

UNIVERSITY OF EDUCATION, WINNEBA

**STUDENTS' PERCEPTION OF MULTIMEDIA INSTRUCTIONAL
MATERIALS AND THEIR EFFECT ON LEARNING ICT IN SENIOR HIGH
SCHOOLS IN THE ADENTAN MUNICIPALITY**



SAMUEL OPOKU

POST-GRADUATE DIPLOMA

2021

UNIVERSITY OF EDUCATION, WINNEBA

**STUDENTS' PERCEPTION OF MULTIMEDIA INSTRUCTIONAL
MATERIALS AND THEIR EFFECT ON LEARNING ICT IN SENIOR HIGH
SCHOOLS IN THE ADENTAN MUNICIPALITY**



SAMUEL OPOKU

**A Dissertation in the Department of Educational Foundations,
Faculty of Educational Studies, submitted to the School of
Graduate Studies in partial fulfilment
of the requirements for the award of the degree of
Postgraduate Diploma
(Education)
in the University of Education, Winneba**

AUGUST, 2021

DECLARATION

Student's Declaration

I, **Samuel Opoku**, declare that this Dissertation, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE

DATE

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of dissertation as laid down by the University of Education, Winneba.

DR. PETER ESHUN (SUPERVISOR)

SIGNATURE

DATE



DEDICATION

I dedicate this project work to the Almighty God for His numerous mercies, blessings and guidance bestowed on me throughout the course.



ACKNOWLEDGEMENT

I wish to express my profound and heartfelt appreciation to Mr. Peter Eshun (PhD) my supervisor whose constructive comments, criticisms and suggestions have made this study possible. Thank you, Sir, and may God bless you.

My heartfelt gratitude to Mr. John N-yeibi, Department of Counselling Psychology for taking time off his busy schedules to critically read through the work and make very useful suggestion to make this project work what it is now. Thank you, Sir, and may God bless you.

Special thanks go to my parents, Mr. Isaac Sampson Opoku and Mrs. Phidelia Opoku who has been a great source of both spiritual and material help to me and give me moral and financial support to produce this work. May God richly bless you.

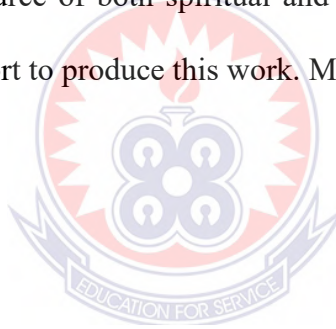


TABLE OF CONTENT

CONTENT	PAGE
DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENT	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
ABSTRACT	xi
CHAPTER ONE: INTRODUCTION	1
1.0 Background to the Study	1
1.1 Statement of the Problem	4
1.2 Theoretical/Conceptual Framework of the Study	6
1.3 Purpose of the Study	11
1.4 Objectives of the Study	12
1.5 Research Questions	12
1.6 Significance of the Study	12
1.7 Delimitation of the Study	13
1.8 Definition of Terms	13
1.9 Organization of the Study	15

CHAPTER TWO: REVIEW OF RELATED LITERATURE	16
2.0 Introduction	16
2.1 The Appropriate Multimedia Instructional Materials for Teaching and Learning	16
2.2 Effect of Multimedia Instructional Materials on Teaching and Learning	17
2.3 Challenges in the use of Multimedia-Based Instruction for Teaching and Learning	23
2.4 Summary	24
CHAPTER THREE: METHODOLOGY	25
3.0 Introduction	25
3.1 Research Paradigm	25
3.2 Research Approach	26
3.3 Research Design	26
3.4 Study Area	27
3.5 Population of the Study	27
3.6 Sample and Sampling Procedure	28
3.7 Instrumentation	31
3.8 Pilot testing	32
3.9 Reliability	33
3.10 Validity	33
3.11 Data Collection Procedure	34
3.12 Data Analysis	35
3.13 Ethical Considerations	36



CHAPTER FOUR: ANALYSIS OF RESULTS AND FINDINGS	38
4.0 Introduction	38
4.1 Demographic Characteristics of Respondents	39
4.2 Research Question One: What kinds of multimedia instructional material is appropriate for learning of ICT in Senior High Schools?	41
4.3 Research Question Two: What are the effects of multimedia instructional materials on Senior High School students' learning of ICT?	47
4.4 Research Question Three: What are the Challenges Associated with the Use of Multimedia Instructional Materials in Senior High Schools?	50
CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS	54
5.0 Introduction	54
5.1 Summary of Findings	54
5.2 Conclusion	56
5.3 Recommendations	56
5.4 Suggestion for further studies	57
REFERENCES	58
APPENDIX 'A': QUESTIONNAIRE	63
APPENDIX 'B': RELIABILITY STATISTICS	67
APPENDIX 'C': QUESTIONNAIRE RESPONSE RATE	68
APPENDIX 'D': PARENTAL CONSENT FORM	69



LIST OF TABLES

Table	Page
3.1 Number of Second Year Students Senior High Schools in the Adentan Municipality	28
3.2 Sample Size determination	29
4.1 Questionnaire Response Rate	38
4.2 Age Distribution of Respondents	39
4.3 Gender Distribution of Respondents	40
4.4 Programme of Study of Respondents	41
4.5 Students' Usage of Multimedia Instructional Materials for ICT Learning	42
4.6 Students opinion on the appropriate Multimedia Instructional Materials for an ICT lesson	43
4.7 Overall Mean Score of Students' Opinion	46
4.8 Effect of Multimedia Instructional Materials on Students' Learning of ICT	48
4.9 Challenges in Learning with Multimedia Instructional Material	50
4.10 Kind of Challenges Students Faced	52

LIST OF FIGURES

Figure	Page
1: Conceptual Model of the Study	11
2: Map of Adentan Municipal	28
3: Sample drawn from West Africa SHS	30
4: Sample drawn from Delcam SHS	31
5: Challenge faced in Learning with Multimedia Instructional Materials	51



ABSTRACT

The study investigated students' perception of multimedia instructional materials and their effect on learning ICT in Senior High Schools in the Adentan Municipality. Specifically, the study sought to identify the kinds of multimedia instructional materials that are appropriate for students' learning of ICT and also investigate the effects of them on students' learning of ICT. The accessible population of 1,563 students was drawn from the High School student population of 5,015. The study then sampled 100 second year students of selected schools in the Adentan municipal. The selection was done using simple random sampling technique. The researcher opted for descriptive survey design was used gather data from the various respondents. Descriptive statistics such as standard deviation, mean and frequencies were used to analyse the research questions. The findings revealed that computer interactive lesson and slideshow lesson are the most appropriate multimedia instructional materials for learning ICT. However, even though the students are of the opinion CD/DVD lesson and web-based content are also appropriate, they are rarely used for ICT lessons. Secondly, though there are some challenges students face in the use of multimedia instructional materials, they significantly effect students' learning positively. The researcher then recommends that schools should make multimedia instructional materials available for learning ICT. Furthermore, CD/DVD lesson and web-based content should be incorporated in teaching and learning of ICT.



CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Teaching is becoming one of the most challenging professions in the society today where knowledge is expanding so rapidly that modern technologies demand the use of Information and Communication Technology (ICT). ICT has become within a short time one of the building blocks of a modern society. Many countries now regard understanding ICT and mastering its basic concepts as part of the core of education (UNESCO, 2002). ICT is essential to assist students assess their own learning and complete specific personal projects. It is natural for teachers and students to collaborate with other colleagues in sharing experiences to solve problems. Hence, ICT becomes a stimulus for exciting new teaching and learning opportunities.

The government of Ghana in collaboration with the Ministry of Education unveiled the ICT in Education policy framework and implementation strategy, complete with measurable outcomes and timelines (Ministry of Education, 2015). This policy document serves as a platform to launch a systematic ICT in Education delivery through three pillars: ICT as a learning and operating tool, ICT as integrated into the teaching and learning and ICT as a career option for students. The second policy objective of the policy is to ensure that Senior High School students in Ghana get access to quality education which takes into account the integration of ICT in instruction. Furthermore, there have been a gradual increase of computer laboratories at all levels of the school system and this testify to the potency of the use of computer technology in education delivery (Yidana & Asiedu-Addo, 2001). Also, ICT has currently become a compulsory (core) subject for every SHS student in Ghana even

though it is still not yet examinable in the West Africa Senior High Certificate Examination as a standalone paper (Ministry of Education, 2015).

Despite the progress made by previous governments in ICT integration, some problems still persist such as lack of ICT tools and materials as well as no access to Internet (Opoku et al., 2016). Teachers tend to use the traditional methods of teaching as opposed to the use of technologies that enhances teaching and learning at the Senior High level. Most students in Ghana complete Senior High School without exploring the full potential of ICT. Instructors at the Basic and Secondary level of education are under pressure to provide more effective and efficient learning environments and educational experiences to their students. Teaching serves as an important vehicle for achieving institutional goals of enhancing students' learning and engaging them in the learning process to prepare them for the future. Therefore, educators are always looking for ways to make their educational initiatives more effective. The learning experience in higher education has experienced paradigm shift from an instructor-focused approach to student-centered pedagogical methods (Hsu & Wolfe, 2003).

Instructional systems and educational technology have been gaining great attention in education to enhance students' learning. Educators have become aware of the benefits and shortcomings of various traditional methods used to provide instruction and training to students and the possible benefits of educational technologies. Thus, educators have been adapting their curricular to take advantage of new instructional methods (Preal, 2019). The author concluded that educational technologies such as use of multimedia instruction such as slide presentations, simulation methods, online courses, and computer-assisted case-based instruction are

becoming the order of the day. Multimedia allows teachers to integrate text, graphics, animation, and other media into one package to present comprehensive information for their students to achieve specified course outcomes. Multimedia permits the demonstration of complicated processes in a highly interactive, animated fashion and that instructional material can be interconnected with other related topics in a more natural and intuitive way (Crosby & Stelovsky, 1995). Teaching and learning supported by multimedia instructional materials and other communication technologies offers an alternative to the solutions used in the traditional approach. The Internet as the largest source offers over 5,000 multimedia learning materials for ICT as a subject (Internet Society, 2017).

Multimedia instruction has been applied as a component of classroom activities, in pre-class preparation, or as a stand-alone learning experience for students (Slate & Gaytan, 2002). Multimedia tools like still images, animated graphics, text, video and audio integrated in a structured manner, compared to traditional textbooks are confirmed to be much more efficient tools in adopting new knowledge (Sadaghiani, 2012). An increase in integration of instructional multimedia in courses at the Senior High School level has been noted as access to educational technology improves. Some recently employed multimedia instructional materials including video, film, DVD/CD-ROM, computer simulations, slide presentations, audio recordings, and web-based content (internet), have been utilized to present lectures, supplement classroom activities, and demonstrate psychomotor skills (Nousiainen et al., 2008). Advantages of instructional multimedia include increased availability and repetition of instructional content, improved ability of students to learn at their own pace, increased student control of material, less demand on instructor time, and addressing multiple learning preferences (Jones et al., 2006).

Inferring from the above, it is evident that multimedia instruction is becoming an integral part of contemporary instructional delivery in educational institutions, when properly integrated, multimedia instruction has the possibility to improve teaching and learning outcomes among teachers and students.

1.1 Statement of the Problem

According to Gambari et al. (2014), in this 21st century, a motivating and captivating approach should be encouraged to help students better learn, understand, and retain ICT concepts and promote their future involvement. One of the promising approaches involves the use of multimedia-aided instruction supported by visual and verbal formats supplemented with pictures, animations, texts, and narrations. Multimedia instructional materials can be a lesson in formats such as audio, video, text, animation and simulations stored on a smart phone, laptop, computer, CD/DVD or an external storage device. It can also be presented using a television or projector or even downloaded or accessed through the internet.

The researcher is a teacher and during his interaction with some students of West Africa Senior High school, it came to light that first-year students were not allowed to use the school's ICT laboratory for their ICT lessons. This is as a result of the limited ICT infrastructure in the school which is incapable of accommodating multiple classes at a time. For this reason, form two students are given priority to use the ICT lab for their lessons while first year ICT teachers use the regular traditional classrooms for ICT lessons with poor electrical installations making it difficult to make use of multimedia instructional materials and related ICT tools. The researcher also noted that some of the students seemed not to be motivated to learn ICT meanwhile they enjoyed using ICT and multimedia tools for other thing such as

watching movies as well as playing video games. Moreover, the researcher also realized that the notion of some students was that, they will not get any opportunity to practice what they learn in an ICT lab outside the school since getting access to multimedia instruction is nonexistent. Hence, making use of multimedia instructional materials for learning ICT poses a great challenge to them.

Also, students may be motivated to learn other subjects but not ICT which is heavily reliant on the use of multimedia instructional materials. In recognition of these problems, Opira (2010) opined that if ICT is not properly integrated in learning, schools may fail to achieve its mission of producing graduates who are ready for the world of work and higher education that are increasingly reliant on ICT and multimedia aided information delivery. Most often, educational policies in multimedia instruction are implemented top to bottom that is the students who are key players are often left out in the decision-making process.

Thus, it is well recognized that multimedia instruction remains a key towards improving learning outcomes. However, the extent to which this has been achieved seem not yet been assessed in ICT education while challenges may also persist. In spite of the various attempts made by previous governments to make multimedia instruction a reality, it appears there is a paucity of studies that actually considered the students' perception of multimedia instructional materials and their effect on learning ICT. It is on the basis of this that this study is intended to delve into students' perception of multimedia instructional materials and their effects on learning ICT in Senior High Schools in the Adentan Municipality.

1.2 Theoretical/Conceptual Framework of the Study

The theoretical framework that underpinned the study was hinged on the cognitive theory of multimedia learning (CTML) which was popularized by the work of Richard Mayer and other cognitive researchers who argue that multimedia supports the way that the human brain learns. Mayer (2005) asserts that people learn more deeply from words and pictures than from words alone, which is referred to as the multimedia principle.

Multimedia learning describes learning through the use of a combination of pictures and words. The words can be spoken or written (text), and the pictures can be any form of graphical imagery including illustrations, photos, animations, or videos. Examples of multimedia learning include watching a PowerPoint presentation, or watching a pre-recorded lecture. Hence, multimedia instructional design attempts to use cognitive research to combine words and pictures in ways that maximize learning effectiveness. Multimedia learning theory describes how the designers of instructional messages, systems, and learning environments can optimize learning. Audio and visual presentation technologies provide an effective set of tools for instructors and instructional designers to communicate with learners. Mayer's multimedia learning theory provides an informative set of principles that can be used to create effective instructional message design.

Cognitive scientists seek to understand mental processes such as perceiving, thinking, remembering, understanding language, and learning. As such, cognitive science can provide powerful insight into human nature, and, more importantly, the potential of humans to develop more efficient methods using instructional technology (Sorden, 2005). The cognitive theory of multimedia learning center on the idea that

learners attempt to build meaningful connections between words and pictures. According to CTML, one of the main aims of multimedia instruction is to encourage the learner to build a coherent mental representation from the presented material. The learner's job is to make sense of the presented material as an active participant, ultimately constructing new knowledge.

The theoretical foundation for CTML draws from several other theories, models, and many other research studies influenced the evolution of multimedia learning theory. However, the main contributions come from Paivio's dual coding theory, Baddeley's working memory model, and Sweller's cognitive load theory (Mayer & Moreno, 2003). According to Mayer (2003) multimedia instructional content is more likely to create a meaningful learning experience if the content is developed based on three assumptions: the dual-channel assumption, the limited capacity assumption, and the active processing assumption.

The dual-channel assumption is that, working memory has an auditory and visual channel based on Baddeley's (1986) theory of working memory and Paivio's (1991) dual coding theory. Thus, one for visual/pictorial and one for auditory/verbal processing. The second assumption is the limited capacity assumption is based on cognitive load theory by Sweller (1994) and it states that each subsystem of working memory has a limited capacity. The third assumption is the active processing assumption by Mayer (1999) which suggests that people construct knowledge in meaningful ways when they pay attention to the relevant material, organize it into a coherent mental structure, and integrate it with their prior knowledge. Active learning entails carrying out a coordinated set of cognitive processes during learning.

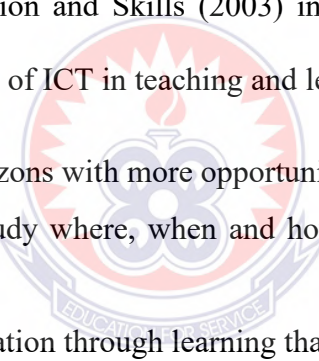
The multimedia principle serves as the foundation for Multimedia Design Theory. This principle asserts that deeper learning occurs from words and pictures than from just words. Simply adding images or graphics to words does not assure a deeper level of learning. However, in education, verbal modes of instruction have traditionally played a larger role than pictorial modes of instruction. Verbal modes of instruction are based on words and include spoken text (such as lectures and discussions) and printed text (such as the text portion of textbooks or on-screen text). Pictorial modes of instruction are based on pictures and include static graphics (such as photographs, illustrations, figures, and charts) and dynamic graphics (such as animation and video). In spite of the disproportionate emphasis on verbal forms of instruction, advances in computer graphics and the proliferation of pictorial representations on the World Wide Web have led to an increasing interest in exploiting the potential of pictorial forms of instruction as aids to meaningful learning (Pailliotet & Semali, 2000). In the subsequent chapters in the study presented, I examined how multimedia modes of instruction affect students' learning.

1.2.1 ICT as a Subject and its Integration into Teaching and Learning

Although, ICT is being taught in Senior High Schools in Ghana as a non-examinable core subject and as an elective subject in some few selected schools, the question is, how is ICTs used by teachers and students in their teaching and learning? This however, can be done by the use of power point presentations, internet connectivity of the school for e-learning, the use of skype in linking other students, and so on. This suggests that ICT can make significant contribution to teaching and learning across all subjects. Educators continuously seek innovative ways to present quality instruction for a number of reasons, including to: (a) increase their service for student's learning, (b) fulfill their institution's mission by integrating institution's

core concepts into each curricular, and (c) address students' demographic needs (Morse, 2003). Feinstein et al. (2005) noted that there was a current trend toward more active involvement of students in their own education. The authors also pointed out that many educators thought that instructor-led lectures were not effective methods of instruction. Other instructional methods such as case studies, student-led discussions, and web-based modules allow students to learn at their own pace and have been incorporated into classrooms to enhance students' learning (Hsu & Wolfe, 2003).

Integration of ICT in teaching and learning is increasingly becoming a necessity for these innovative instructional methods. It is therefore not surprising that the Department of Education and Skills (2003) in the United Kingdom set out the objectives for effective use of ICT in teaching and learning as;

- 
- Broadening horizons with more opportunities for creative expression
 - Flexibility to study where, when and how best suits individuals need and preferences
 - Increased motivation through learning that stimulates interest
 - Wider access to learning and participation
 - Sensible choices about when, when not and how to use new technology to enhance, enrich and sustain learning.

Granger et al. (2002) opined that successful implementation of ICT in education is a complex process, determined by pedagogical values, attitudes, curricular needs and physical infrastructures. ICTs are radically transforming the curriculum in a number of ways, demanding that teachers reflect on new pedagogy and not the traditional methodologies. Educators themselves assert that the integration of ICT into the classroom will greatly enhance the learning experience (Sutherland et al., 2004). The growth of ICT itself dictates that in order for students to adjust to

modern society and the global economy, the way in which they are taught and what they are taught, requires adjustments to and around ICT (Watson, 1999). Balanskat et al. (2006) argue that although educators appear to acknowledge the value of ICT, difficulties continue to be encountered in adopting and integrating such technologies in instruction delivery.

1.2.3 Conceptual Framework for the study

The conceptual framework used in this section was adapted from Spiro et al. (1992). This was used in a similar study by Opira (2010) which focused on the effects of ICT on students' learning at University of Gulu, Uganda. The conceptual framework to determine the students' perception of multimedia instructional materials and its effects on learning ICT at Senior High Schools has been summarized as shown in figure 1 below.



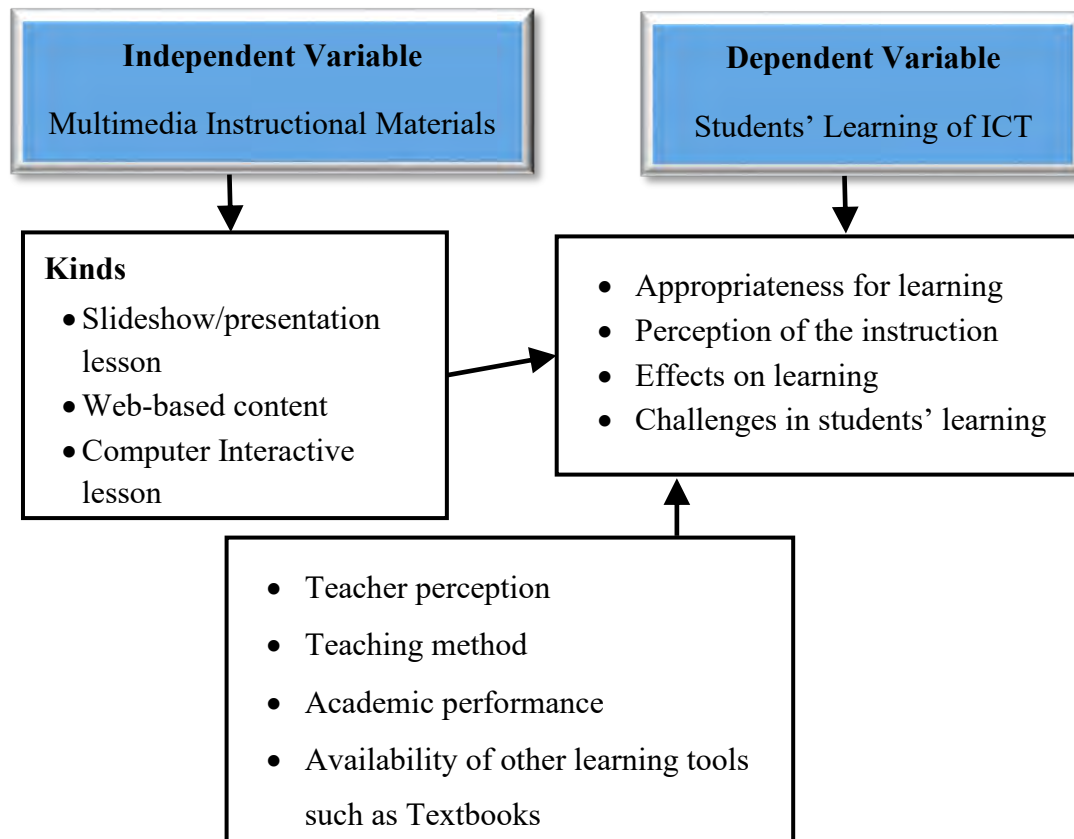


Figure 1: Conceptual Model of the Study

Source: Adapted from Spiro et al. (1992)

From figure above, the presence and use of the multimedia instruction materials by students and teachers provides an avenue of interaction. These interactions provide feedback which acts as a reinforcer towards the learning process. Multimedia applications like pictures, videos, animation and other graphical applications provides practices that take the form of questions (stimulus) and answers (response) frames which exposes the students to ICT as a course in gradual steps consequently generating more interest in the subject matter which in the long run affects their learning and gives them the desire to try and use this acquired knowledge in a different setting.

1.3 Purpose of the Study

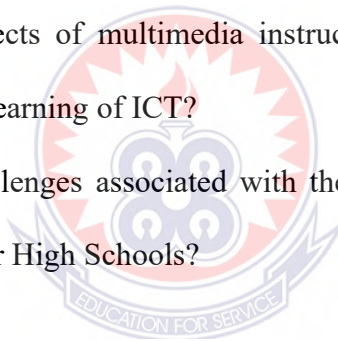
The purpose of this study is to investigate students' perception of multimedia instructional materials and their effect on learning of ICT.

1.4 Objectives of the Study

1. To identify the kinds of multimedia instructional material appropriate for Senior High School students' learning of ICT.
2. To investigate the effects or otherwise of multimedia instructional materials on Senior High School students' learning of ICT.
3. To find out students' challenges with the use of multimedia instructional materials in Senior High Schools.

1.5 Research Questions

1. What kinds of multimedia instructional material is appropriate for learning of ICT in Senior High Schools?
2. What are the effects of multimedia instructional materials on Senior High School students' learning of ICT?
3. What are the challenges associated with the use of multimedia instructional materials in Senior High Schools?



1.6 Significance of the Study

The researcher seems to inform and enlighten policy makers at the Ghana Education Service and the Ministry of Education as well as administrators and teachers of Senior High Schools in Ghana to appreciate the usefulness or otherwise of multimedia instructional materials in learning so as to come up with policies that promote ICT training to improve student performance. Furthermore, it will help teachers to better prepare students for their future studies and the job market which is highly reliant on the use of multimedia aided tools. The study will serve as a valuable contribution in indigenous literature.

1.7 Delimitation of the Study

The study focused on second year students at Senior High Schools within the Adentan Municipality of the Republic of Ghana. This choice of second year students was due to the fact that they are the likeliest to have used multimedia instructional materials for ICT lessons. Also, the study will be restricted to the perspective of students. The reason for this selection is that, these students will be able to address the research objectives as they give insights to their experience and perception using multimedia instructional materials and how it has impacted on their learning.

The study was additionally delimited to an aspect of ICT as a subject. Moreover, due to time constraint, limited resources and proximity, questionnaire was used as only instrument for collection and only selected senior high schools in Adentan Municipality were sampled.

1.8 Definition of Terms

Aristotle was of the firm opinion that intelligent discussions must begin with definition of terms. Thus, the researcher deems it fit to give operational definition to the following concerned terms in the study:

Instruction: generally, refers to the teaching methods and learning activities that a teacher uses to deliver the curriculum in the classroom. The terms ‘teaching’ and ‘instruction’ are often used interchangeably.

ICT (Information and Communications Technology): refers to all forms of computer and communications equipment and software used to create, design, store transmit, interpret and manipulate information in its various formats. Personal

computers, laptops, tablets, mobile phones, television and network technologies are just some examples of ICTs or ICT tools.

ICT Integration: It is defined as the use of ICT to introduce, reinforce, supplement and extend skills in education. ICT integration determine where and how technology fits in the teaching and learning process.

Traditional methods of instruction: refers to instructor-led lectures without the inclusion of any type of technology-based material such as PowerPoint slides, while **technology-based methods** of instruction include the use of any technology media resource.

Multimedia: is the combination of several media sources such as video, graphics, animation, audio, and text, accessed by a computer and attached peripherals driven by special programs. Multimedia as the combination of multiple technical resources for the purpose of presenting information represented in multiple formats via multiple sensory modalities.

Multimedia Instruction: Multimedia instruction (MI) can be defined as instructional procedures that integrate online or onsite computer environments where the combination of text, sound, images, videos and interactivity in learning tasks helps students advance their knowledge.

Perception: Perception is a personal manifestation of how one views the world which is coloured by many sociocultural elements. It is characterized by attaining awareness or understanding of sensory information.

1.9 Organization of the Study

This study is organized into five chapters. Chapter one gives the introduction, problem statement, research objectives and questions, limitations of the study and significance of the study. Chapter two discusses the relevant literature and outlines theoretical considerations that are used in discussing the empirical findings of this study. Chapter three focus on the methodology of the study while chapter four present analysis of the data gathered and discussion of the results and findings of the study. Chapter five highlight summary of the major findings, conclusions and suggested areas for future research.



CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter presents the literature relevant to the study which explores the integration of multimedia instructional materials in teaching and learning. It covers empirical studies into the research problem which were categorized under three research questions. The purpose is to provide the basis for drawing generalization in the research study.

2.1 The Appropriate Multimedia Instructional Materials for Teaching and Learning

In essence, multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation. With multimedia, the process of learning may be more goal oriented, more participatory, and flexible, unaffected by distances and tailored to individual learning styles, and increases collaboration between teachers and students. Moreover, multimedia instructional materials allow teachers to integrate text, still pictures, video graphics, animations, and other media into one package controlled and manipulated through a computer program to present comprehensive information for their students to achieve specified course outcomes. According to Slack (1999), teachers have stated that multimedia enables students to work at different pace, and lesson packages can be tailored to student needs. Multimedia instruction has also become one of the well-known and effective training tools and was referred to as the technological wave of the future.

There are a number of research works that seems to suggest some multimedia instructional materials that are appropriate for learning. Nousiainen et al. (2008)

recommended that multimedia instructional materials such as DVD/CD-ROM, computer simulations, slide presentations, audio recordings, and web-based content should be utilized to present lectures, supplement classroom activities, and demonstrate psychomotor skills. Other researchers also suggested certain multimedia instructional materials that can be employed for teaching and learning. Bradley et al. (2007) in a tutorial review of how to adapt and implement pedagogy that includes multimedia instructional materials in an MIS classroom asserted that instructors should adopt instructional materials to include multimedia case studies that incorporate web-based content, video instruction, and CD ROM into classroom instruction.

Yamauchi (2008) also investigated the effects of multimedia instructional material on students' learning and their perceptions of the instruction and concluded that students showed more positive perceptions about the amount of information covered in instructional sessions after watching an instructional DVD. Moreover, Shah and Muhammad (2015) conducted a study on the comparative effectiveness of multimedia-aided teaching (MAT) on students' academic achievement and attitude at elementary level. The results indicated students' attitude towards science improves more if multimedia presentation is used as compared to the traditional methods of teaching.

2.2 Effect of Multimedia Instructional Materials on Teaching and Learning

Many research has been done in various subject areas till date to find the effectiveness of multimedia in teaching. Most of the results show positive outcomes, with students being enthusiastic about new methods of learning. Most of the studies suggest that multimedia approach to teaching is more effective than traditional

approach to teaching. Taking the findings of such experiments into account, many schools have also started using the multimedia approach to teaching in their classrooms.

Bartlett and Strough (2003) stated that multimedia formats may offer benefits to instructors teaching multi-section courses because this type of format ensures uniformity in the lecture content across the sections. Jones et al. (2006) identified the advantages of instructional multimedia to include increased availability and repetition of instructional content, improved ability of students to learn at their own pace, increased student control of material, less demand on instructor time, and addressing multiple learning preferences. Multimedia also provides easiness and students may also learn new information. Dwyer (1993) states that students can gain the knowledge and information that would be impossible to get in traditional ways. Moreover, they could find the opportunity to prepare their own products and ideas with multimedia technique (Çeliköz, 1998). As a result, it could be asserted that the use of multimedia aided instruction possesses the power of helping students with different skills and learning styles. Dwyer (1993) also points out that multimedia provides the opportunity for every student to work individually. In other words, a student can work on the subjects she/he believes she/he needs to in the way she/he desires. The author further stated that a simple multimedia presentation helps students to better understand a subject without the help of a teacher particularly for shy and weak students.

Sivin-Kachala and Bialo (2000) reviewed 311 research studies on the effectiveness of technology on student achievement. Their findings revealed positive and consistent patterns when students were engaged in technology-rich environments,

including significant gains and achievement in all subject areas, increased achievement in preschool through high school for both regular and special needs students, and improve attitude toward learning and increased self-esteem. Ayithey (2015) conducted a study into the impact of multimedia instruction in Biology on Ghanaian senior high school students' achievement found that students exposed to teaching and learning of photosynthesis through the use of multimedia content performed significantly better than their counterparts exposed to the traditional instructional approach.

Ilhan and Oruc (2016) have also investigated the effect of multimedia technique on the academic achievement of students. A significant difference between the control and experimental groups was found to be in the benefit of the experimental group. In other words, they concluded that multimedia technique is a much better instruction way than traditional ways. Additionally, students' interest, motivation and participation increased according to the researcher and experimental group's teachers' observation. In the control group, traditional instruction had no effect on the academic achievement of the students. Moreover, for the experimental group, it was observed that all students were in the learning process while control group students could not be addressed as a whole. This means multimedia use could include more students into learning process. This way, all students in a classroom would be addressed.

Semerci (1999) expresses the fact that message via multimedia instruction reaches the receivers in various ways and thus, it provides a richer learning environment. The subjects being taught could be transmitted to the students with web-based audio, visuals, video and animations in a way that could not be taught in classrooms authentically with other techniques. This way, closeness to reality could

be provided and complete learning could be achieved. The author added that multimedia eases education in terms of data used, storage, share and transportation of the visual and non-visual written material, graphs, audios and other materials. Another contribution multimedia makes into education is the increase in academic achievement of the students. When compared to traditional instruction, multimedia use increases the academic achievement of the students. The use of multimedia affects education positively when designed properly compared to traditional instruction, in terms of academic achievement (Akkoyunlu & Yilmaz, 2005).

Finally, Yamauchi (2008) concluded that multimedia-based instruction can be efficient and effective for three reasons:

1. It is self-paced learning: the individualized pace of the learning allows students to break down the group instructional setting, which often inhibits some people's natural progression.
2. It includes video/audio production: enhancing a learner's interaction with the course material through less bridging effort between the learner and the information being processed; and
3. It provides autonomy in the learning process: self-regulated instruction shifts the sense of responsibility from the instructor to the student.

From the literature, it could be asserted that multimedia use eases and objectifies learning as it presents more than one technological factor to the learner and it addresses more than one emotion of the receiver.

2.2.1 Perception and Attitude of Students towards Multimedia Instructional

Materials

Effects of instructional methods also have been measured by assessing students' attitudes and perception toward the instruction (Bartlett & Strough, 2003; Susskind, 2005). These studies reported that students' attitudes toward instruction were becoming more favorable after they were exposed to new technology-based instructional material.

Susskind (2005) examined the effects of non-interactive computer-assisted instruction on students' self-efficacy and attitudes. In an introductory Psychology course, 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. 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.

Other studies also addressed students' perception of multimedia-assisted instruction. Price et al. (2005) assessed educational outcomes among students learning with traditional lecture versus CD-ROM. Although they found students preferred traditional lecture instruction, they suggested that when given the option of total self-instruction, students who knew they learned well using this type of instruction chose it but there were always students who preferred the traditional lecture method of instruction. To satisfy the diverse learning needs of students and enhance computer skills, the authors concluded that it would be beneficial to offer courses that combine traditional lecture methods of instruction with computer-assisted self-study.

Perry and Perry (1998) surveyed 109 college students enrolled in two classes: computer information systems and teacher education. The authors concluded that students preferred to attend classes using multimedia presentations and that they found class more interesting and more enjoyable with multimedia. The authors also stated that multimedia could affect learning in a positive manner. Moreover, the multimedia opinion survey showed that, when multimedia materials were utilized: (1) students found more material was covered, (2) students considered they learned and retained course material better, and (3) students indicated they understood difficult concepts better.

Furthermore, Kim and Kim (2005) found that, when comparing a set of five teaching resources (course website, didactic lectures in class, laboratory activities, assignments, and textbook) for teaching sanitation principles, students perceived the technology-based instruction as the most effective teaching resource to improve students' knowledge, followed by cooking lab activities, textbook, didactic lectures in class, and assignment related to food sanitation.

A study intended to explore the effectiveness of applying multimedia in an engineering course in support of students' learning by Yueh et al. (2012) found that students' degree of learning engagement caused variance in their perception of the helpfulness of multimedia-assisted learning in the course. The authors also found that students who would actively review multimedia videos after class showed higher appreciation for this multimedia-assisted instruction. It would confirm the previous literature that the more students are motivated to learn, the more likely they are to perceive the effectiveness of instructional technology (Nortcliffe & Middleto, 2008). The researchers also proposed that engineering educators should be aware of the effect of positive student engagement on attitude toward learning, and should design more complementary learning activities such as multimedia assisted instruction, online learning assignment as well as collaborative teamwork assignments, which would help engagement students more in deeper learning.

2.3 Challenges in the use of Multimedia-Based Instruction for Teaching and Learning

Challenges can retard the achievement of any set objective or aim. It therefore means that the removal of one or more challenges in teaching and learning with multimedia instructional-based instruction should significantly advance course of students learning. A study conducted by Organization for Economic Cooperation Development (2009) confirmed that there are a number of barriers that inhibit the use of multimedia in education. These barriers included an inconsistent number of computers to students, a deficit in maintenance and technical assistance and a lack of computer skills and/or knowledge among teachers and student.

Jenson et al. (2002) classified these barriers as: limited equipment, inadequate skills, minimal support, time constraints and lack of interest or knowledge by teachers and students. Moreover, in a research report conducted by British Educational Communications and Technology Agency (2004), a number of other important barriers were identified. These were; lack of confidence, lack of time, and poor appreciation of the benefits of the technology.

Boakye and Banini (2008) concluded that majority of the teachers at SHS level in Ghana do not use technology in classrooms for teaching and learning activities but often use technology to prepare lesson notes, browse the web and send emails. Becker (2001) also concluded that teachers generally use computer technology to support their existing practices (providing practice drills, demonstration) and communication (such as the use of email) rather than to engage students in learning that involves higher order thinking. This gives an indication that there are challenges persist as the use of technology in instruction delivery is yet to be fully realized and utilized.

2.4 Summary

This chapter has presented a review of related literature. Topical issues covered in the empirical study included; the Kinds of multimedia instructional materials used in teaching and learning, students' perception and its effect on learning, and challenges associated with student learning using multimedia instructional materials. These formed the foundation of this thesis.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes and discusses methodology, which would be used to conduct this study and the materials to be used in the research process. It covers key aspects of the methodology adopted by the researcher, which includes research design, study population, sampling techniques, data collection tools and procedure, how the data would be analysed as well as ethical considerations.

3.1 Research Paradigm

Guba and Lincoln (1994) define research paradigm as a basic set of beliefs or world view that guides research action or an investigation. It is the lens through which a researcher looks at the world and examines the methodological aspects of their research project to determine the research methods that will be used and how the data will be analysed.

In this study, the researcher adopted a positivist paradigm for the study. The researcher's choice of this paradigm is in line with Patel (2015), who opined that positivist believe there is a single reality which can be measured and known, and therefore quantitative methods is the best approach to measure this reality. Moreover, the researcher was of the opinion that positivist paradigm can be used in large-scale research for a short period of time to uncover social trends, such as the relationship between educational achievement and a social class. In addition, the role of the researcher is limited to data collection and interpretation in an objective way.

3.2 Research Approach

In terms of approach in data collection, the study adopted quantitative approach as the best choice of this research based on the objectives of the study. According to Creswell (2014), quantitative research design explains a phenomenon through the collection of a numerical data that are analysed using mathematical based methods especially statistics. The researcher was of the view that quantitative methods such as structured questionnaires and official statistics can be adopted because you are likely to get data that is reliable, consistent and representative of the larger group as argued by Guba et al. (1994).

Moreover, this approach offers the researcher the opportunity to gather and analyse large amount of data statistically within a short period of time. It also minimizes bias and data received can be expressed in the form of numbers and statistics, arranged in tables, charts, figures, or other non-textual forms. Finally, the findings from the study can be generalized if selection process is well designed and sample is representative of the study population.

3.3 Research Design

The researcher opted for a descriptive survey design for this study. Odoh and Chinedum (2014) recommends descriptive survey design technique for research where attitudes, ideas, comments and public opinion on a problem or issue are studied. Data is gathered predominantly by questionnaire or semi-structured interview and the answers to these questions by respondents constitute the data of the study. Data collected from the respondents was used to describe some aspects or characteristics of the population of which the respondents are part of. The choice of descriptive survey design was also dependent on the nature of the variables in this

study which sought to analyse students' perception on multimedia instructional materials and the effects it had on them.

3.4 Study Area

The Adentan Municipal is one of the twenty-six (26) Districts in the Greater Accra Region of Ghana. The district is among the new Districts and Municipals created in 2008 (Ghana Statistical Service, 2010). Currently, there are four (4) Senior High Schools within the Adentan Municipality, comprising of 2 (50%) public and 2 (50%) private. All the schools within the Municipal are mixed schools namely West Africa SHS, Fafraha Community School, St. Peters Mission SHS and Delcam SHS. A map of the Adentan Municipal is shown in figure 2 below.

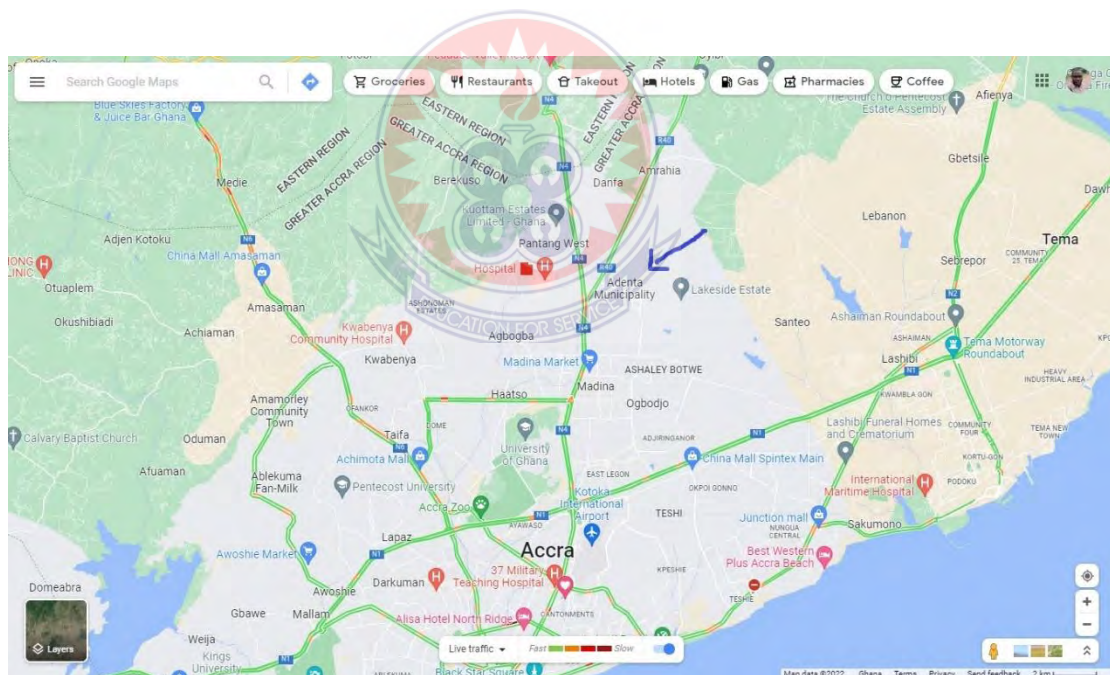


Figure 2: Map of Adentan Municipal

Source: Adopted from google maps (2020)

3.5 Population of the Study

The study was carried out among Senior High students in schools within the Adentan Municipality. The population constituted all students in the four Senior High

Schools in the Adentan Municipal with total enrollment of 5,015 students. However, the researcher targeted second year students in these schools for the study because second year students were expected to have had sufficient exposure to multimedia instructional materials at school. First year students in public schools in the district mostly use the traditional methods of instruction while ICT is not taught as a subject at third year in most of these schools. Therefore, the accessible population comprising of second year students from the four schools was 1,563. A list of Senior High Schools in the Adentan municipality and the number of second year students is shown in table 3.1 below.

Table 3.1 Number of Second Year Students Senior High Schools in the Adentan Municipality

No.	Name of School	Number of students	Status
1	West Africa SHS	809	Public
2	Fafraha Community Day SHS	449	Public
3	St. Peters Mission School	107	Private
4	Delcam SHS	198	Private
Total Population		1,563	

3.6 Sample and Sampling Procedure

The study used both cluster sampling technique and simple random sampling method to select the respondents. The researcher used cluster sampling technique to select two schools from the four Senior High Schools in Adentan. In simple terms, in cluster sampling, large clusters of the population are divided into smaller clusters in several stages in order to make primary data collection more manageable (Dudovskiy, 2018). The schools were given identification numbers of 1 to 4. The two schools which were West Africa SHS and Delcam SHS were then selected randomly from the

schools in the Municipal. The students in the sampled schools were considered a true representative of the population.

The researcher then used simple random sampling technique to sample 100 second year students randomly by a computer-generated system in Microsoft Excel for the two sampled schools. This sampling technique was used because it affords all the members under consideration the equal chance of being selected. 80 students were selected from West Africa SHS. On the other hand, 20 students were selected from Delcam SHS. The numbers were proportional since the sample size for the schools corresponded with their actual proportion in the schools.

The sample size for the two schools was calculated as follows:

- Number of second year students from the two sampled schools = 1007
- Number of second year students from West Africa SHS = 809
- Number of second year students from Delcam SHS = 198
- Total sample size = 100
- Sampled number for West Africa SHS = $(809 \div 1007) \times 100 = 80$ students
- Sampled number for Delcam SHS = $(198 \div 1007) \times 100 = 20$ students

Table 3.2: Sample Size determination

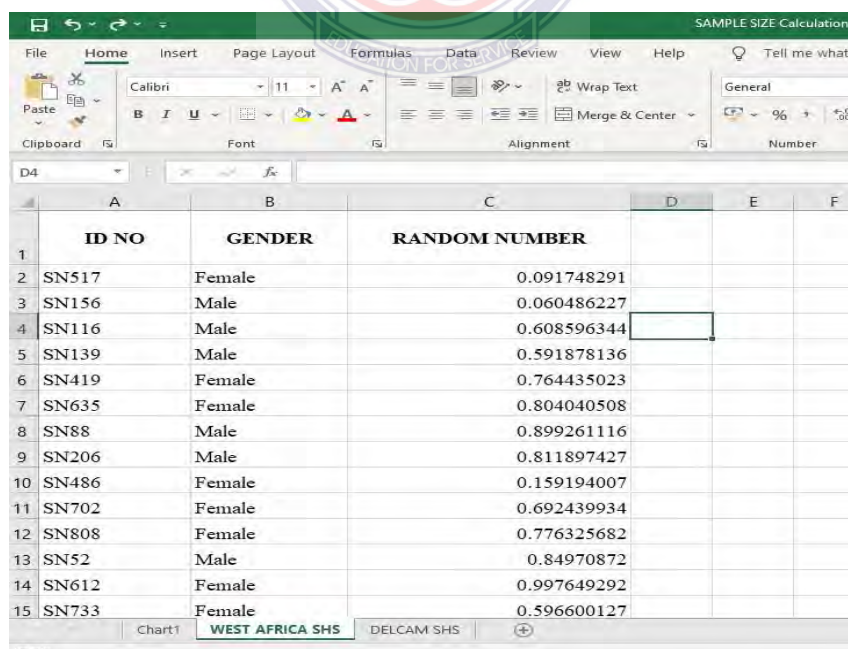
No.	Name of School	Number of students	Sampled Number
1	West Africa SHS	809	80
2	Delcam SHS	198	20
Total		1,007	100

Moreover, the sample was drawn from the two schools in Ms. Excel as follows:

1. 80 second students were to be randomly selected from the 809 students in West Africa SHS.

2. Each student was given a unique identification number which started from SN1 to SN809.
3. The ID numbers together with the gender of the student were entered in Ms. Excel in corresponding columns.
4. A 'RAND' function was used to return a random value between 0 and 1 for each student in a new corresponding column which was named 'Random Number' as the heading.
5. The worksheet was sorted by "smallest to largest" using the values computed as random number.
6. Finally, the first 80 ID numbers from the worksheet was taken as the sampled students from West Africa SHS.

Similar procedure was used to produce 20 students randomly from Delcam SHS. Figures 3 and 4 below shows how the sample was generated using Ms. Excel 2019 edition.



	A	B	C	D	E	F
	ID NO	GENDER	RANDOM NUMBER			
1						
2	SN517	Female	0.091748291			
3	SN156	Male	0.060486227			
4	SN116	Male	0.608596344			
5	SN139	Male	0.591878136			
6	SN419	Female	0.764435023			
7	SN635	Female	0.804040508			
8	SN88	Male	0.899261116			
9	SN206	Male	0.811897427			
10	SN486	Female	0.159194007			
11	SN702	Female	0.692439934			
12	SN808	Female	0.776325682			
13	SN52	Male	0.84970872			
14	SN612	Female	0.997649292			
15	SN733	Female	0.596600127			

Figure 3: Sample drawn from West Africa SHS

	A	B	C	D	E	F
1	ID NO	GENDER	RANDOM NUMBER			
2	SN12	Male	0.157418584			
3	SN14	Male	0.327114947			
4	SN9	Male	0.912724823			
5	SN5	Male	0.864366122			
6	SN16	Female	0.370014262			
7	SN10	Male	0.349207022			
8	SN13	Male	0.140566522			
9	SN19	Female	0.092241667			
10	SN4	Male	0.97205695			
11	SN3	Male	0.572431895			
12	SN18	Female	0.465812432			
13	SN8	Male	0.078782198			
14	SN17	Female	0.106824193			
15	SN2	Male	0.900234004			
16	SN7	Male	0.027703802			
17	SN1	Male	0.51087248			
18	SN6	Male	0.525009798			
19	SN20	Female	0.471043281			

Figure 4: Sample drawn from Delcam SHS

3.7 Instrumentation

This study used primary data as the main source data and the data was collected using survey questionnaire administered to students. The researcher is able to contact large numbers of participants quickly and efficiently in a short space of time using questionnaire (Trueman, 2015). Questionnaire design is related to the general plan for design of a descriptive survey is essentially a scientific instrument for the collection of particular kind of data (Odoh & Chinedum, 2014). A structured questionnaire was used as the research instrument because you can be sure that everyone in the sample answers exactly the same questions, which makes this a very reliable instrument used in research. Both closed and open-ended questions were used. Open ended questions were to help supplement the information given in the closed ended questions and helped in obtaining more complete data.

A self-designed questionnaire was used for the study and it was sectioned into two main parts with 38 items. Part I contained questions that sought demographic information of respondents such as age, program of study and gender. Part II on other hand was sectioned into three parts, thus sections A, B and C which sought to find answers to the research questions provided in chapter one.

Section A contained questions about the kind of multimedia instructional materials appropriate for learning ICT. A Likert scale from 1 to 5 was used for recording responses by students, with 1 being strongly disagree and 5 being strongly agree. Section B which contained responses about the effects a listed multimedia instructional material had on students' learning of ICT. A Likert scale from 1 to 5 was used to record responses by students, with 1 being strongly disagree and 5 being strongly agree. Section C which contained a list of responses about challenges students face when multimedia instructional materials were used for their ICT lessons. A Yes/No question type which required respondents to answer Yes or No to the question was provided. It also contained a list of challenges which required respondents to tick the ones that applied.

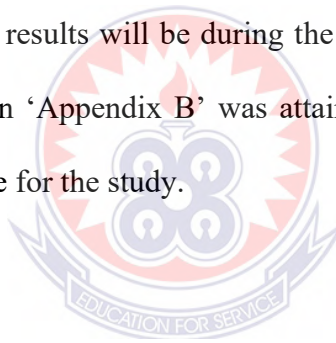
3.8 Pilot testing

In this study, a pilot test was employed to assess the internal reliability of the instrument using second year students at Fafraha Community Senior High School, Adentan. The school is part of the population of the study and share similar characteristics with the sampled schools. Moreover, students in this were likely to be of similar age range to the sampled schools, and were likely to have had similar exposure to multimedia instructional materials in the classroom or ICT lab. The researcher used 20 students for the pilot test comprising 12 males and 8 females

drawn randomly. On the basis of the pre-test results, some of the items that recorded lower reliability were modified.

3.9 Reliability

Reliability refers to the consistency of a measure (Heale & Twycross, 2015). If a study and its results are reliable, it means that similar results would be obtained if the study were to be replicated by other researchers using the same method. The Cronbach's co-efficient alpha measure of internal consistency was used in determining the reliability of the questionnaire used for the study. This choice of based on Collins (2007) view that Cronbach's alpha is used as a means of measuring the reliability of multiple items scales. The instrument was pilot tested in order to check how consistent the results will be during the actual work. A Cronbach's alpha value of 0.71 as shown in 'Appendix B' was attained on the 31 items tested which was reasonably acceptable for the study.



3.10 Validity

Heale and Twycross (2015) describe validity as whether the items measure what they are designed to measure. The authors also stated that content validity is a measure of the degree to which data collected using an instrument represents a specific domain of indicators of a particular concept. In this study, the researcher ensured that the questionnaire items were constructed based on the objectives of the study. The items were written using simple language for easy comprehension by the respondents. To check for the validity of the instrument, the researcher used two Senior Lecturers from the department of Educational Foundations in University of Education, Winneba who have expert knowledge in research to evaluate the questionnaire for content and construct validity as well as face validity. This ensured

that the items in the instruments captured the intended information accurately according to the objectives of the study. After the feedback was received, the necessary changes to the content of the questionnaire were made. Consultation and discussions with the supervisor of the research work was also done to establish content and face validity.

3.11 Data Collection Procedure

An introductory letter was taken from the Department of Educational Foundations and this helped the researcher to get to the students through the teachers and school administration. The questionnaire was administered in person to the students during classes and at their free time. The researcher used one week for this process. During this period, the researcher visited the two schools on different days. The objectives and purpose of the study were explained to the respondents. Students were encouraged to fill the questionnaire and submit it to the researcher immediately but those who opted for more time were granted 2-day period to return the filled questionnaires to the researcher. This technique enabled the researcher to get completed questionnaires from respondents more easily. Follow ups were made where questionnaire was incomplete to ensure that the full and required information were provided.

In the study, a total number of 80 students were sampled from West Africa SHS while 20 students were sampled from Delcam SHS giving a total of 100 questionnaires that were distributed. A total of 91 fully completed questionnaires were returned which gave a response rate of 91.0%. The response rate was considered reasonable because at least more than 50% of the targeted respondents participated in the study.

3.12 Data Analysis

The data collected from the respondents were analysed using the Statistical Packages for the Social Sciences (SPSS) version 22. The researcher analysed a set of 38 questionnaire items using descriptive analysis. Part I contained demographic information about students was recorded and analysed using descriptive analysis to produce the frequency count and percentage of the demographic information on students.

Part II, Section A which contained responses about the kind of multimedia instructional materials appropriate for learning ICT were recorded and analysed. The researchers used descriptive analysis to produce the frequency and percentages as well as the mean, standard deviation and mean ranking which sought answers to research question one.

Section B which contained responses about the effects a listed multimedia instructional material had on students' learning of ICT were recorded and analysed. The researchers used descriptive analysis to produce the frequency count and percentages as well as the mean, and standard deviation which sought answers to research question two.

Section C which contained a list of responses about challenges students face when multimedia instructional materials were used for their ICT lessons were recorded and analysed. The researchers used descriptive analysis to produce the frequency and percentages as well as the mean, standard deviation and mean ranking which sought answers to the research question three.

3.13 Ethical Considerations

An, official introductory letter was obtained from University of Education-Winneba which helped the researcher to seek permission from the headmasters of the selected schools. Moreover, permission was also sort from the form masters of the sampled classes before the questionnaire was administered.

The respondents gave a verbal assent to provide answers to the questionnaire as the purpose of the study was fully explained to them highlighting all risks and benefits. However, since majority of the respondents were below the age of 18, a Parent Consent Form highlighting the risks, benefits and purpose of the study was given to them to take to their parents for their approval. This was to seek permission from parents and also serve as prove that the parents have given their consent to allow their wards partake in answering the questionnaire.

It is also important to note that participation in this research was completely voluntary. Thus, respondents can choose not to participate or free to withdraw from participating at any time during data collection without any penalty and questioning.

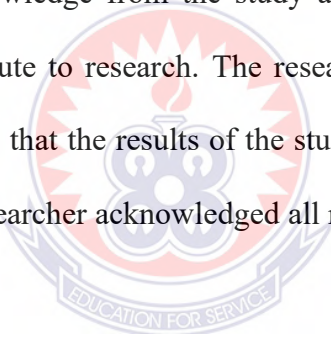
Also, highest form of confidentiality was applied to sensitive data and information in the process of collecting the data. To ensure confidentiality, students and parents were informed that the data provided by the participants would only be used by the researcher and appropriate authorities. Under no circumstance would the names and other details of the participants would be linked to the data analysis and dissemination of the research findings.

With regards to ensuring anonymity, students were informed that the questionnaire did not contain any question such as names, student ID or mobile

number that sort information on their identity. Hence, pseudonyms were used to describe the respondents in this study. Respondents were also assured that their names will not be included in any report as the results will only be shared in aggregate form.

This study posed minimal risks and inconvenience to the participants. An inconvenience posed to respondents was the time students spent in answering the questions. Moreover, the participants were assured of their privacy through confidentiality and anonymity which handled that concern of the students.

It was made known to the participants that there was no compensation or payment for participating in this study. However, the researcher informed the students that they would gain knowledge from the study and answers they provided to the questionnaire will contribute to research. The researcher also made it known to the students and form masters that the results of the study will be communicated to them in writing. Finally, the researcher acknowledged all references so as to avoid any form of plagiarism.



CHAPTER FOUR

ANALYSIS OF RESULTS AND FINDINGS

4.0 Introduction

In this chapter, a presentation and discussion of the results and findings from the analysis of the data gathered for the purpose of the study is made. The chapter is divided into two parts. Part one deals with the demographic characteristics of respondents, Part two presents the descriptive statistics of the items relating to particular objectives. In addition, the discussions focused on giving explanation to the findings and relating them to literature which serves as the basis for recommendations and conclusions. A total of 91 fully completed questionnaires were returned of which 74 (92.5%) and 17 (85.0%) were filled by students of West Africa SHS and Delcam SHS respectively. This gave a response rate of 91.0% as illustrated in Table 4.1 below. The response rate was considered reasonable because more than 50% of the targeted respondents participated in the study. The researcher felt that the views expressed by respondents in the report was therefore representative of the target population.

Table 4.1: Questionnaire Response Rate

Respondent category	Number issued out	Number returned	Percentage
West Africa SHS	80	74	92.5%
Delcam SHS	20	17	85.0%
Total	100	91	91.0%

Source: Field Data (2021)

4.1 Demographic Characteristics of Respondents

In order to have an idea about the background of the respondents that participated in the study, the researcher gathered data on the demographic characteristics of the respondents such as age, gender and programme choice. The results on these demographics are presented in the subsequent paragraphs. The demographic characteristic illustrates the distribution of respondents' categories in relation to Age, Gender, and Programme of study.

4.1.1 Age Distribution of Respondents

Table 4.2 presented the results of the age distribution of the respondents that were engaged in this study (i.e., second year students of West Africa SHS and Delcam SHS). From Table 4.2 below, the results indicated a total of 91 respondents chose to respond to the questionnaire despite sampling 100 students from two different schools of which 9 respondents (representing 9.9%) fall below the age of 15. Those that fell within 15-17 years were 71, hence representing 78%. Moreover, 11 of the sampled respondents representing 12.1% were 18 years and above. This gives an indication that the dominant group of second year senior high school students were within the ages of 15 to 17. This is associated with the fact that the greater sections of the SHS population are direct entrants from Junior High School.

Table 4.2 Age Distribution of Respondents

	Age Range	Frequency	Percentage (%)
Valid	Below 15	9	9.9
	15 to 17	71	78.0
	18 and above	11	12.1
Total		91	100.0

Source: Field Data (2021)

4.1.2 Gender Distribution of Respondents

Table 4.3 below presents the results of the gender distribution of the respondents that were engaged in this study. From the table below, the results indicated that a total of 91 responses were gathered, of which 49 respondents (representing 53.8% of the respondents) were males. The remaining 42 respondents representing 46.2% were females. It can be concluded that majority of the students used in the study were males.

Table 4.3 Gender Distribution of Respondents

	Gender	Frequency	Percentage (%)
Valid	Male	49	53.8
	Female	42	46.2
	Total	91	100.0

Source: Field Data (2021)

4.1.3 Programme of Study of Respondents

With regards to the programme of study of respondents, Table 4.4 below indicate that majority of the students representing 40.72% (37 respondents) offered General Science. The General Arts programme also had 26 responses which represents 28.6% while 20.9% (19 respondents) of respondents offered Business. In addition, 9.9% (9 respondents) were from the Home Economics department.

Table 4.4 Programme of Study of Respondents

	Programmed offered	Frequency	Percentage (%)
Valid	Science	37	40.7
	Business	19	20.9
	General Arts	26	28.6
	Home Economics	9	9.9
Total		91	100.0

Source: Field Data (2021)

4.2 Research Question One: *What Kind of Multimedia Instructional Materials are appropriate for Learning ICT in Senior High Schools?*

This question sought to determine kinds of multimedia instructional material is appropriate for learning of ICT. To answer this question, multimedia instructional materials that are used in senior high schools in Ghana were examined for usage and appropriateness.

4.2.1 Students' Usage of Multimedia Instructional Materials

To examine the kinds of multimedia instructional materials that are appropriate for student' learning of ICT, the researcher had to determine how frequent these materials are used by students for learning. Five key items were presented in the questionnaire and these were, slideshow lesson, web-based content, computer interactive lesson, CD/DVD lesson and audio output lesson. The students were made to respond to a three-point likert scale items (never, rarely, or often) on the frequency of using these five multimedia instructional materials. Table 4.5 presents the frequency of using multimedia instructional materials for learning ICT.

Table 4.5 Students' Usage of Multimedia Instructional Materials for ICT Learning

Multimedia instructional material	Never		Rarely		Often	
	f	%	f	%	f	%
1. Slideshow/presentation lesson	4	4.4	33	36.3	54	59.3
2. Web-based content	75	82.4	12	13.2	4	4.4
3. Computer Interactive lesson	5	5.5	29	31.9	57	62.6
4. CD/DVD lesson	54	59.3	29	31.9	8	8.8
5. Audio Output lesson	81	89.0	6	6.6	4	4.4

Source: Field Data (2021)

The results in Table 4.5 show that a high number of students often had lessons in ICT using slideshow lesson (59.3%) and Computer Interactive lesson (62.6%). However, majority of these students never used web-based content (82.4%), CD/DVD lesson (59.3%) and Audio output lesson (89%). This indicates that although majority of the SHS students use multimedia instructional materials for learning ICT in general, very few of them often used web-based content (4.4%), CD/DVD lesson (8.8%) and Audio output lesson (4.4%).

4.2.2 Kinds of Multimedia Instructional Materials appropriate for students'

learning of ICT

The students were made to respond to a five-point likert scale items (strongly disagree, disagree, undecided, agree or strongly disagree) of their approval or otherwise of an appropriate multimedia instructional material for learning ICT. Five key items were presented in the questionnaire and these were, slideshow lesson, web-based content, computer interactive lesson, CD/DVD lesson and audio output lesson. The students were made to respond to a five-point likert scale items (strongly

disagree, agree, undecided, agree, strongly agree) on the appropriateness of using the five multimedia instructional materials for lessons in ICT. Table 4.5 presents the results discovered.

Table 4.6 Students Opinion on the Appropriate Multimedia Instructional Materials for an ICT lesson

Multimedia instructional material	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	f	%	f	%	f	%	f	%	f	%
	1. Slideshow lesson	4	4.4	2	2.2	21	23.1	34	37.4	30
2. Web-based content	2	2.2	12	13.2	37	40.7	29	31.9	11	12.1
3. Computer Interactive lesson	1	1.1	4	4.4	18	19.8	31	34.1	37	40.7
4. CD/DVD lesson	4	4.4	12	13.2	32	35.2	28	30.8	15	16.5
5. Audio Output lesson	8	8.8	21	23.1	28	30.8	27	29.7	7	7.7

Source: Field Data (2021)

Results from table 4.6 show that majority of the respondents (34, 37.4%) agreed that slideshow lesson is appropriate for learning ICT. In the same vein, 30 (33.0%) respondents strongly agreed whereas 21 (23.1%) claimed they are undecided. While 4.4% and 2.2% of respondents claimed Slideshow lesson was not appropriate for learning ICT. The finding reveals that majority of the students are of the opinion slideshow lesson good for ICT lessons and should be used for students' learning of the subject.

Table 4.6 recorded 29 (31.9%) respondents agreed that Web-based content lesson is appropriate for learning ICT together with 12.1% (11) of respondents who strongly agreed on the appropriateness of using web-based content. Majority of the

respondents (37, 40.7%) were undecided on the matter. While 13.2% (disagreed) and 2.2% (strongly disagreed) of respondents claimed web-based content lesson is not appropriate for learning ICT. This result did not come as a surprise to the researcher because the result for usage of web-based content as indicated in table 4.5 showed that majority of the student had never used web-based content for learning ICT. This perhaps accounted for more students rating web-based content as undecided. A high number of students agreeing with the assertion that web-based content is appropriate gives an indication that if a lot more students had access to web-based content perhaps the rate of approval could have been higher.

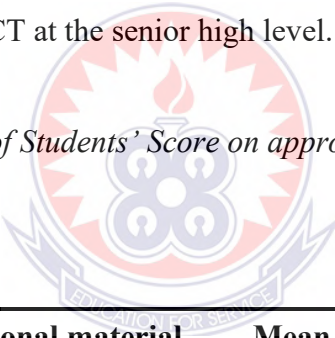
Results from Table 4.6, show that majority of the respondents (37, 40.7%) agreed that computer interactive lesson is appropriate for learning ICT. In the same vein, 31 (34.1%) respondents agreed whereas 18 (19.8%) respondents claimed they are undecided. While 4.4% (disagreed) and 1.1% (strongly disagreed) of respondents claimed computer interactive lesson is not appropriate for learning ICT. The finding reveals that a very high number of students are of the opinion that computer interactive lesson should be used for ICT lessons to aid students learning.

Table 4.6 recorded 28 (30.8%) respondents agreed that CD/DVD lesson is appropriate for learning ICT together with 16.5% (15) of respondents who strongly agreed on the appropriateness of using CD/DVD lesson. Majority of the respondents (32, 35.2%) were undecided on the matter. 13.2% (disagreed) and 4.4% (strongly disagreed) of respondents claimed CD/DVD lesson is not appropriate for learning ICT. This perhaps accounted for more students rating CD/DVD lesson as undecided. The finding reveals that though a high number of students are of the opinion that

CD/DVD lesson should be used for ICT lessons to aid students learning, a great percentage of students are undecided on the matter.

Results from Table 4.7, show that only 7.7% (7) of the respondents strongly agreed that Audio Output lesson is appropriate for learning ICT. About 27 (29.7%) respondents agreed on the appropriateness of using audio output lesson while twenty-eight (30.8%) were undecided. A total of 21 (23.1%) respondents disagreed on the appropriateness of using Audio Output lesson together with 8 (8.8%) respondents who also strongly disagreed with the assertion. This perhaps accounted for more students rating audio output lesson as undecided. This finding gives a clear indication that a high number of students are uncertain with the assertion that audio output lesson is appropriate for learning ICT at the senior high level.

Table 4.7 Mean Ranking of Students' Score on appropriate Multimedia Instructional Material



	Multimedia instructional material	Mean	Std. Deviation	Rank
1.	Slideshow/presentation lesson	3.92	1.024	2 nd
2.	Web-based content	3.38	.940	4 th
3.	Computer Interactive lesson	4.09	.939	1 st
4.	CD/DVD lesson	3.42	1.055	3 rd
5.	Audio Output lesson	3.04	1.095	5 th
	Valid N	91		

Source: Field Data (2021)

For each of the items computed in table 4,7 above, the score for each respondent ranged from 1 to 5. The midpoint score is 3. A ranking of the mean score for each multimedia instructional material was calculated as indicated in the table. A multimedia instructional material with the highest mean is rated as the most

appropriate for student learning while the least mean indicate the least appropriate.

Table 4.7 revealed that out of the five items, computer interactive lesson was ranked 1st with a mean score of 4.09 and standard deviation of 0.939. Slideshow lesson was ranked 2nd with mean score of 3.92 and standard deviation of 1.024 while CD/DVD lesson ranked 3rd with a mean score of 3.42 and standard deviation of 1.055. Moreover, Web-based content was ranked 4th with a mean score of 3.38 and standard deviation of 0.940. Multimedia instructional material with the least mean score of approval was Audio output lesson with mean score of 3.04 and standard deviation of 1.095.

Table 4.7 Overall Mean Score of Students' Opinions

	N	Min	Max	Mean	Std. Deviation
Students' Opinion on Appropriate Multimedia Instructional Materials	91	2.2	4.6	3.571	.4576

Source: Field Data (2021)

The overall mean scores of students' opinion on the appropriate multimedia instructional materials for learning ICT was computed from the individual means of the five items. From table 4.7 above, the minimum mean for a multimedia instructional material approval is 2.2 while the maximum was 4.6. A mean value below 3.0 would indicate a low approval rate while a mean value above 3.0 indicates a high approval rate. The results as shown in table 4.7 indicates that students are in agreement that multimedia instructional materials are appropriate for learning ICT with a high mean value of 3.571.

4.3 Research Question Two: *What are the Effects of Multimedia Instructional Materials on Senior High School students' Learning of ICT?*

This question sought to examine how multimedia instructional materials affect students' learning of ICT. To answer this question, thirteen key items which sort to address the question were analysed and students were made to respond to a five-point likert scale items (strongly disagree, disagree, undecided, agree or strongly disagree). Table 4.8 presents the frequency of respondents' level of agreement with each of the thirteen items for the study.



Table 4.8 Effect of Multimedia Instructional Materials on Students' Learning of ICT

Item	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	f	%	f	%	f	%	f	%	f	%
Improves understanding of lesson	4	4.4	7	7.7	9	9.9	33	36.3	38	41.8
Improves interest in ICT	7	7.7	1	1.1	6	6.6	37	40.7	40	44.0
Arouses awareness in class	10	11	8	8.8	31	34.1	23	25.3	19	20.9
Helps me actively participate in class	7	7.7	9	9.9	11	12.1	51	56.0	13	14.3
Motivation to learn ICT	11	12.1	5	5.5	21	23.1	34	37.4	20	22.0
Improves problem solving skills	8	8.8	23	25.3	22	24.2	37	40.7	1	1.1
Improves creativity	6	6.6	9	9.9	12	13.2	33	36.3	31	34.1
Improves interaction in class	12	13.2	12	13.2	11	12.1	39	42.9	17	18.7
Helps me learn more and explore	7	7.7	9	9.9	10	11.0	38	41.8	27	29.7
Makes learning ICT enjoyable and comfortable	3	3.3	7	7.7	10	11.0	26	28.6	45	49.5
Encourages me to collaborate with other students	10	11.0	8	8.8	16	17.6	38	41.8	19	20.9
Helps me to learn new skills in ICT	10	11.0	22	24.2	17	18.7	28	30.8	14	15.4
Improves my communication skills	7	7.7	15	16.5	25	27.5	26	28.6	18	19.8

Source: Field Data (2021)

Results from Table 4.8, showed that majority of the students perceived multimedia instructional materials as able to improve their understanding of ICT lessons (SA=41.8%, A=36.3%) and their interest in the ICT course (SA=44%,

A=40.7%). This data is supported by Yueh et al. (2012) view that students perceived the multimedia video as able to improve their understanding of the content. Majority of students (56%) also agreed that the multimedia instruction as able to help them actively participate in class together with 14.3% of students who strongly agreed with the assertion. Table 4.8 also reported that majority of students (34.1%) were undecided on whether multimedia instruction arouses their awareness in class however a large number of students perceived that multimedia instruction arouses their awareness in class (SA=20.9, A=25.3).

Table 4.8, recorded 34 (37.4%) respondents who agreed that multimedia instruction motivates them to learn ICT together with 22.0% (20) of respondents who also strongly agreed. 23.1% of respondents were undecided on the matter. While 5.5% (disagreed) and 12.1% (strongly disagreed) of respondents claimed they were not in affirmative to the assertion. Also, majority of the students perceived multimedia instructional materials as able to improve their problem-solving skills (A=40.7%, SA=1.1%), creativity (A=36.3%, SA=34.1%), and interaction in class (A=42.9%, SA=18.7%). With regards to multimedia instruction assisting students explore more, 38 (41.8%) respondents who were in the majority agreed, together with 27 (29.7%) respondents who strongly agreed. While 7.7% of respondents strongly disagreed, 9.9% disagreed and 11% were undecided.

Moreover, from table 4.8 above, majority of the students perceived multimedia instructional materials makes learning ICT comfortable (A=28.6%, SA=49.5%), encourages collaboration with other students (A=41.8%, SA=20.9%), and helps them learn new skills in ICT (A=30.8%, SA=15.4%). With regards to multimedia instruction assisting students improving communication skills, 26 (28.6%)

respondents majority agreed, together with 18 (19.8%) respondents who strongly agreed. While 7.7% of respondents strongly disagreed, 16.5% disagreed and 27.5% were undecided.

4.4 Research Question Three: *What are the Challenges Associated with the Use of Multimedia Instructional Materials in Senior High Schools?*

This question sought to examine students faced with the use of multimedia instructional materials. This section was segmented into. The first section sought to determine the percentage of students who faced challenges and those who did not. The second section sought to examine the particular kind of challenges student faced. Students were made to respond to a yes/no question as presented in table 4.9 below.

Table 4.9 Challenges in Learning with Multimedia Instructional Material

Did you face challenges in learning with a multimedia instructional material?		Frequency	Percentage (%)
Valid	No	28	30.8
	Yes	63	69.2
Total		91	100.0

Source: Field Data (2021)

It can be seen from table 4.9 that, as many as 63 (69.2%) of the respondents responded in the affirmative that, they have faced challenges with the use of multimedia instructional material. The remaining 28 (30.8%) responded in the negative. It can be deduced that majority of the respondents had faced challenges with the use of multimedia instructional materials. Figure 5 indicates a pictorial summary of the percentages of students' response to the question.

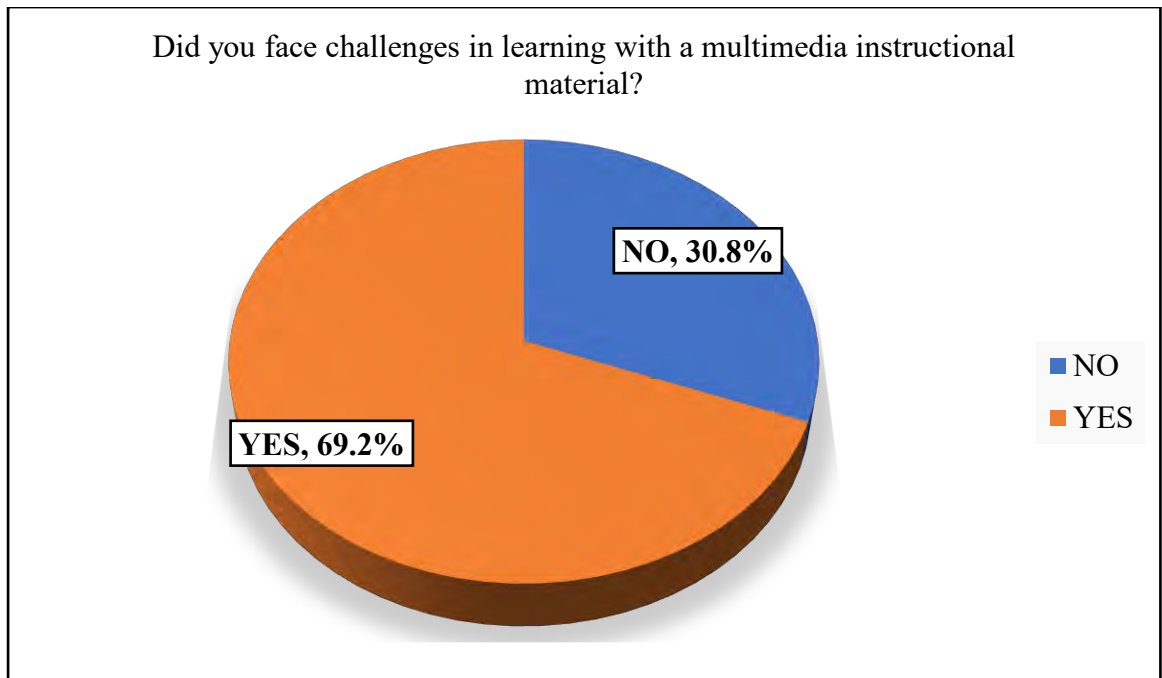


Figure 5: Challenge faced in Learning with Multimedia Instructional Materials

The students were also made to respond by ticking the appropriate box that applied to items stated in the questionnaire. Thirteen key items which sort to address the kind of challenges students faced were analysed. A value of 1 indicated that the student ticked to indicate that the listed challenge applied and 0 indicated the student did not tick which indicate no challenge faced. Table 4.10 below presents the mean ranking and standard deviation of the kind of challenged faced by student.

Table 4.10 Kind of Challenges Students Faced

Kind of Challenge Student Faced	Mean	Std. Dev	Rank
1. Difficult to use and understand	.27	.447	7 th
2. Limited time to learn with multimedia instructional materials in class	.71	.455	2 nd
3. Difficult to explore due to the lack of internet service	.62	.490	4 th
4. Lack of access to a multimedia instructional material after school hours	.68	.469	3 rd
5. I will not write ICT in the WASSCE examination so there no motivation to learn it.	.43	.499	5 th
6. I have limited hands-on experience in learning with multimedia instructional materials	.40	.493	6 th
7. Inadequate multimedia instructional materials for lessons.	.86	.353	1 st
8. Misuse of Multimedia Instructional materials at the ICT lab by students	.22	.419	8 th
Valid N	63		

Source: Field Data (2021)

From table 4.10, the findings revealed “inadequate multimedia instructional materials for lessons” was the most serious challenge students faced with a mean value of 0.86 and standard deviation of 0.353. The results also revealed that “limited time to learn with multimedia instructional material” was ranked 2nd (M=0.71, SD=0.455) while “lack of access to a multimedia instructional material after school hours” was ranked 3rd (M=0.68, SD=0.469). Furthermore “difficult to explore due to the lack of internet service” was ranked 4th with a mean of 0.62 and standard deviation of 0.490. These four challenges stated earlier were rated high by respondents due to the fact that their mean value was above the midpoint which was set at 0.50.

Results from table 4.10, also indicated that “I will not write ICT in the WASSCE examination so there no motivation to learn it” was ranked 5th with mean value of 0.43 and standard deviation of 0.499 while “I have limited hands-on experience in learning with multimedia instructional materials” was ranked 6th with mean value of 0.40 and standard deviation of 0.493. Moreover, “difficult to use and understand” was ranked 7th (M=0.27, SD=0.447) while “misuse of multimedia instructional materials at the ICT lab by student” was ranked 8rd (M=0.22, SD=0.419). The 5th to 8th challenges were rated low by respondents due to the fact that their mean value was below the midpoint.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

The purpose of this chapter is to present summary of findings in relation to the objectives of the study. It further provides conclusions and practical recommendations based on the findings of the study.

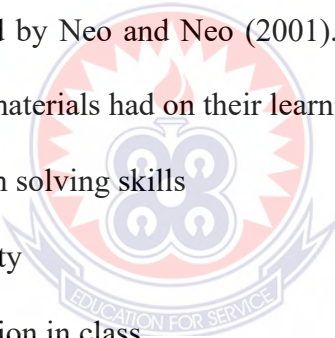
5.1 Summary of Findings

The primary aim of this study was to investigate the students' perception of multimedia instructional materials and their effect on learning of ICT at senior high schools within the Adentan municipality. The study focused on second year students of selected Senior High Schools in the above-mentioned district. Specifically, the study sought to identify the kinds of multimedia instructional materials that are appropriate for learning ICT as well as their effects on students' learning. Moreover, it also sought to identify challenges associated with the use of multimedia instructional materials. Data was gathered for this purpose and the data was analysed using descriptive statistics.

The findings revealed that computer interactive lesson and slideshow lesson were the most appropriate multimedia instructional materials for learning ICT. However, even though students were of the opinion CD/DVD lesson, and web-based content were also appropriate, they were rarely used for ICT lessons. This gives an indication that the use of web-based content and CD/DVD lesson should be explored more as it has the tendency to greatly improve student learning of the subject. This finding is consistent with the findings of Boakye and Banini (2008) who concluded

that majority of the teachers at SHS level in Ghana do not use technology in classrooms for teaching and learning but often use technology for other educational purposes such as to prepare lesson notes, browse the web and send emails.

Moreover, the study also investigated the effects of multimedia instructional materials on students learning of ICT. The findings revealed that multimedia instructional materials were found to statistically positively effect students' learning. It was revealed multimedia is an innovative and effective teaching and learning tool, because it helps students motivate their learning process, improves their interest in the lesson and helps them understand the information presented. It also helps learners become active participants in the teaching and learning process instead of being passive learners as opined by Neo and Neo (2001). Other effects students perceived multimedia instructional materials had on their learning of ICT included:

- 
- Improving problem solving skills
 - Improving creativity
 - Improving interaction in class
 - Helping student learn more and explore
 - Encouraging me to collaborate with other students
 - Helps me to learn new skills in ICT

Finally, the study also investigated the challenges students faced in the use of multimedia instructional materials for learning ICT. The findings revealed that most of the students were of the opinion that they faced challenges with the use of multimedia instructional materials for learning. In addition, it was found that the challenges related to some specific issues. These issues include; inadequate multimedia instructional materials, limited time to learn with multimedia instructional

material, lack of access to a multimedia instructional material after school hours and difficulty to explore due to the lack of internet service. It was discovered that students are exposed to the consequences of multimedia instructional materials as they are aware of their strengths and weaknesses in using it. It was therefore not surprising to find that majority of them faced challenges when using multimedia instructional materials. The finding is consistent with the findings of Jenson et al. (2002) found barriers to the usage of multimedia instruction for learning as: inadequate skills, minimal support, time constraints and lack of interest or knowledge by teachers and students.

5.2 Conclusion

The following conclusions can be drawn from the study. The results from the study simply implies that multimedia instructional materials move students toward the constructivist approach of learning in which the learner plays an active role in the learning process. On the basis of the kind of multimedia instructional material, the study concluded that computer interactive lesson and slideshow lesson are preferred by students in learning ICT.

5.3 Recommendations

From the summary of the major findings of this study, it is suggested that;

- The National Council for Curriculum and Assessment (NaCCA) of the Ghana Education Service in collaboration with the related agencies in the Ministry of Education should carry out research to review critically the ICT curriculum and revise the existing syllabus to explicitly state what multimedia instructional materials must be used and how it should be used in the teaching and learning process

- There is need for the schools in the study to invest more in multimedia instructional materials to improve student learning with more attention given to the use of web-based content and CD/DVD lessons.
- One of the challenges in the findings was limited hands-on experience in learning with multimedia instructional materials. Therefore, ICT teachers should make sure these multimedia materials are available and used for lesson delivery in the classroom/ICT lab.
- Multimedia instructional materials helps students play an active role in the teaching and learning process, so teachers should be encouraged to teach ICT using multimedia. By addressing students' individual differences in relation to using multimedia instructional materials for learning, Students can be well motivated to learn ICT and hence improve their attitude towards the subject.

5.4 Suggestion for further studies

In future studies more focus should be given on management strategies and policies to address the barriers faced by teachers in using multimedia instructional materials in teaching and learning. If the barriers faced by teachers can be overcome, it is a step forward to enhance students' learning outcomes. Secondly, the study should be replicated in other courses as well as the Basic level. Finally, other aspect of the problem exists and should be investigated and dealt with. Such aspects include; usability level of students in multimedia instructional materials and linking multimedia instructional materials to students' performance using test scores.

REFERENCES

- Akkoyunlu, B., & Yilmaz, M. (2005). Generative multiple learning theory. *Hacettepe University Journal of Education Faculty*, 8, 9-18.
- Ayittey, A. (2015). The impact of multimedia instruction in Biology on senior high school student's achievement.
- Baddeley, A. D. (1986). Working memory. *The Quarterly Journal of Experimental Psychology*, 603-618.
- Balanskat, A., Blamire, R., & Kefala, S. (2006). *The ICT impact report: A review of studies of ICT impact on schools in Europe*. European Schoolnet.
- Bartlett, R. M., & Strough, J. (2003). Multimedia versus traditional course instruction in introductory social psychology. *Teaching of Psychology*, 30, 335-338.
- Becker, H. (2001, September 11). *How are teachers using computers in instruction? Paper presented at the 2001 Meetings of the American Educational Research Association*. Retrieved from Uci.edu: [:http://www.crito.uci.edu/tlc/findings/conferencespdf/how_are_teachers_using.pdf](http://www.crito.uci.edu/tlc/findings/conferencespdf/how_are_teachers_using.pdf)
- Boakye, K. B., & Banini, D. A. (2008). *Teacher technology readiness in Ghana*. In K. Toure.
- Bradley, R. V., Mbarika, V. W., Sankar, C. S., Raju, P. K., & Kaba, B. (2007). Using multimedia instructional materials in MIS classrooms: A tutorial. *Communications of the Association for Information Systems*, 20(1).
- British Educational Communications and Technology Agency. (2004). *A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers*. Becta partners. Retrieved from BECTA partners.
- Çeliköz, N. (1998). The effect of using 3D teaching tools in history teaching on students success.
- Collins, L. M. (2007). Research design and methods. *Encyclopedia of Gerontology*, 2.
- Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. *Bibliographie*, 1, 251-260.
- Crosby, M. E., & Stelovsky, J. (1995). From multimedia instruction to multimedia evaluation. *Journal of Educational Multimedia and Hypermedia*, 4, 147-162.
- Department of Education and Skills. (2003). *Using ICT to enhance home school links*. Bridget Somekh.

- Dudovskiy, J. (2018, January). *Business Research Methodology*. Retrieved from researchmethodology.net: <https://research-methodology.net/sampling-in-primary-data-collection/multi-stage-sampling/>
- Dwyer, C. (1993). Multimedia in Education. *Educational Media International Volume, 30*(4), 193-198.
- Feinstein, A. H., Raab, C., & Stefanelli, J. M. (2005). Educational technology research in the Hospitality industry. *Journal of Hospitality & Tourism Education, 17*(3), 9-18.
- Gambari, A., Yaki, A. A., Gana, E. S., & Ughovwa, E. (2014). Improving secondary school Students' achievement and retention in Biology through video-based multimedia instruction. *InSight: A Journal of Scholarly Teaching, 9*, 70-75.
- Ghana Statistical Service. (2010). *Adenta Municipal Analytical report: Population and Housing sensus*. Ghana Statistical Service.
- Granger, C., Morbey, M., Lotherington, H., Owston, R., & Wideman, H. (2002, December 11). Factors contributing to teachers' succesful implementation if IT.
- Guba, E., & Lincoln, Y. (1994). Competing Paradigms in Research. 105-116.
- Heale, R., & Twycross, A. (2015, August 10). Validity and reliability in quantitative studies. *Evidence-based nursing, 18* (3), 66-67. Retrieved from group.bmj.com: <http://ebn.bmj.com/>
- Hsu, C. H., & Wolfe, K. (2003). Learning styles of hospitality studentsand faculty members. *Journal of Hospitality and Tourism education, 15*(3), 19-28.
- Ilhan, G. O., & Oruç, Ş. (2016). Effect of the use of multimedia on students' performance: A case study of social studies class. *Academic Journal, 11*(8), 877-882.
- Internet Society. (2017, November 20). *Internet access and education: Key considerations for policy makers*. Internet society. Retrieved from internetociety.org: internetociety.org/resources/doc/2017/internet-access-and-education/
- Issa , R. A., Cox, R. F., & Killingsworth, C. F. (1999). Impact of multimedia-based instruction on learning and retention. *Journal of Computing in Civil Engineering, 281-290*.
- Jenson, J., Lewis, B., & Smith, R. (2002). No one way: Working models for teachers' professional development. *Journal of Technology and Teacher Education, 10*(4), 481-496.

- Jones, J., Cavanaugh, C., Venn, J., Wilson, W., & Smith, R. (2006). Effect of interactive multimedia on basic clinical psychomotor skill performance by physical therapist students. *Journal of Physical Therapy Education*, 20(2), 61-67.
- Kim, Y. S., & Kim, H. C. (2005). Food sanitation education: A survey of perceptions of teaching resources in an undergraduate hospitality. *The Consortium Journal of Hospitality and Tourism*, 9(1), 5-12.
- Kluge, A. E. (1996). A literature review of information technology in the hospitality curriculum. *Hospitality Research Journal*, 19(4), 45-64.
- Mayer, R. E. (1999). Research based principles for the design of instructional messages. *Document Design*, 1(1), 7-19.
- Mayer, R. E. (2005). *Introduction to multimedia learning*. New York: R. E. Mayer.
- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce congestive load in multimedia learning. *Educational Psychologist*, 38(1), 43-52.
- Ministry of Education. (2015). *ICT in Education policy*. Ministry of Education, Ghana.
- Morse, T. (2003, April). *Design and implementation of a multimedia CD-ROM-based course directed study preservice teacher education course*. Mtsu Edu.
- Neo, M., & Neo, T. K. (2001). Innovative teaching: Using multimedia in a problem-based learning environment. *Educational Technology & Society*, 4(4), 19-31.
- Nortcliffe, A., & Middleto, A. (2008). A three year case study of using audio to blend the engineer's learning environment. *Engineering Education*, 3(2), 45-52.
- Nousiainen, M., Brydges, R., & Dubrowski, A. (2008). Comparison of expert instruction and computer-based video training in teaching fundamental surgical skills to medical students. *The Surgery*, 143(4), 539-544.
- Odoh, M., & Chinedum, I. E. (2014). Research designs, survey and case Study. *Journal of VLSI and Signal Processing (IOSR-JVSP)*, 4(6), 16-22.
- Opira, G. (2010). *Effects of ICT technologies on Students' learning: A case of Gulu University*. Retrieved from academia.edu: academia.edu/31350166
- Opoku, M. P., Badu, E., & Alupo, B. A. (2016). ICT education in Ghana. An evaluation of the challenges associated with the teaching and learning of ICT in basic schools in Atwima Nwabiagya District in the Ashanti region. *Sosio humanika*, 9(1), 1-4.
- Organisation for Economic Cooperation Development. (2009). *Education at a Glance*.

- Pailliotet, A. W., & Semali, L. (2000). Bridge to critical media literacy. *The Reading Teacher*, 54(2), 208-219.
- Paivio, A. (1991). Dual coding theory and education. *Educational Psychology review*, 3(3), 149-210.
- Patel, S. (2015). *The research paradigm; methodology, epistemology and ontology*. Salma Patel.
- Perry, T., & Perry, L. A. (1998). University student presentations. *British Journal of Educational Technology*, 29, 375-377.
- Plass, J., & Jones, L. C. (2005). *Multimedia Learning in Second Language Acquisition*. R. E. Mayer .
- Preal. (2019, October 11). *The transformation of learning with the use of Educational Technology*. Retrieved from thedialogue.org: thediologue.org/blogs/2019/10/the-transformation-of-learning-with-the-use-of-educational-technology/
- Price, J., Lukhard, K. S., & Postel, R. T. (2005). Quantity food production management: Interactive CD-ROM vs. lecture methods of instruction. *Journal of Hospitality, Leisure, Sport and Tourism Education*, 4(2), 27-35.
- Sadaghiani, H. R. (2012). Controlled study on the effectiveness of multimedia learning modulues for teaching mechanics. *Physical Review Specila Topics: Physics Education*, 8, 1.
- Samaras, H., Giouvanakis, T., Bousiou, D., & Tarabanis, K. (2006). Towards a new generation of multimedia learning research. *AACE Journal*, 14(1), 3-30.
- Semerci, A. (1999). Developing, implementing and evaluating a multimedia software for instructional purpose. *Education and Science*, 23(111).
- Shah, I., & Muhammad , K. (2015). Impact of multimedia-aided teaching on students' academic achievement and attitude at elementary level. *US-China Education Review A*, 5(5), 349-360.
- Sherif, A., & Mekkawi, H. (2006). Developing a computer aided learning tool for teaching construction engineering decision making. *Joint international conference on computing and decision making in Civil and building engineering*, 14-16.
- Sivin-Kachala, J., & Bialo, E. (2000, May). *Research report on the effectiveness of technology in schools (7th ed.)*. Jonathan Langford. Retrieved from ala.org: http://www.ala.org/aasl/sites/ala.org.aasl/files/content/aaslpubsandjournals/slr/edchoice/SLMQ_EffectivenessofTechnologyinSchools_InfoPower.pdf.
- Slack, R. (1999). *The Use of multimedia in schools*. Scotland: Center for educational sociology.

- Slate, J. R., & Gaytan, J. A. (2002). Multimedia and the college of business. *Journal of Research on Technology in Education*, 35(2), 186-205.
- Sorden, S. D. (2005). A cognitive approach to instructional design for multimedia learning. *Information Science Journal*, 8, 263-279.
- Spiro, R. J., Feltovich, M. J., Jacobson, M. J., & Coulson, R. L. (1992). Cognitive flexibility, constructivism and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. In *Constructivism and the Technology of Instruction*. Erlbaum: T. Duffy & D. Jonassen.
- Stillings, N. A., Weisler, S. E., Chase, C. H., Feinstein, M. H., Garfield, J. L., & Rissland, E. L. (1995). *Cognitive science: An introduction (2nd ed.)*. Cambridge, MA.
- Susskind, J. E. (2005). PowerPoint's power in the self efficacy and aptitude. *Computer and Education*, 45(2), 203-215.
- Sutherland, R., Armstrong, V., Barnes, S., & Brawn, N. B. (2004). Transforming teaching and learning: Embedding ICT into every classroom practice. *Journal of Computer Assisted Learning*, 20(6), 413-425.
- Sweller, J. (1994). Cognitive load theory, and instructional design. *Learning and Instruction*, 4(4), 295-312.
- Trueman, C. N. (2015, May 22). *Structured questionnaires*. Retrieved from historylearningsite.co.uk
- UNESCO. (2002). *Information and communication technologies in teacher education*. Division of higher education, UNESCO.
- Watson, A. S. (1999, January 1). ICT tools for improving the competitiveness of the LSE industry. *Engineering, Construction and Architectural Management*, 6, 30-37.
- Yamauchi, L. G. (2008). Effects of multimedia instructional material on students' learning and their perceptions of the instruction. *Retrospective Theses and Dissertations*, 15324.
- Yidana, I., & Asiedu-Addo, S. (2001). The use of information technology in teacher education. *Mathematics Connection*, 2(1), 30-33.
- Yueh, H.-P., Lin, W., Huang, J.-Y., & Sheen, H.-J. (2012). Effect of student engagement on multimedia-assisted instruction. *Knowledge management and E-learning: An international journal*, 4(3), 346-358.

APPENDIX ‘A’

QUESTIONNAIRE

Questionnaire on “students’ perception of multimedia instructional materials and their effects on learning ICT in Senior High Schools in the Adentan Municipality”.

INTRODUCTION

This questionnaire has been designed to collect data from students for this academic exercise. You have been selected to take part in this study and you are requested to fill the questionnaire to facilitate the study. The information you provide will be used only for the study and will be treated with absolute confidentiality. Thank you for your kind assistance.

PART I - Demographic information

The following statements describe your demographic information on Age, Gender and Programme of study. Indicate by ticking [✓] one of the options in each section labelled 1, 2 and 3.

1. Age (yrs.)
 - a. Below 15 []
 - b. 15-17 []
 - c. 18 and Above []
2. Gender
 - a. Male []
 - b. Female []
3. Programme of study
 - a. Science []
 - b. Business []
 - c. General Arts []
 - d. Home Economics []
4. Name of School
 - a. West Africa SHS []
 - b. Delcam SHS []

PART II**Section A: Kinds of multimedia instructional material appropriate for students' learning of ICT**

The following statements describe the kinds of multimedia instructional materials used in most Ghanaian schools.

Indicate by ticking []: **Never (N)**, **Rarely (R)**, or **Often (O)**, in the appropriate section to show how often the media is used for your learning of ICT.

No.	Statement	Response		
		N	R	O
5.	Slideshow/presentation (using projector)			
6.	Web-based content (including emailed lessons)			
7.	Computer Interactive lesson			
8.	CD/DVD lesson			
9.	Audio Output lesson			

The following statements describe your approval or otherwise of the continuous use of a multimedia instructional material for learning ICT in your class.

Indicate by ticking []: **Strongly Disagree (SD)**, **Disagree (D)**, **Undecided (U)**, **Agree (A)**, or **Strongly Agree (SA)** in the appropriate section to show your approval rate.

No.	Statement	Response				
		SD	D	U	A	SA
10.	Slideshow/presentation (using projector)					
11.	Web-based content (including emailed lessons)					
12.	Computer Interactive lesson					
13.	CD/DVD lesson					
14.	Audio Output lesson					

Section B: Effects of multimedia instructional materials on senior high school students' learning of ICT.

The following statements describe the effect of the continuous use of multimedia instructional materials described in section A on your learning of ICT.

*Indicate by ticking [√]: **Strongly Disagree (SD)**, **Disagree (D)**, **Undecided (U)**, **Agree (A)**, or **Strongly Agree (SA)** in the appropriate section to show your approval rate.*

No.	Statement	Response				
		SD	D	U	A	SA
15.	It improves my understanding of the lesson					
16.	It improves my interest in ICT					
17.	It arouses my awareness in class					
18.	It helps me to actively participate in class					
19.	It motivates me to learn more on my own (individual learning)					
20.	It improves my problem-solving skills					
21.	It improves my creativity					
22.	It improves interaction and engagement in class					
23.	It helps me to explore and learn more					
24.	It makes learning ICT enjoyable and comfortable					
25.	It encourages collaboration with other students					
26.	It helps me to learn new skills easily					
27.	It develops my communication skills					
28.	State any other effect (specify in the field below)					

Section C: Students' challenges associated with the use of multimedia instructional materials.

29. Did you face challenges when multimedia instructional materials are used for lessons in your class?

Yes [] B. No []

If yes, kindly tick [√] as many as applied for the kind of challenges you faced.

30. It is difficult to use and understand. []

31. There is limited time for using multimedia instructional materials for learning in the ICT lab or classroom. []

32. Difficult to explore due to the lack of internet service. []

33. Lack of access to a multimedia instructional material after school hours (lack of access to the material outside school). []

34. I will not write ICT in the WASSCE examination so there no motivation to learn it. []

35. I have limited hands-on experience in leaning with multimedia instructional materials. []

36. Inadequate multimedia instructional materials for lessons. []

37. Misuse of Multimedia Instructional materials at the ICT lab by students. []

38. Specify by writing any other challenge you faced which is not listed above.

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

APPENDIX 'B'

RELIABILITY STATISTICS

	Cronbach's Alpha Value	Number of Items
Usage	.703	5
Appropriateness	.796	5
Perceived Effect	.689	13
Challenges	.667	8
Overall Value	.71	31



APPENDIX 'C'

QUESTIONNAIRE RESPONSE RATE

Respondent category	Number issued out	Number returned	Percentage
West Africa SHS	80	74	92.5%
Delcam SHS	20	17	85.0%
Total	100	91	91.0%



APPENDIX ‘D’

PARENTAL CONSENT FORM

UNIVERSITY OF EDUCATION, WINNEBA
DEPARTMENT OF EDUCATIONAL FOUNDATIONS
UNIVERSITY POST OFFICE, WINNEBA

Dear Parent/legal guardian,

PARENTAL CONSENT

My name is **Samuel Opoku** and I am a Post Graduate Diploma in Education (PGDE) student at the University of Education, Winneba. I am conducting a research study on “students’ perception of multimedia instructional materials and their effects on learning ICT in Senior High Schools in the Adentan Municipality.”.

The purpose of this form is to provide you with information that will help you decide if you will give consent for your child to participate in this research. The following is a short summary of this study to help you decide whether you want your child to be a part of this study.

The purpose of this study is to examine students’ perception of multimedia instructional materials and their effects on learning ICT in Senior High Schools in the Adentan Municipality. Your child will be asked to complete a survey and possibly a follow-up interview. We expect that your child will be in this research study for up to an hour during break time.

If you agree to participate, your child will be one of the one hundred participants in the study from two schools in the Adentan municipality. Moreover, your child will be expected to respond to a questionnaire that will be provide by me.

The main risk may be the time the child spends for participating in the study might be considered inconvenience. To minimize this inconvenience of time, the following measures will be taken: The child can skip any questions that he or she feels uncomfortable answering while taking the survey or during the interview and the survey will be scheduled at a time that is convenient to the child.

Your child's responses will be anonymous and confidential. This implies that participants will be assigned pseudonyms for identification during the study and therefore there won't be a collection of personal information such as name, student ID or email address. Moreover, information will only be accessed by the researcher who is doing the study. Additionally, the results of this study may be used in reports, presentations, or publications but your child's name will not be used.

Your child's participation in this study is voluntary. Your child may decline participation at any time. You may also withdraw your child from the study at any time; there will be no penalty. Please note that although you will not receive any payment or compensation for participating in this study, the possible benefit of your child's participation is the knowledge to be gained from this study and information provided by your child for the study will contribute to educational research.

If you have questions about the study, please call me at 0503949990 or e-mail me at samuelkewpok12@yahoo.com. If you have any questions about your child's rights as a participant in this research or if you feel your child has been placed at risk, you can

contact the UEW Educational Foundations department at edufound@uew.edu.gh.

Thank you for your cooperation.

Yours Sincerely,

Samuel Opoku

By signing below, you are giving consent for your child to participate in the above study.

YOUR CHILD'S NAME: _____

PARENT'S NAME: _____

PARENT'S SIGNATURE: _____

DATE: _____

