the frequency of multimedia instruction, the impact on students, the barriers to successful multimedia instruction and the suggestions.

The next chapter of this research will detail the Research Methods used to capture the empirical data, including details on the research strategy adopted, data collection techniques, and sample selection and data analysis plan.

CHAPTER THREE

RESEARCH METHODS

Overview

This chapter contains the layout description of the methodology followed in the study, multimedia instruction and students learning at Basic Schools for the Deaf in Eastern Region, Ghana. The methodology followed in this study such as construction of research tools, reliability of the tools, sampling procedures, methods of data collection and statistical techniques used are discussed here. Methodology layout helped the investigator to proceed with the proposed research systematically. It helped to select or construct suitable tools for data collection and analysis.

Research Design

Research design plays an important role in every research as it sets out the blueprints for data collection and gives a brief of the subjects or variables involved in a study and how they link to the problem under investigation. Katundu (1998), is of the view that the purpose of research and its objectives determine the type of research design employed for a study.

In order to achieve the purpose and objectives of the research, this study was a simple descriptive survey design which employed descriptive statistical technique to find out effects of multimedia instruction in the Basic schools for the Deaf in Eastern Region. A survey design was deemed more appropriate for the study because, survey research deals basically with obtaining data to determine specific characteristics of a group (Fraenkel & Wallen 2000). This design aimed to

obtain information about the attitudes of teachers, their skills, resources available for multimedia instruction and perception on effects of multimedia use on pupils. It also explored problems teachers face in using multimedia to teach the hearing-impaired pupils. The objectives of the study made it more suitable to employ survey design because as Cohen, Manion and Morrison (2008) indicated, such studies look at individuals, groups, institutions, methods and materials in order to describe, compare, contrast, classify, analyse and interpret the entities and the events that constitute their various fields of inquiry. Best and Khan (1993) also opined that the design aimed at determining the nature of prevailing conditions, practices and attitudes; opinions that are held, processes that are going on or trends that are developed. Gay, (1981) also held the view that descriptive research involves collecting data in order to test hypothesis or answer research questions concerning the current status of the subject of the study.

Descriptive research involves one or a combination of data collection methods and is evidence in Amedahe and Gyimah (2003) in their views that the method makes use of various data collection techniques involving questionnaire, interview or observation. Fraenkle and Wallen (1993) listed the following as advantages of descriptive research: It provides a good number of responses from numerous people, provides a meaningful picture of events and seeks to explain people's perception and behaviour on the basis of information obtained, can be used with greater confidence with regard to particular questions which are of special interest and values to a researcher.

Notwithstanding, Fraenkle and Wallen also has these to indicate as demerits of these design among them being; variety in responses or answers depending on the exact wording of the questions or statements, less trusty outcomes due to privacy and emotional issue that respondents may not be completely truthful about. In addition to the above, they caution that descriptive research does not enable us to understand why people feel, think or behave in a certain manner, why programs pose certain characteristics, why a particular strategy is used at a certain time and so forth.

However, I am convinced the design would provide the greater insight into the problem under study because there is opportunity for more respondents to be questioned, privacy maintained, reliability, validity of instruments used and a higher degree of accuracy of result obtained which can be generalised to entire population.

Population

The target population for the study was mainly made up of teachers of the Basic schools for the Deaf in Eastern Region; namely, Kibi, Koforidua and Mampong with teacher population of 142. The schools were selected because they all reside in the same geographical area and share similar characteristics in the mode of instruction being that they all use sign language in the schools for the Deaf. The combined population of the teachers consisted of seventy-eight (78) males and sixty-four (64) females. The sample for the study was drawn from the accessible population of all teachers in the Basic Schools for the Deaf in the Eastern Region of Ghana.

Sample and Sampling Procedure

Due to various constraints, such as time and inaccessibility to the population of interest, a sizable part of the subjects of interest was selected to serve as a focus from which data was collected, analysed and inferred to the general population. Thus, the sample was the subset of data from the population and consists of subjects, objects or events that form the population.

The three participant schools were selected using purposive sampling technique and simple random sampling was used to select the respondents from each school. Purposive sampling was used to select the three schools because they are the only Basic school for the Deaf in the Eastern Region, they share the same characterises and reside in the same geographical area. Maxwell (1998) asserts that in purposive sampling, particular settings, persons or events are deliberately selected for information which otherwise could not be obtained elsewhere. Cohen, Manion and Morrison (2005) supports similar view by stating in purposeful sampling, "The researcher handpicks the cases to be included in the sample on the basis of their judgment of their typicality or possession of the particular characteristics being sought" (p. 114). Purposive sampling also deals with pre-selected criteria and is evidenced in Maree (2007) who opined that purposive sampling means selecting participants according to pre-selected criteria relevant to a particular research problem. The power and logic of purposeful sampling is that a few cases studied in depth yield many insights about the topic (Macmillan & Schumacher, 2001).

In selecting participants from the schools, the simple random sampling technique was used to select the quota of respondents. The simple lottery method of paper folding was used. This involved the picking of papers with "Yes" or "No" written on them until the desired sample size was reached. Teachers who picked "Yes" formed the sample size. This sampling technique was used because it offers all the members under consideration the equal chance of being selected. The sample is made up of 104 teachers and comprise 62 males and 42 females. Thus, on average, 34 participants were selected from each school. The sample size was appropriate because Asamoah Gyimah and Amedahe (2013), opined that in most quantitative studies, a sample size of 5% to 20% of the population size is sufficient for generalization purposes. Moreover, Alreck and Settle (1985) indicated that a sample size of 10% of a population is enough to obtain adequate confidence. In support of this, Nwana (1993, p. 72) opined that "… if the population … is many hundreds, a 20% sample or more will do". The size of the sample selected was also based on Krejcie and Morgan (1970) table for determining sample size from a given population. Hence, a sample of 104 was drawn from the population of 142 teachers. The decision on sample size is that the larger the sample size, the better, because larger samples minimizes sampling errors (Johnson & Christensen, 2008).

Research Instrument

In this research design, questionnaire was used as instrument for data collection. Questionnaire as a document containing questions and other types of items designed to solicit information appropriate for analysis was the instrument

used to collect data from respondents with regard to the problems under investigation.

Questionnaires were used due to its stability, consistency and uniform measure without variations, popular method of collecting numeric data and credibility in ensuring anonymity of respondents (Walliman, 2005) and also due to the fact that it would be impossible to interview all the one hundred and four (104) participant teachers covered in the Schools for the Deaf.

The questionnaire used for the study were semi-structured consisting of closed and open-ended questions. The closed ended questions make for easier coding of responses for data analysis which though to some extent might be to the disadvantage of the respondents who are compelled to answer all the items. The open-ended questions afford the respondents opportunity to express themselves further on their feeling or suggestions for the study. The survey items were developed based on issues discovered in the literature review of the study.

The questionnaire was divided into four parts: the introduction section which state the purpose and rationale of the research, the right of respondents and instructions on how to respond to items. It also includes respondents background such as age range, gender, teaching experience, area of specialization, and qualification. The other part looks at teacher attitudes, perception of effects of multimedia use on pupils. The third part examine teacher skills in use of multimedia instruction and their sources of multimedia for use in teaching. The final part consists of policies, barriers or problems in use of multimedia in teaching as well as the way forward in addressing the challenges faced.

In designing the items on the questionnaire, a five point Likert scale rating was adopted to measure the perceptions and attitudes of respondent about multimedia and its use in teaching. The ratings range from undecided to strongly disagree and from agree to strongly agree.

Reliability and Validity of Research Instrument

The goal of this research is to obtain measures that are valid and reliable and is echoed by Creswell (2005) who noted that validity is concerned with whether the finding of the study is authentic. This authenticity can best be done if the instruments for collecting the data produce what they are supposed to do. Nevell (1993) emphasized the importance of scrutinizing data gathering instruments to identify ambiguity or misleading questions and for instructions and suggesting improvements.

To ensure the validity, for that matter, the authenticity of the outcome of the results, the questionnaire items were passed through subject matter experts and tutors. It was also checked against the literature review and other similar instrument used by other researchers. After pre-testing, items which seems similar in the questionnaire were modified or were reworded. Open-ended questions for example, respondents were asked to indicate reasons for their preference of the choice of the place they prefer to use for multimedia instruction. Multimedia skills for example respondents' ability to design multimedia instruction with power point which was initially missing from the questionnaire was added after pre-testing because it was found that not many of the respondents were able to use PowerPoint for

instructional purpose. Reliability of the research instrument is concerned with the consistency of the instrument providing results (Seidu, 2006).

Pre-Testing of Research Instrument

Pre-testing of research instruments is important and is emphasized by Oppenheim (1992), Wilson and McLean (1994) who indicate that piloting helps to establish reliability, validity and practicability of the questions. It serves among other things: to check feedback on the response categories for data analyses, to eliminate ambiguity of questions, to check the clarity of the questions. Moreover, Teijlingen and Hundley (2001) also stressed the need for piloting by explaining that, pilot studies refer to mini version of a full-scale study which is also called (feasibility studies) as well as the specific pre-testing of a particular research instrument such as a questionnaire or interview schedule. Pre-test are often done to assess if the research protocol is realistic and workable and also find out if sampling frame and technique are effective and helps to identify logistical problems which might occur when using the proposed methods. It also estimates variability in outcomes to help in determining sample size and collect preliminary data and assess the proposed data analysis techniques to uncover potential problems. A pre-test of the questionnaire helped to make changes in the instrument based on feedback from the small number of individuals who complete and evaluate the instrument.

In addition, Oppenheim (1992) also stated that everything about questions should be tested, nothing should be excluded. A test of instruments used in data collection in a research performs several functions by principally increasing the reliability, validity and practicability of the instruments (Cohen et al., 2003).

Alumode (2011) and Vanderstoep and Johnson (2009) contend that the testing of instruments in a research are to detect weaknesses, ambiguities and deficiencies. This helps the researcher to modify and correct the instruments before they are administered to actual sample of the study.

A pre-test of the instrument was conducted with teachers of Demonstration school for the Deaf. This was to make out any difficulty or ambiguities that may be identified, and for the rectification before administering them to the sample that was to participate in the actual study. The pre-test study determined the suitability and feasibility of the questionnaires and helped the researcher identify the pitfalls in the questionnaire and overall contributed to the validity and reliability of the research instrument.

Data Collection Procedure

This section involved all the processes the researcher undertook to gather data for the study which involved the administering of the questionnaire to teachers. These include:

Access

Before the researcher went out for data, permission was sought from the school head, who subsequently informed the teachers about the study in order to solicit their cooperation and assistance. As a principle, Creswell (2005) stipulates that it is important to respect the site where a research takes place. This respect, as stated by Creswell (2005), is shown by gaining permission before entering the site. In addition, the researcher explained the purpose of the study, and assured the participants of the necessary confidentiality on the information to be gathered.

Ethics

Ethics in research refer to considerations taken to protect and respect the rights and welfare of participants and other parties associated with the activity (Reynolds, 1982). The study follows the Ethical Principles for Research involving Human Participants [EPRHP] a document provided by the Open University Human Participants and Materials Ethics – [HPMEC] in March 2006. The principles discussed in this document are in compliance with protocol, informed consent, openness and integrity, protection of participants from harm, confidentiality and engagement with a professional code of practice and ethics. The study therefore adheres to the guidelines provided by the British Educational Research Association [BERA] published in 2004.

The rights of respondents and other parties involved at every stage of this study were particularly treated with utmost care. The following considerations were made to promote and or protect the rights and interests of participants at the different stages of the study.

Administering of Questionnaire

The questionnaires were developed from review of related literature and based on the Likert Scale method and simple percentage ratings. A Likert Scale (a summated rating scale) assesses attitudes towards a topic by presenting a set of statements about the topic and asking respondents to indicate for each whether they strongly agree, are undecided, disagree or strongly disagree. The various (agree, disagree) responses are assigned numerical value and the total scale score is found by summing the numeric responses given to each item. This total score (4, 3, 2, 1,

0 - high to low) represent the individual's attitude towards the topic (Ary, Jacobs & Razavieh, 2002 p. 224).

Notwithstanding the various strengths of questionnaires, the researcher used simple and direct language with intent of clarity and comprehension by respondents. The wording of the questions was simple and familiar to the target population and items stated briefly. The same sets of questionnaires were administered to all respondents because they are required to consider the same variables of interest (Refer to Appendix A for Questionnaire item) The questionnaire consisted of forty-one (41) items mainly statements which require Strongly Agree (SA), Agree (A) Undecided (UD) Disagree (D) Strongly Disagree (SD) responses.

In all, 104 questionnaires were administered. Teachers were told to respond to the best of their knowledge, be frank and honest; It was explained that the researcher was studying or conducting a study to know how multimedia is used in teaching and its impact on hearing impaired pupils.

The researcher was given one week to revisit the selected schools for the collection of the completed questionnaires. After questionnaires, had been answered, they were collected accordingly. However, out of the one hundred and four questionnaires administered seventy-two were retrieved for analysis.

Data Processing and Analysis

In this study, analysis and presentation of data was done using descriptive statistics. The researcher summarized patterns in the responses from the sample by the use of frequency tables, and simple percentages. However, inferential statistics was used for hypothesis of the study to determine if the patterns described in the sample can be applied to the population from which the sample is drawn.

Responses from the questionnaires were assembled and arranged according to the research questions that guided the study. In effect, analysis of the main data was done manually and electronically. Manual analysis took the form of tallying according to similarity. With electronic analysis, responses for each of the items in the questionnaires were coded with numerical values for inputting process into Statistical Products and Service Solutions (SPSS) Version 22. In describing SPSS software, Field (2009), stated that it is an application program that is used for statistical analysis, manipulating of quantitative data, and also for producing tables and graphs that summarize the data collected. Despite the tedious coding process, the SPSS software helped me speed up my data analysis.

A summary of the open-ended responses was done so that responses that expressed similar ideas but were worded differently were put together. De Vaus (1991), opined that open-ended questions often produce multiple responses that require the creation of several variables to capture the responses. It is therefore best to construct a number of variables into which responses can be sorted and coded. A multiple response approach was used for coding the open-ended question responses in this study. Categories were created from the responses received to a

particular question. A code was allocated to a particular category, for respondents' answers.

As usual, after the initial coding had been done, they were inputted into the variable view of electronic software. When that had been done, each questionnaire retrieved from respondents was numbered and coded as per the coding plan and inputted into the data view of the SPSS one after the other until all were keyed into the system. Data was then analysed electronically using the descriptive statistical tool and presented in frequency tables and percentages to give a pictorial presentation of the results.

Summary of Chapter

This chapter described the methodology and procedures that were used to conduct and collect data from the respondents for the study. A descriptive survey design was used and questionnaire made to collect data from the population or study area. Purposive sampling was used to select the schools but a simple random technique was used to select a sample of one hundred and four (104) teachers from a population of one hundred and forty-two (142). It also discussed the data collection procedure, consideration of ethical issues and plan of data analysis involving use of descriptive statistics of frequency table and percentages as well as inferential statistics of correlations and analysis of variance. The next chapter presents the empirical data and discussion of results.

CHAPTER FOUR

RESULTS AND DISCUSSION

Overview

This chapter presents the surveyed data and analysis done based on the research questions formulated for the study. The study aims to find out multimedia instruction and impact on students learning in three basic school for the deaf in Eastern Region. Questionnaire was the instrument used for data collection which was administered to teachers. One hundred and four (104) questionnaires were distributed however, seventy-two (72) were recovered representing 74.9% of the total sample. Therefore, the data analysed in this study is based on 72 respondents. Simple percentage tables and figures were used to present the findings. Data collected for analysis is based on responses to questionnaire on teachers' attitude, perception of impact on pupils learning, skill, resources available and barriers of multimedia instruction in the basic schools for the deaf.

Demographic Characteristics of Respondents

This part shows characteristics of the samples in the study and is based on gender, age, qualification, teaching experience, area of expertise among others. The gender distribution of respondent to the questionnaire is presented in Table 1

Table 1: *Demographic Characteristics of Respondents*

Demographic Variables	**Responses**	
Gender	**Frequency**	**Percent (%)**
Male	42	58.3
Female	30	41.7
Age Range		
18-24 years	9	12.5
25-34 years	42	58.3
35-44 years	14	19.4
45-55 years	7	9.7
Professional Qualification		
Diploma in Basic Edu	28	38.9
1st Degree	32	44.4
Masters	12	16.7
Teaching Experience		
1 – 3 years	24	33.3
4 – 6 years	32	44.4
7 – 9 years	7	9.7
10 - 12 years	9	12.5
Subject Specialization		
Social studies	14	19.4
Mathematics	6	8.3
English	17	23.6
Science	12	16.7
ICT	8	11.1
BDT	11	15.3
RME	4	5.6

Source: Field survey (2017)

Data from Table 1 shows that 30(41.7%) of the respondents were females and 42(58.3%) were males. This shows that the number of male teachers got from the respondents was 16.6% more than the number of females. This may appear as a gender imbalance. Table 1 also indicates that 9(12.5%) of the respondents to the questionnaire were between the ages of 18-24, whereas 42(58.3%) fell into the 25-34 age bracket. Also, 14(19.4%) were between the ages of 35-44 and 7(9.7%) were

in 45-55 age range. Analysis shows that majority of the respondents were in their youthful age and have potential to be abreast with current technology trends in education.

Data was also collected on teachers' professional qualification and as shown in Table 1, served as one of the main variable for inferential statistics analysis of the hypothesis of the study. On professional qualification of respondents, Table 1 shows that 28(38.9%) teachers had Diploma in Basic Education, 32(44.4%) of the teachers hold a first degrees. Furthermore, 12(16.7%) teachers have Master of Education (M. Ed) degrees. None of the respondents indicated having Higher National Diploma or Certificate A. It shows a higher percentage of teachers have attained a professional level where they might have been exposed to use of information technology in teaching.

Data on the number of years the respondent taught was also collected. Their teaching experience shown in Table 1 indicates that, 24(33.3%) teachers have taught between 1 to 3 years, 32(44.4%) had taught between 4 to 6 years, 7(9.7%) 7 to 9 years and 9(12.5%) teachers have 10 to 12 years teaching experience. It is deducible that majority of the teachers on average have 4 years teaching experience at the schools for the deaf and would be in position to offer information on the study.

Data on subject area specialisation was also collected and presented in Table 1. Respondents subject area specialisation from Table 1, showed that 14(19.4%) respondents teach Social Studies, 6(8.3%) teach Mathematics, 17(23%) and 12(16.7%) teach English and Science. Interesting only 8(11.19%) of the

respondents have ICT as their subject area of specialization. Furthermore, Basic Design and Technology (BDT) and Religious and Moral Education (RME) had 11(15%) and 4(5.6%) of the respondents who specialized in that areas.

Research Objective 1. Attitudes of teachers in the Basic schools for the Deaf in Eastern Region toward multimedia instruction

The rate at which information technology (IT) is integrated in classrooms in some way is determined by attitudes of teachers because the individual teacher is the one who makes decisions on the classroom practices, and the use of technology based on their teaching philosophy. It must be worth noting that simply having ICT in schools will not guarantee their effective use. Regardless of the quantity and quality of technology placed in classrooms, the key to how those tools are used is the teacher; therefore, teachers must have the right attitude towards technology (Kadel, 2005).

The intent of this question is to find out teachers' attitudes, and perception towards multimedia instruction in educating their students. The perception that one has in a subject will influence one's ability to contribute to the discussion and the development of the subject area (Nelson & Kerr, 2005). Understanding tutors' perception on multimedia instruction is critical since they hold the most influence in classroom decision in developing the conscious mind of students. Items (1-6) on the questionnaire was used to find out teachers' attitude and perception of multimedia instruction. Data is presented in the Table 2.

Table 2: *Teacher's Attitude and Perception of Multimedia Instruction*

Attitude to multimedia Instruction	Undecided		Disagree		Strongly Disagree		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
Multimedia instruction is mainly concerned with use of Tech	2	2.8	51	70.8	16	22.2	3	4.2	-	-
Multimedia instruction is restricted to certain subjects only	2	2.8	44	61.1	21	29.2	5	6.9		
Multimedia instruction plays important role in educating the deaf			7	9.7	5	6.9	33	45.8	27	37.5
Multimedia instruction enables the deaf overcome socio-communication problems	4	5.6	10	13.9	2	2.8	30	41.7	26	36.1
Teachers must be replaced with IT	1	1.4	58	80.6	9	12.5	4	5.6		
There is no need to use multimedia to teach the Deaf			53	73.6	11	15.3	8	11.1		
The real world is presented to the deaf through multimedia instruction	2	2.8	17	23.6	11	15.3	23	31.9	19	26.4

N=Number of respondents Source: Field survey (2017)

Data from Table 2 on respondents' perception and attitude to multimedia instruction shows that 51(70%) and 16(22%) disagree and strongly disagree on the perception that multimedia instruction simply involves the use of technology in the classroom. Whereas 3(4.2%) agreed to the perception, 2(2.8%) of the respondents were undecided on this perception.

On subject areas where multimedia instruction is applicable, 44(61.1%) and 21(29.2%) disagree and strongly disagree that multimedia instruction is only

applicable or possible to certain subject areas. On the other hand, 5(6.9%) of the respondents agreed in their perception whereas 2(2.8%) were undecided.

Item 3 on the questionnaire sought to find out respondents' perception of multimedia instruction in educating hearing-impaired students. Data from Table 2 showed that 33(45.8%) and 27(37.5%) agreed and strongly agreed whereas 7(9.7%) disagreed and 5(6.9%) strongly disagreed. On overcoming communication barriers with multimedia instruction, data showed that 30(41.7%) and 26(36.1%) agreed and strongly agreed whereas 10(13.9%) and 2(2.8%) of the respondents disagreed and strongly disagreed that multimedia instruction enables the deaf student overcome socio-communication problem. However, 4(5.6%) of the respondents were undecided in their opinion. On whether teachers, should be replaced by IT in the classroom, data indicated that 56(80.6%) and 9(12.5%) disagreed and strongly disagreed whereas 4(5.6%) were in the affirmative with a respondent (1.4%) undecided on the assumption. On the question is there a need to use multimedia instruction in teaching the deaf at all, the responses showed a strong believe among respondents as 11(15.3%) and 53(73.6%) strongly agreed and agreed respectively. This substantiate the assertion of (Boni, 2007) that integration of technology does not replace a teacher with a computer.

On presentation of the real world to the hearing impaired through multimedia instruction, 23(31.9%) and 19(26.4%) support the assumption by agreeing and strongly agreeing. These responses validate the findings of Kozma and Anderson (2002) that ICTs can transform schools and classrooms by bringing in new curricular based on real world problems, providing scaffolds and tools to

enhance learning, giving students more opportunities for feedback reflection and building local and global communities that include students, parents, teachers practicing scientists and other interested parties.

Testing of Hypothesis 1

H_0: There is no statistically significant difference in attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region

A one-way between groups analysis of variance was conducted to explore differences in attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region and presented in Table 3.

Table 3: *ANOVA of Attitudes of Teachers Towards Use of Multimedia Instruction in Teaching Hearing Impaired Students in Eastern Region*

		Sum of Squares	df	Mean Square	F	Sig.
Multimedia instruction disrupts learning	Between Groups	1.011	2	.506	1.242	.295
	Within Groups	28.100	69	.407		
	Total	29.111	71			
My Pupils don't feel excited learning from multimedia	Between Groups	1.226	2	.613	3.973	.023
	Within Groups	10.649	69	.154		
	Total	11.875	71			
Concepts are easier to Present with Multimedia instruction	Between Groups	2.720	2	1.360	1.388	.256
	Within Groups	67.600	69	.980		
	Total	70.319	71			
	Total	45.875	71			
	Within Groups	30.607	69	.444		
	Total	31.875	71			

Source: Field survey (2017). (Refer to Appendix B for full table)

Participants were divided into three groups according to their educational qualification (Diploma, Degree and Masters). Only one out of 25 questions

concerning attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students is statistically significant (thus, 0.023 < 0.05) at the alpha level. Despite reaching statistical significance the researcher fail to reject the null hypothesis that there is no significant difference in attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region as it represent only one out of twenty-five questions. (Refer to Table 3 in Appendix B). This showed that teachers have similar attitude toward multimedia instruction in the schools for the Deaf. They feel comfortable in their perception of the impact of multimedia instruction on their pupils. This result supports the findings of Teo (2008), who concluded that teachers have good attitude towards the use of ICT. However, the findings contradict the work of Korte and Husing (2007), who concluded that teachers believe that the benefits of ICT are not clearly seen and Barfi (2015) who found that teachers have poor attitudes to IT.

Research Objective 2. Resources for multimedia instruction in the Basic schools for the Deaf in Eastern Region

Multimedia instruction to a great extent depends on availability of resources and where they can be got from. This research question aims to find out resources available for multimedia instruction for teachers and resources used by teachers to aid multimedia instruction. Five items on the questionnaire (items 26- 30) were used and data collected are presented in the Table 4.

Table 4: *Sources of Multimedia Resources for Teaching Hearing Impaired Students*

	Frequency	Percent
PowerPoint	14	19.4
Internet	58	80.6
CD/DVD ROM	0	0
Total	72	100

Source: Field survey (2017)

Data from Table 4 shows that 14(19.4%) of the respondents indicate PowerPoint as their main source of multimedia for teaching their pupils while 58(80.6%) indicated internet as their main source of multimedia. None of the respondents indicated CD/DVD Roms as their sources. It is probable that due to proliferation of smart phones and improvement in internet access from telecommunication companies, majority of the respondents somehow rely on their portable device to access multimedia online.

Inquiry was also made of the available resources in the classrooms that would support multimedia instruction by the teachers. Data is presented in Table 5.

Table 5: *Multimedia Resources Provided for Classroom*

	Frequency	Percent
Computer/Laptop	7	9.7
Projector	2	2.8
Interactive Whiteboard	0	0
Television	0	0
None	63	87.5
Total	72	100

Source: Field survey (2017).

Table 5 showed data on multimedia technologies provided for respondents' classroom and indicates that of four technologies, 7(9.7%) of the respondents have

computers or laptops provided for their classrooms while 2(2.8%) have projectors for their classroom. It emerged that 63(87.5%) of the respondents have neither projectors, computers, televisions or interactive whiteboards provided for their classes. Similar findings were made on technology usage in Basic schools in Pakistan by Tahir and Arif (2016). In their analysis of results obtained from teachers' survey which showed that none of the public schools provided any kind of technology for primary school age children in Pakistan. Their result also indicated that technology usage in Pakistani schools for primary/elementary school age children is limited to mainly desktop PC and projectors only while a few schools use interactive tables or game devices. Tahir and Arif indicated that their findings were not at par with the developed countries because, the modern mobile technology such as smartphones and tablets are increasingly being used in schools for young children as an effective medium of children education and learning. The finding from this area shows that generally the Basic schools for the Deaf in Eastern region are lagging far behind in use of multimedia technology in educating students.

The research also wanted to find out the general resource for multimedia instruction in the schools as well as policies to encourage or sustain multimedia instruction. Data collected is presented in Table 6.

Table 6: *Multimedia Technology Resources in Schools and Policy*

Available Resources and Policy	Yes		No	
	N	%	N	%
Does the school have an IT Policy	0	0	72	100
Availability of Computer Lab	72	100	0	0
Availability of Internet connection	0	0	72	100
Prior training in how to use MM to support Teaching	2	2.8	70	97.2

Source: Field survey (2017)

On resources, available in the Basic schools for the Deaf, Table 6 shows that none of the school had a policy on how information technologies are used in the schools and is evidenced by all respondents 72(100%) indicating "No" as to whether their schools have IT Policy. On availability of computer laboratories in the schools, all the respondents 72(100%) confirmed that their schools have computer labs. However, on whether the computer laboratories in the schools were connected to the internet, again all respondents 72(100%) said their schools do not have an internet connection. On prior training on use of multimedia instruction, 2(2.8%) confirmed as having had training while 70(97.2%) of the respondents indicated as having no previous training. A deduction from these findings is that the Basic schools for the Deaf had no direction as far as the use of information communication in education is concerned.

Table 7 presents data on respondents' skills as regard multimedia instruction. The aim is to find out the ability of teachers to create and deliver instructions through multimedia.

Table 7: *Multimedia Instructional Skills of Respondents*

Multimedia instruction skills of teachers	Unfamiliar		Beginner		Intermediate		Expert	
	N	%	N	%	N	%	N	%
I can download videos and other MM from internet and use to teach	5	6.9	29	40.3	31	43.1	7	9.7
I am familiar with PowerPoint and can design and present information	7	9.7	43	59.7	18	25.0	4	5.6
Multimedia Authoring Software								

Source: Field survey (2017)

Data from the Table 7 shows that 5(6.9%) of the respondents were unfamiliar with how to download videos from the internet and use them to teach. A number of respondents 29(40.3%) were at beginner level with 31(43.1%) at intermediate level and 7(9.7%) indicate as being experts. On ability to design and present instruction through PowerPoint, data from Table 7 shows that 7(9.7%) were unfamiliar or unable to do so. As many as 43(59.7%) indicated they were at beginner level with 18(25.0%) at intermediate level. However, 4(5.6%) indicated they were experts at using PowerPoint for instructional delivery. It is conclusive that the skill level of teachers for multimedia instruction is inadequate.

Table 8 sought to find out how often respondents used computer laboratories for multimedia instruction and how often they use multimedia instruction at all.

Table 8: *Frequency of Multimedia Instruction and at IT Lab*

	Never		Rarely		When Topic Demands		Frequently	
	N	%	N	%	N	%	N	%
How often do you use MM to support teaching	14	19.4	44	61.1	14	19.4		
How often do you take your pupils to IT Lab for Multimedia instruction	43	59.7	12	16.7	10	13.9	7	9.7

Source: Field survey (2017)

Data shows that 14(19.4%) used multimedia instruction. As many as 44(61.1%) rarely used it and 14(19.4%) never used multimedia instruction. On how often the computer laboratory is used for purpose of multimedia instruction, only 7(9.7%) of the respondents frequently used computer labs for multimedia instructions, 10(13.9%) used it when the topic demands its use, 12(16.7%) rarely

using it and as many as 43(59.7%) never using it at all. This finding showed that majority of the teachers do not integrate multimedia instruction in their teaching it is probable they have barriers preventing them from.

Respondents were also asked to indicate their preferred place for multimedia instruction. Data collected is presented in Table 9.

Table 9: *Preferred Place for Giving Multimedia Instruction*

Where do you prefer most to give mm instruction to pupils	Frequency	Percent
Classroom	62	86.1
Computer Lab	10	13.9
Total	72	100

Source: Field survey (2017).

Data from Table 9 aims to find out respondents preferred place for giving multimedia instruction to their students and it showed that more than half of the respondents 62(86.1%) prefer classrooms against 10(13.9%) who preferred a computer laboratory. Table 10 presents data on reasons for respondents' choice of where they preferred to give multimedia instruction.

Table 10: *Reasons for Preferred Place for Giving Multimedia Instruction*

What are reasons for preference	Frequency	Percent
Time	32	44.4
Easier to manage class	30	41.7
Technical support	7	9.7
Available resources	3	4.2
Total	72	100

Source: Field survey (2017).

The most central theme from all respondents to open-ended item have been coded and data shows that of those who preferred classrooms, 32(44.4%) indicate time to carry out the multimedia instruction was their main reason for their choice of place for multimedia instruction, 30(41%) indicate convenience to manage the

class as their reason for preference. On those who prefer using the computer laboratory, 7(9.7%) indicate available technical support for their preference with 3(4.2%) indicating available resources at the computer laboratories as their reasons. Other uncaptured data given on explanation on preference for classroom was small size of IT Lab and conflict in the time table because both the JHS has to share the same IT lab with the Primary classes. This also suggests that teacher's preference has great influence on where multimedia instruction is carried out.

Testing of Hypothesis 2

H_0: There is no statistically significant relationship between availability of computer labs and multimedia instruction by teachers in Basic schools for the Deaf in Eastern Region

A correlation analysis was conducted to explore the relationship between availability of computer labs and multimedia instruction by teachers in the Basic schools for the Deaf in Eastern Region and presented in Table 11. The aim is to find out if availability of computer labs had influence on teachers to integrate multimedia into their instructions. The independent variable computer Labs could not be used for the analysis since all respondents acknowledge the availability of computer labs. The researcher used avenue for multimedia instructions as a proxy variable for computer labs and the dependent variable multimedia instruction measured as frequency of multimedia instruction use.

Table 11: *Correlation Between Multimedia Instruction and Availability of ICT Labs*

		Multimedia Instruction	Avenue for Multimedia Instructions
Multimedia Instruction	Pearson Correlation	1	.064
	Sig. (2-tailed)		.591
	N	72	72
Avenue for Multimedia Instructions	Pearson Correlation	.064	1
	Sig. (2-tailed)	.591	
	N	72	72

Source: Field survey (2017)

A sample size N=72 was used for analysis and an alpha level of 0.05 significance with an outcome of 0.064 correlation co-efficient. The correlation co-efficient of determination value (0.064) reveals that there is a positive and high relationship between computer labs and multimedia instruction by teachers in the Basic schools for the Deaf in Eastern Region but statistically insignificant (thus, 0.591 > 0.05) at the 0.05 alpha level. The researcher as a result fail to reject the null hypothesis that there is no statistically significant relationship between availability of computer labs and multimedia instruction by teachers in Basic schools for the Deaf in Eastern Region. Although we fail to reject the null hypothesis, the finding from Table 10 is in contrast to the outcome of the hypothesis. It is inferable that availability of computer labs alone has no direct bearing on multimedia instruction as evidenced in Table 11, majority of teachers in the Schools for the Deaf do not use the computer lab for multimedia instruction as they prefer or would prefer their classrooms and the reasons given as shown in Table 10. It is also probable the teachers' attitudes have a lot of influence over available resources.

Research Objective 3. Effects of multimedia instruction on teacher instruction and students learning in the Basic schools for the Deaf in Eastern Region

To find out effects of multimedia instruction, 14 items on the questionnaire were analysed based on pedagogical effects and students learning. Data collected is presented in the Table 12.

Table 12: *Respondents Statement on Effects on Multimedia Instruction*

Statements	Undecided		Disagree		Strongly Disagree		Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%
Multimedia instruction disrupts learning			50	69.4	16	22.2	6	8.3		
Multimedia instruction use saves instructional time			16	22.2	4	5.6	47	65.3	5	6.9
MM instruction help reduce amount of direct instruction given to pupils			20	27.8	8	11.1	27	37.5	17	23.6
Concepts are easier to Present with Multimedia instruction			15	20.8	7	9.7	38	52.8	12	16.7
My Pupils don't feel excited learning from multimedia			57	79.2	15	20.8				
Mm instruction makes lesson Active and interesting for pupils			7	9.7			39	54.2	26	36.1
When I use MM, it reduces Communication With pupils			46	63.9	19	26.4	7	9.7		
My pupils can explain better in their own words lessons delivered through MM			6	8.3			42	58.3	24	33.3
When I use MM, pupils' comprehension improved			3	4.2			41	56.9	28	38.9

Table 12 Continued

Pupils understand abstract concepts better when I use MM	6	8.3	1	1.4	43	59.7	22	30.6
My pupils don't participate in lessons when I use MM	47	65.3	25	34.7				
When I use MM, pupils become more Interested in my lessons	4	5.6	1	1.4	43	59.7	24	33.3
Pupils attention in class during lessons improve because of MM instruction	9	12.5	1	1.4	25	34.7	37	51.4
Pupils feel motivated to learn to use MM Technologies	9	12.5	4	5.6	38	52.8	21	29.2

Source: Field survey (2017)

Seven items in the questionnaire were used to find out effects of multimedia instruction on teachers' pedagogical practice. On whether multimedia instruction disrupts learning, as many as 50(69.4%) of the respondents disagreed and 16(22.2%) also strongly disagreed. However, 6(8.3%) of the respondents believe multimedia instruction disrupts their teaching. On whether multimedia instruction saves instructional time 47(65.3%) agreed and 5(6.9%) of the respondents also strongly support this view. However, 16(22.2%) disagreed and 4(5.6%) also strongly disagreed to the view that multimedia instruction saves time. A further analysis shows that 27(37.5%) and 17(23.6%) of the responds assert that multimedia instruction reduces the amount of direct instruction they give their pupils and support the views of Bingimlas (2009) who advanced that "the use of computers can help students to become knowledgeable, reduce the amount of direct

instruction given to pupils and give teachers an opportunity to help those students with particular needs" (p. 236). Moreover, Lowerison, et. al. (2006) note, "the belief is that computer technology has the potential to transform a passive learning environment into one that is more active and under the control of the learner. However, this is largely dependent on how the computer technology is used" (p. 46).

On possibilities of multimedia instruction making concepts presentation easier, majority of the respondents are in the affirmative and evidenced by 38(52.8%) who agreed and 12(16.7%) who strongly agreed as well. This supports the views of (Oshinaike & Adekunmisi) cited in Agunbote and Adesoye (2006) who expressed the belief that multimedia technology adds new dimension to learning experiences because concepts were easier to present and comprehend when the words are complemented with images and animations. However, a sizable number, 15(20.8%) and 7(9.7%) of them do not think concept presentation through multimedia instruction is easier for them. It is probable they have difficulty due to lack of training or knowhow.

Analysis also show that multimedia instruction makes the learning process interesting for the pupils and is supported by 39(54.2%) respondents who agreed and 26(36.1%) who also strongly agreed and this contradicts Davies, Lavin, and Korte, (2010) assertion that, technology is used by some to accomplish a one-directional transmission of knowledge, enabling students to once again be passive and avoid participating in the learning process. Finding also show that all the respondent believed multimedia instruction excites pupils and is evidenced by

57(79.2%) who agreed and 15(20.8%) who strongly agreed as well. In addition, data showed that multimedia instruction does not reduce communication with pupil as 46(63.9%) of the respondents disagreed and 19(26.4%) strongly disagreed but 7(9.7%) of the respondents think multimedia instruction has a negative effect on communication with pupils in class. This support the findings of Ghavifekr, and Rosdy (2015) which shows that technology-based teaching and learning is more effective as compared to traditional classroom. From their perspective, it is because, using ICT tools and equipment will prepare an active learning environment that is more interesting and effective for both teachers and students.

Eight items on the survey questions were also used to find out the effects of multimedia instruction on student learning. The intent was to find out teachers' perception of the effects of multimedia instruction on their pupil. Measures sought to find out effects on students' participation, comprehension and retention among others in lessons received from multimedia instruction. Data from Table 12 shows that on comprehension and pupils' self-expression, 66(91.6%) and (69)95.8% of the respondents agreed that there is positive effect of multimedia instruction on their pupils as against 6(8.3%) and 3(4.2%) who could not find a positive effect. In addition, 65(90.3%) of the respondent agreed that multimedia instruction improved pupils understanding of abstract concept while 6(9.7%) report no effect in area of understanding of abstract concept. Data also showed that pupils participate well in lessons delivered through multimedia instruction as evidenced by 47(65.3%) and 25(34.7%) of the respondents who disagreed and strongly disagreed that multimedia instruction does not improve pupils' participation in lessons. These are

in line with the findings of Kuen-fung (2000) on the impact of information technology on special education among other things; enhancing better interaction, promoting full participation in the learning activities, attracting student's attention and concentration lessening demands on teaching time.

Table 12 also showed that pupils had high interest and concentrated on lessons delivered through multimedia instruction as against traditional delivery methods. This is evident by a large number of respondents who agreed and strongly agreed making 67(93%) and 62(86.1%) as against 5(7%) and 10(13.9%) who did not identify any positive effect in areas of interest and concentration during lessons. In addition, data also showed positive effect in area of pupil motivation to learn to operate or use multimedia technologies and is supported by 59(82%) of the respondents as against 13(18%) of the respondents who indicate no effect in area of pupils' motivation to use multimedia technologies. This also supports the findings of Marr (2000); Okolo and Ferretti (1998) that multimedia increase student motivation and also that of Karen, Ivers and Barron (2002) that creating multimedia projects reinforces students' technology skills and invites them to work cooperatively and use a variety of media to express their understanding.

Moreover, a series of regression analysis was conducted to determine an overall effect of multimedia instruction on students learning at the Basic school for the Deaf. Results from the linear regression analysis is presented in Table 13.

Table 13. *Effects of Multimedia instruction on Students Learning*

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.333[a]	0.111	0.098	0.30734

ANOVA of Multimedia Usage on Students' Learning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.823	1	0.823	8.711	0.004
	Residual	6.612	70	0.094		
	Total	7.435	71			

Coefficient of Multimedia Usage on Students' Learning

Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.415	0.122		28.069	0.000
	Multimedia Usage	0.171	0.058	0.333	2.951	0.004

The linear regression revealed that multimedia usage in instruction is a significant predictor of students' learning, representing $F(1, 70) = 8.711$, $p = 0.004$ (< 0.05). The regression model is a good fit of the data. The model summary indicated that multimedia usage in instruction explains 9.8% of the variation in Students' learning (R^2 *adj.* = 0.098).

The model coefficient table showed a standardized coefficient of 0.333 (i.e. Beta = 0.333). This means that for every one unit increase in the use of multimedia instruction in teaching, there is a 0.333 representing a 33.3% increase in the quality of students' learning. Thus, the use of multimedia instruction in lessons at Basic schools for the deaf in Eastern region, Ghana has a significant positive effect on their learning.

Testing of Hypothesis 3

H_0: There is no statistically significant effect of multimedia instruction on hearing impaired students' attention during lessons

A two tailed Pearson correlation analysis is conducted to explore the effect of multimedia instruction on hearing impaired students' attention during lessons and presented in Table 14. The aim is to find out if utilizing multimedia instruction has some significant influence on students' engagement in the lessons they were taught. Two variables multimedia instruction and students' attentions were compared. The independent variable being multimedia instruction and the dependable variable being students' attention.

Table 14*: Correlation Between Multimedia Instruction and Students' Attention During Lessons*

		Multimedia Instruction	Students' Attention in Class
Multimedia Instruction	Pearson Correlation	1	.136
	Sig. (2-tailed)		.255
	N	72	72
Students' Attention During Lessons	Pearson Correlation	.136	1
	Sig. (2-tailed)	.255	
	N	72	72

Source: Field survey (2017)

A sample size N = 72 was used for the analysis at an 0.5 alpha level and a correlation co-efficient of 0.136 realised. The Pearson Correlation co-efficient of determination value of 0.136 shows that Multimedia Instruction has a positive effect on pupil's attention during lesson but statistically insignificant (thus, 0.255 > 0.05) at the 0.05 alpha level. The researcher therefore fails to reject the null hypothesis that there is no statistically significant effect of multimedia instruction

on hearing impaired students' attention during lessons. This finding also relates to data from Table 12 which indicate that 67(93%) of the respondents agreed that multimedia instruction improves pupils' attention during lessons.

Overall findings from Research Question 3 showed that multimedia instruction has benefits for both classroom interactivity and students learning and supports the findings of Kuen-fung (2000) on positive impact of information technology on special education. This shows that multimedia instruction is an innovative and effective teaching and learning tool, because it helps students motivate their learning process and helps them understand the information presented. It helps teachers present information in an effective way. Learners become active participants in the teaching and learning process instead of being passive learners (Neo & Neo, 2001). From the above results, it is obvious that multimedia instruction is more effective than the traditional way of instruction and would engender and increase in the quality of education of students.

Research Objective 4. Barriers to integrating multimedia instruction in the Basic Schools for the Deaf in Eastern Region

The intent of this question is to find out challenges teachers face that hinder them from fully integrating multimedia instruction into their teaching. Data collected for this question is presented in the Table 15.

Table 15: *Respondents' Challenges to Integration of Multimedia Instruction*

Barriers to use of MM instruction in classroom	Frequency	Percent
Lack of time	2	2.8
Lack of training and technical support	18	25.0
Lack of multimedia Resources	21	29.2
Unavailability of Software	5	6.9
Lack of Confidence	2	2.8
Distractibility of pupils and teachers	2	2.8
Lack of internet	22	30.6
Total	72	100

Source: Field survey (2017)

Data collected shows that a little over a quarter of the respondents 22(30.6%) cited lack of internet access as their main barrier to multimedia instruction with 21(29.2%) indicating a lack of multimedia resources as their barriers. This supports Sicilia (2005) finding that the main barrier to teachers' integration of technology was lack of accessibility of computers. The finding also supports Becta (2004) report that the issues of inaccessibility of ICT resource is not always merely due to non-availability of the hardware and software or other ICT material within the school but may be the result of one of a number of factors such as poor organisation of resources, poor quality of hardware, inappropriate software, or lack of personal access for teachers.

In addition, a quarter of the respondents 18(25%) indicated a lack of training and technical supports which is similar to the findings of Beggs (2000) and Pelgrum (2001) that one of the top three barriers to teacher's use of ICT in teaching students is lack of training. Furthermore, a sizeable number 2(2.8%) of the respondents each cited a lack of time, lack of confidence and distractibility of pupils and teachers as

their main barriers and a further 5(6.9%) indicate unavailability of software for multimedia instruction.

Overall, these findings are in line with Karbo (2009), Gavor (2010), Yeboah (2015) findings that lack of knowledge about ways to integrate ICT in lesson and lack of training opportunities for ICT integration knowledge acquisition, and lack of resources are some of the barriers facing Ghanaian teachers in integrating ICT into their pedagogical practices.

Testing of Hypothesis 4

H_0: There is no significant difference in challenges faced by teachers in integrating multimedia instruction in Basic schools for the Deaf in Eastern Region

A one-way between groups analysis of variance was conducted to explore differences in challenges faced by teachers in integrating multimedia instruction in the Basic Schools for the Deaf in Eastern Region and presented in Table 16.

Table 16: *ANOVA of Barriers to Use of Multimedia Instruction in Classroom*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.303	2	5.652	.989	.377
Within Groups	394.350	69	5.715		
Total	405.653	71			

Source: Field survey, Multimedia Instruction (2017).

Respondents were divided into three groups according to their educational qualification (Diploma, Degree and Masters) and differences in their mean squares compared. The p-value of 0.377 shows that there is no statistical difference in challenges faced by teachers in integrating multimedia instruction in the Basic schools for the Deaf in Eastern Region. Consequently, we fail to reject the null

hypothesis that there is no significant difference in challenges faced by teachers in integrating multimedia instruction in Basic schools for the Deaf in Eastern Region. This implies that the unique nature of the population makes all share the same challenges as regards multimedia instruction integration in the schools for the Deaf. Teachers in the Basic schools for the Deaf in Eastern Region no matter their professional qualification face the same barriers integrating multimedia into their instruction.

Questions were asked on how challenges facing the respondents can be addressed from policy enactment to provision of resources. Data collected is presented in Table 17.

Table 17: *Respondents' View on Improving Multimedia Instruction*

	Undecided		Disagree		Strongly Disagree		Agree		Strongly Agree	
Statements	N	%	N	%	N	%	N	%	N	%
A school policy on IT MM use would help integrate IT in classroom	1	1.40	17	23.61	12	16.67	34	47.22	8	11.1
A school Plan based on national objective of IT can give outside support			10	13.9	2	2.8	54	75.0	6	8.3
School plan with opportunity for training on use of mm would enhance integration of multimedia instruction			1	1.4	1	1.4	44	61.1	26	36.1
MI should not be restricted to certain subject areas only			1	1.4			46	63.9	25	34.7

Table 17 continued

Use of MM should be routine and transparent	7	9.7	38	52.8	1	1.4	22	30.6	4	5.6
Every class must have MM technologies	1	1.4	2	2.8			37	51.4	32	44.4
Teachers must be trained from time to time(Inset) in use of MM							47	65.3	25	34.7

Source: Field survey (2017)

Respondents were asked if a school policy on information technology would help integrate multimedia instruction into their teaching. Data showed that 34(47.22%) respondents thought so, and 8(11.1%) strongly agreed. However, 17(23.6%) and 12(16.67%) had different levels of disagreement with others remaining undecided. On possibilities of outside support for multimedia resources if a policy is in place, 54(75%) agreed and 6(8.3%) also strongly agreed on the possibility. However, a small number 10(13.9%) and 2(2.8%) of the respondents do not think a policy would give outside support. On opportunities for training in a school plan to enhance multimedia use to teach, two respondents 2(4.8%) do not think it would. However, there is a strong positive believe as 44(61.1%) and 26(36.1%) of the respondents agreed and strongly agreed that training would enhance integration of multimedia instruction into teaching. On whether there should be restriction on multimedia instruction to certain subject areas only, 46(63.9%) and 25(34.7%) respondents are not in support of it while a respondent support restriction of multimedia instruction to certain subject areas. On frequency of multimedia instruction in the curriculum, 22(30.6%) and 4(5.6%) agreed and

strongly agreed that multimedia instruction should be use frequently. However, 38(52.8%) and 1(1.4%) of the respondents disagreed and strongly disagreed. They do not think multimedia instruction should be routine with 7(9.7%) of the respondents, undecided. On provision of multimedia technologies for classes in the schools for the deaf, 37(51.4%) and 32(44.4%) agreed and strongly agreed. They support the provision of technologies that would enhance multimedia instruction. However, 2(2.8%) of the respondents were not in favour as they disagreed with a respondent undecided.

Overall, its deducible that the Basic schools for the Deaf need policies on use of IT which would provide opportunity for training of teachers, acquisition of resources and speed up integration of multimedia instruction. Hepp, et al. (2004) indicate that, "in order to have long lasting effects, an ICT policy should preferably not be designed in isolation. Rather it should be part of a more compressive effort towards improving the equity and quality of an educational system" (p. 2). Similarly, Levine (1998) emphasized the need of having a plan that is based on real school needs and one that is realistic, achievable and effective. He was emphatic, the plan should be produced not for the sole purpose of putting technology in the classroom but to reflect the effective technology deployment to produce enhanced learning environments.

On how to improve multimedia instruction in the Basic schools for the Deaf, respondents were asked to select technologies that would be useful in their classrooms. Data collected is presented in Table 18.

Table 18: *Technologies Recommended for Hearing Impaired Classrooms*

Multimedia Technology recommended for classrooms	Frequency	Percent
Computer	20	27.8
Projector	38	52.8
Interactive Whiteboard	4	5.6
All of the Above	10	13.9
Total	72	100

Source: Field survey (2017)

Data from Table 18 shows that a high number of the respondents recommended computers and projectors for their classrooms and is evidenced by 38(52.8%) and 20(27.8%) of the respondents who selected those technologies respectively. Further analysis shows that 4(5.6%) respondents recommend interactive whiteboards while 10(13.9%) recommend projector, computers and interactive whiteboards for their classrooms to aid multimedia instruction. A deduction from these findings is that in the schools for the deaf, computers and projectors in the classrooms are necessary resource for multimedia instructional needs of teachers.

Summary

The chapter examined result of the data collected and analysed based on the research objectives and hypothesis on multimedia instruction in basic schools for the Deaf in Eastern Region, effects on students learning, teacher attitude, resources available for multimedia instruction, barriers teachers face in integrating multimedia instruction as well as ways to improve multimedia instruction. Major findings which have implications for the schools for the Deaf are presented in the next chapter.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

This chapter summarizes the study, the major findings and then presents conclusions and recommendations based on the findings. Furthermore, suggestions were made for future research direction.

Summary of the Study

The study examined the use of multimedia instructions and its effects on students learning at Basic schools for the Deaf in the Eastern Region of Ghana. It looked into the attitude and skills of teachers toward multimedia instruction, the resources available in the Basic schools for the Deaf to support multimedia instruction and the barriers teachers face in integrating multimedia instruction into their teaching and the way forward.

The research objectives of the study were;

1. To find out attitudes of teachers in Basic Schools for the Deaf in Eastern Region toward multimedia instruction.
2. To find out the relationship between availability of computer labs and multimedia instruction by teachers in the Basic schools for the Deaf in Eastern Region.
3. To find out effects of multimedia instruction on student learning at Basic schools for the Deaf in Eastern Region.
4. To identify challenges teachers in the Basic Schools for the Deaf in Eastern Region face in incorporating multimedia instruction in their teaching.

The hypothesises of the study were;

1. **Ho:** There is no statistically significant difference in attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region.
2. **Ho:** There is no statistically significant relationship between availability of computer labs and multimedia instruction by teachers in Basic schools for the Deaf in Eastern Region
3. **Ho:** There is no statistically significant effect of multimedia instruction on hearing impaired students' attention during lessons.
4. Ho: There is no significant difference in challenges faced by teachers in Basic schools for the Deaf in integrating multimedia instruction in their teaching.

A descriptive survey design was used for the study with purposive sampling used to select three Basic schools for the Deaf because they were the only basic schools for the deaf in the region while a simple random sampling technique was used to select a sample of 104 respondent teachers from the schools with a return rate of 74.9%. Questionnaire was used for data collection. Responses from the participants were processed using SPSS Version 22 and data presented using descriptive statistics of frequency tables and percentages. However, inferential statistics of analysis of variance, correlations and regressions were used to determine if patterns that emerged can be applied to the population under study.

Summary of Major Findings

Findings form the study showed that;

1. Majority of teachers in the Basic schools for the Deaf in Eastern Region had positive attitudes towards multimedia instructions as indicated by their appreciation of multimedia instruction and its benefits in educating hearing impaired pupil.
2. The Schools for the Deaf in Eastern Region had computer Laboratories as resource for multimedia instruction but majority of teachers preferred using their classrooms for multimedia instruction. The main reasons given were time and the ease to manage pupils during the instruction. Pupils also preferred having multimedia instructions in their classrooms. It was also found that though the Basic schools for the Deaf had computer laboratories they lacked internet access and adequate computers. Some of the labs were quite small and incapable of accommodating a large number of students or handle two stream of classes as it was found that both the Primary and Junior High Schools rely on those same ICT Labs.
3. Finding also showed that there was positive perception of effect of multimedia instruction on pupils' comprehension, attitude to lessons, but insignificant statistically in areas of attention during lessons. Thus, the use of multimedia instruction has a significant positive effect on students learning at the Basic schools for the Deaf.
4. Only 12% of the respondents had any multimedia resources provided for their classroom which implies majority of the classrooms in Basic schools for the deaf in Eastern Region of Ghana lacked Multimedia resources and none of the Basic School for the deaf had policies on IT in the schools. Each

teacher does whatever he is capable of. Moreover, only 2.8% of the respondent teachers had prior training in multimedia instruction and these were ICT subject teachers. Which imply teachers in the schools for the deaf lacked training in multimedia instruction. As a result, none of the respondents frequently support their teaching with multimedia instruction and only 19.4% do when the topic demands it. It was found that there was no significant difference in challenges faced by teachers in integrating multimedia instruction into their teaching and the major barriers that confront teachers in the Basic schools for the deaf in multimedia instruction were lack of training, unavailability of multimedia resources in their classrooms and lack of internet access.

5. Majority of the respondents (58%) believed that there must be a policy in the school for use of IT and 95% of the respondents too support provision of multimedia resources for each classroom as well as training of teachers in multimedia instruction.

Conclusions

The conclusions drawn based on the research objectives were;

Teachers in the Basic schools for the Deaf in Eastern Region had positive attitudes toward multimedia instruction because they believe multimedia instruction had positive effects on students learning. However, teachers do not integrate multimedia instruction into their teaching and their multimedia skill level is questionable which implies teachers in the Basic schools for the Deaf are facing

barriers integrating technology in their instructions but which are not being addressed.

Although the Basic schools for the Deaf in Eastern Region have computer laboratories as the only resource to support multimedia instruction, teachers preferred multimedia instruction in their classrooms which implies the resources available at the computer laboratories are inadequate to support multimedia instruction because availability of computer labs has no influence on multimedia instruction by teachers in the schools for the Deaf. Likewise, no significant difference in barriers faced by teachers in multimedia instruction.

Multimedia instruction has positive effects on hearing impaired students' comprehension and retention but statistically insignificant in areas of attention during lessons. Hearing impaired students will be the greater beneficiaries if multimedia instruction is integrated into their education by their teachers.

However, Majority of the classrooms in Basic schools for the deaf in Eastern Region lacked Multimedia resources and the schools do not have any direction as far as the use of information technology in educating special needs children is concerned because there was no periodic IT training for teachers in the Basic schools for the Deaf in Eastern Region and no provision of multimedia resources for the classrooms.

Recommendations

From the summary of the major findings of this study, it is recommended that:

1. It is not enough having computer laboratories if it not accessible by a large number of beneficiaries due to barriers such as unavailable internet

connection. The computer labs in the School for the Deaf must be equipped with internet to enable teachers access multimedia resources in order to enhance their lesson delivery through multimedia instruction which will increase teachers positive attitude toward multimedia instruction.

2. The Classrooms in the Basic schools for the Deaf in Eastern Region must be equipped with multimedia resources such as a computer, a projector a smart television or whiteboard. In fact, a school policy on IT should aimed at achieving one classroom one projector or one multimedia resource because finding showed that majority of teachers prefer having multimedia instruction in their classrooms as against using computer labs. This can best be done if the Special Education Division of Ghana Education Service takes concrete efforts to assist the schools for the Deaf.
3. Teachers in the Basic school for the Deaf in Eastern Region need to be trained on multimedia instruction and periodically have their skillset updated in order for them to be abreast with current technological changes in education because the Government Policy on ICT for Development made no provision for teachers in Special schools.
4. Meanwhile that classrooms have not been equipped with adequate multimedia technologies, teachers must be encouraged to use the ICT Labs for multimedia instruction while they make effort to borrow from the Labs the few movable resources such as projector and laptops and use them for multimedia instruction.

Suggestions for Further Research

A further research should examine the impact of multimedia instruction on students' achievement in various subject areas. This research can also be expanded to cover all the Basic schools for the Deaf in Southern sector of Ghana.

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APPENDIX A

Sample Questionnaire for Teachers

QUESTIONNAIRE

Questionnaire Assessing the use of Multimedia in Hearing Impaired schools in Eastern Region, Ghana

Dear sir/madam,

The nature and use of multimedia and its technologies in the education of the special needs hearing impaired pupil in the Eastern Region is not explicit. This researcher has the burden to find out how multimedia is being integrated into teaching in the hearing impaired special need classroom and its impacts and barriers facing teachers in its use. The study will stress on teachers' and pupils' perception and views as regards the use of multimedia mainly PowerPoint or combination of image, text animation and video.

I honestly do recognize your busy schedule but please find time to answer the following questions in few hours or days.

All information provided is subjected to anonymity and confidentiality and you are at liberty to decline answers to portions of questions that you feel infringe your privacy.

Thank you

SECTION A

BACKGROUND INFORMATION

Instruction: Please tick (√) what is applicable to you

i. Gender/Sex Male [ ] Female [ ]

ii. Age range 18-24 [ ] 25-34 [ ]
35-44 [ ] 45-54 [ ] 55 or more [ ]

iii. Name of School……

iv. Highest Educational Qualification:
Teachers Certificate A [ ]
Diploma in Basic Education [ ]
Diploma in Education [ ]
Degree in Education [ ]
Master's Degree [ ]
Others (Please specify) …….

v. How long have you been teaching in the school?

Less than 3 years [ ] 4 to 6 years [ ]
7 to 9 years [ ] 10 to 12 years [ ]

vi. Indicate the subjects you teach …….

SECTION B

TEACHERS PERCEPTION/VIEWS AND ATTITUDES ON MULTIMEDIA USAGE AND EFFECTS ON PUPILS IN THE SPECIAL NEEDS CLASSROOM

Please indicate your acceptance of the statement by ticking (√) in the related box

Strongly Agree: SA Agree: A
Strongly Disagree: SD Disagree: D Undecided: UN

	STATEMENT	5 SA	4 A	3 SD	2 D	1 UD
1.	Multimedia instruction is mainly concerned with use of technologies in the classroom					
2.	Multimedia instruction is restricted to certain subjects only in the curriculum.					
3.	Use of multimedia in the classroom plays an important role in the education of the special needs child					
4.	Multimedia instruction enables the special need child to overcome social and communications related skills					
5.	With the potential of multimedia technologies there is a need to replace the special needs educators with ICT					
6.	The real world is presented to the special need child through multimedia instruction					
7.	Multimedia instruction saves instructional time in the special needs classroom					
8.	Multimedia instruction disrupts learning					
9.	I don't need to use multimedia in teaching the deaf					

10.	I feel anxious (uneasy/worried) when using IT with my pupil					
11.	I feel threatened to use computer in my teaching					
12.	I feel excited and motivated to incorporate multimedia in my teaching					
13.	I feel tired after using multimedia to teach my pupils					
14.	My pupils don't feel excited learning from multimedia					
15.	Concepts are easier to present to my pupils using multimedia					
	STATEMENT	**5**	**4**	**3**	**2**	**1**
		SA	**A**	**SD**	**D**	**UD**
16.	My pupils can explain better in their own words what they have learnt when I use multimedia to teach than without it.					
17.	When I use multimedia the learning process (teaching) become active (interesting) rather than passive (dull/boring)					
18.	Pupils attention in class and during lessons improve					
19.	When I use multimedia, my pupils feel motivated as well to learn how to operate multimedia technologies like laptops and smart phones and projectors					
20.	My pupils understand abstract concept better when I use multimedia to teach					
21.	When I use multimedia, it reduces the amount of direct instruction given to pupils					
22.	When I use multimedia, my pupils become more interested in the lesson					
23.	My pupils' comprehension improved when I use multimedia to teach					
24.	My pupils don't participate in my lesson when I use multimedia (they					

	don't ask question they just sit and watch or listen to me)					
25.	When I use multimedia, it reduces communication with my pupils					

SECTION C:

AVAILABLE RESOURCES, PRACTICE AND BARRIERS

Please tick (√) what is applicable to you.

26. Are you aware of a policy framework within your school on use of multimedia in the special needs classroom (such as supply of equipment, aim of use and vision)?
    Yes [ ] No [ ]
27. Does your school have a computer Lab?
    Yes [ ] No [ ]
28. Does your school have an internet connection for the computer Lab?
    Yes [ ] No [ ]
29. Which of the following multimedia technologies are provided for your classroom?
    Television [ ] Computer [ ] Projector [ ] interactive whiteboard [ ] None of the above [ ] Others Specify ……
30. Which of the following is/are your sources of multimedia for use in your teaching?
    PowerPoint [ ] CD ROM [ ] Internet [ ]
    Others (specify) ……
31. How often do you take pupils to computer lab for multimedia instruction?
    Frequently [ ] Rarely [ ]
    When the Topic demands [ ] Never [ ]
32. Where do you prefer/would prefer most to give multimedia instruction to your pupils?
    Classroom [ ] Computer Lab [ ]
33. Why?.....
    .....
    .....
34. How will you describe your ability to design and present information using PowerPoint?
    Expert [ ] Intermediate [ ]
    Beginner [ ] Unfamiliar [ ]
35. How will you describe your ability to download videos and images from the internet to your PC and use to teach your pupils?
    Expert [ ] Intermediate [ ]
    Beginner [ ] Unfamiliar [ ]
36. How often do you use multimedia in your lessons delivery?

Frequently [ ] Rarely [ ]
When the Topic demands [ ] Never [ ]

37. Have you had training/initial training in multimedia instruction in the classroom?
Yes [ ] No [ ]

38. On a scale of 1-7 which of the following(s) is/are some of your barriers to use of multimedia in the special needs classroom?

	STATEMENT	
a.	Lack of time	
b.	Lack of training	
c.	Lack of multimedia resources	
d.	Unavailability of software	
e.	Lack of confidence	
f.	Distractibility of pupils and teachers	
g.	Lack of internet or budgetary allocation for internet access to resources	

SECTION D

MAKING MULTIMEDIA USAGE EFFECTIVE

Please tick (√) what is applicable to you.

Strongly Agree: SA Agree: A
Strongly Disagree: SD Disagree: D Undecided: UN

	STATEMENT	5 **SA**	4 **A**	3 **SD**	2 **D**	1 **UD**
39.	A school policy on use of multimedia enhance integration of ICT in the classroom					
40.	A school plan drawn largely from a national objective on use of multimedia ensures that there is outside support for multimedia resources					
41.	Provision for the acquisition of knowledge on use of multimedia resources in the school policy plan would enhance the use of multimedia in the special needs classroom					

42.	Multimedia use should not be restricted to certain subjects only in the curriculum					
43.	Use of multimedia should be routine and transparent in the special need classroom					
44.	Every class must have a multimedia technology device such as Projector, Laptop and flat screen television					
45.	Teachers must be trained from time to time on how to use multimedia technologies to support their teaching					

46. Which of the following multimedia technologies would you recommend for your hearing impaired special need classroom?

Projector [ ] Television [ ]
Computer [ ] Interactive Whiteboard [ ]

APPENDIX B

ANOVA of Teacher's Attitudes

Table 3: ANOVA of attitudes of teachers towards use of multimedia instruction in teaching hearing impaired students in Eastern Region.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Multimedia instruction is mainly concerned with use of Technology	Between Groups	1.119	2	.559	1.654	.199
	Within Groups	23.326	69	.338		
	Total	24.444	71			
Multimedia instruction is restricted to certain subjects only	Between Groups	1.184	2	.592	1.356	.265
	Within Groups	30.135	69	.437		
	Total	31.319	71			
Multimedia instruction plays important role in educating the deaf	Between Groups	.641	2	.320	.378	.687
	Within Groups	58.470	69	.847		
	Total	59.111	71			
Multimedia instruction enables the deaf overcome socio-communication problems	Between Groups	.047	2	.024	.016	.984
	Within Groups	103.064	69	1.494		
	Total	103.111	71			
Teachers must be replaced with IT	Between Groups	.630	2	.315	.997	.374
	Within Groups	21.814	69	.316		
	Total	22.444	71			
The real world is presented to the deaf through multimedia instruction	Between Groups	4.736	2	2.368	1.684	.193
	Within Groups	97.042	69	1.406		
	Total	101.778	71			

Multimedia instruction use saves instructional time	Between Groups	.434	2	.217	.253	.777
	Within Groups	59.219	69	.858		
	Total	59.653	71			
Multimedia instruction disrupts learning	Between Groups	1.011	2	.506	1.242	.295
	Within Groups	28.100	69	.407		
	Total	29.111	71			
There is no need to use multimedia to teach the Deaf	Between Groups	.655	2	.327	.701	.500
	Within Groups	32.220	69	.467		
	Total	32.875	71			
I feel anxious when using IT with my pupils	Between Groups	.530	2	.265	.751	.476
	Within Groups	24.345	69	.353		
	Total	24.875	71			
I feel threatened to use computer in my teaching	Between Groups	.178	2	.089	.407	.667
	Within Groups	15.100	69	.219		
	Total	15.278	71			
I feel excited or motivated to use multimedia	Between Groups	.678	2	.339	.483	.619
	Within Groups	48.433	69	.702		
	Total	49.111	71			
I feel tired after using multimedia to teach	Between Groups	.813	2	.407	1.046	.357
	Within Groups	26.839	69	.389		
	Total	27.653	71			
My Pupils don't feel excited learning from multimedia	Between Groups	1.226	2	.613	3.973	.023
	Within Groups	10.649	69	.154		
	Total	11.875	71			
Concepts are easier to Present with	Between Groups	2.720	2	1.360	1.388	.256

Multimedia instruction	Within Groups	67.600	69	.980		
	Total	70.319	71			
My pupils can explain better in their own words lessons delivered through MM	Between Groups	.507	2	.254	.385	.682
	Within Groups	45.493	69	.659		
	Total	46.000	71			
Mm instruction makes lesson Active and interesting for pupils	Between Groups	1.696	2	.848	1.163	.318
	Within Groups	50.304	69	.729		
	Total	52.000	71			
Pupils attention in class during lessons improve because of MM instruction	Between Groups	1.905	2	.952	.972	.383
	Within Groups	67.595	69	.980		
	Total	69.500	71			
Pupils feel motivated to learn to use MM Technologies	Between Groups	.494	2	.247	.281	.756
	Within Groups	60.493	69	.877		
	Total	60.986	71			
Pupils understand abstract concepts better when I use MM	Between Groups	.321	2	.161	.243	.785
	Within Groups	45.554	69	.660		
	Total	45.875	71			
MM instruction help reduce amount of direct instruction given to pupils	Between Groups	2.910	2	1.455	1.131	.328
	Within Groups	88.743	69	1.286		
	Total	91.653	71			
When I use MM, pupils become more Interested in my lessons	Between Groups	.530	2	.265	.489	.615
	Within Groups	37.345	69	.541		
	Total	37.875	71			
When I use MM pupils' comprehension Improved	Between Groups	.428	2	.214	.450	.640
	Within Groups	32.850	69	.476		
	Total	33.278	71			
My pupils don't participate in lessons when I use MM	Between Groups	.172	2	.086	.368	.694
	Within Groups	16.147	69	.234		

	Total	16.319	71			
When I use MM, it reduces Communication With pupils	Between Groups	1.268	2	.634	1.429	.247
	Within Groups	30.607	69	.444		
	Total	31.875	71			