UNIVERSITY OF CAPE COAST

INFORMATION TECHNOLOGY CHALLENGE IN TEACHING SENIOR HIGH SCHOOL GRAPHIC DESIGN IN CAPE COAST METROPOLIS

ROBERT MUNKU

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BY

ROBERT MUNKU

Dissertation submitted to the College of Distance Education, University of Cape Coast, in partial fulfilment of the requirements for award of Master of Education Degree in Information Technology

MAY 2022

DECLARATION

Candidate's Declaration

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

Candidate's Signature…… Date: ……

Name: Robert Munku

Supervisor's Declaration

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

Supervisor's Signature: ……. Date: ……..

Name: Abednego Kofi Bansah, PhD.

ABSTRACT

The use of information technologies in the field of graphic design, an important discipline in visual arts, contributes to rendering abstract phenomena and concepts concrete, thereby increasing senior high school education students' interest in visual art education (Heinscad & Boadiwah, 2020). The main purpose of this study is to examine the information technology challenges in teaching graphic design at senior high schools in the Cape Coast metropolitan area. The survey included 113 graphic design instructors from 11 different senior high schools in Cape Coast municipality. The research data were analyzed using descriptive analysis techniques. According to the findings, the use of information technology in teaching graphic design courses in senior high schools is restricted. poor usage of information technologies was ascribed by graphic design instructors to a lack of technical infrastructure, poor teaching skills, and inaccessibility to this technological infrastructure in some of the institutions having this sort of infrastructure. The researcher concluded that teachers should be given enough training regarding how to use IT applications such as programming software, interactive whiteboards, multimedia authoring programs, drill/practice programs, animation applications etc. at the teacher preparation school. The researcher recommended that government bodies, non-governmental organisations (NGOs), and parent organizations, among many others, must work together to establish information technology resources and provide institutions with appropriate current technology to stimulate IT incorporation in all senior high schools.

KEYWORDS

Challenge

Teaching

Technology

Technology Support

Integration

Graphic design

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DEDICATION

To my lovely wife, Mrs. Abigail Munku, and my three adorable kids, Godfred N. A. Munku, Ruxanne S. E A. Munku and Diandra S. E.A. Munku.

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CHAPTER ONE

INTRODUCTION

Background to the Study

The majority in educational programs now include technological integration in teaching and learning (Ali, Buabeng-Andoh, Haolader, Muhammad, 2013; Lai, 2015). This is why information technology (IT) is usually seen as the core essential or building block of modern society. (Kyakulumbye, Muhenda, Anaclet, & Kinyua, 2017). However, Daniel and Mensah (2012) point out that there is a discrepancy in IT use in education, particularly in educational contexts. Teaching and learning of graphic design have been considered to be largely teacher-centered (Slattery, 2012).

Information technology has become an essential component of graphic design education. Cheung and Slavin (2013) are of the view that information technology is so ubiquitous, the question is not whether teachers should use it, but how to best integrate it into the curriculum. Information technology is a highly effective instructional tool in the teaching and learning process that allows an individual student to engage with the computer in the same way that the teacher and the individual student communicate in a tutorial system (Kim, Choi, & Olagunju, 2013). It is a crucial instructional method for teachers since it supports the learner by offering personalized education, effective engagement and rapid feedback (Tyagi, Jang, and Nam, 2014). More significantly, it offers students text, graphics, music, visual images, animations, and simulations in the same medium (Olagunju, 2013).

Schank (2010) highlighted the advantages of ICT in educational settings as follows:

1. It allows pupils as well as instructors to be more efficient in their education, improves student involvement in schooling, increases learners' motivation, provides learners with an abundance of knowledge, and supports collaborative learning.
2. It has the potential to shift instructors' roles from knowledge communicators to instructors, from the main source of information to an information navigator and co-learner, and from controlling and directing all elements of learning to provide learners with greater alternatives and responsibilities for their own learning.
3. It has the potential to shift learners' roles from passive information consumers to active participants in learning, from copying knowledge to developing knowledge, and from learning as a lonely activity to learning cooperatively with others.

The role of IT in education cannot be overstated (Jesse, 2014, Serin, 2012; Ahiatrogah, Madjoub & Bervell, 2013; Kereem, 2013, Charagu, 2015). Even though Anamuah-Mensah (2004) lamented the way graphic design was taught in Ghanaian senior high schools. Adebi (2012) pointed out the lack of incorporation of information technology in graphic design teaching as well as public outrage about the country's declining standard of visual art education (Buabeng, 2012). While IT continue to be integrated into teaching various subjects (Abalaka, 2016; Kareem, 2015; Ranade, 2010; Serin, 2011) in other countries, its integration into education in Ghana is virtually non- existent, especially when it comes to graphic design. While various reasons could be associated with the lack of integrating IT into teaching and learning (Achuonye & Cowan, 2014), integrating IT into graphic design lessons

provide a better learning outcome especially for a subject that employs a variety of elements such as markers, symbols, verbal descriptions. which are visualized through typography and images with photographic techniques or illustration (Sihombing, 2010). It is further reported that visuals used in the teaching of students led to a significantly better achievement than teaching conducted without visuals (Sedimo, Ngwako, Ajibade, Elemi & Woode, 2013).

In Ghana, the graphic design curriculum in senior high schools was designed to achieve the following set objectives:

1. Teachers must establish learning circumstances and give guided chances for pupils to gain as much information and comprehension of visual art as feasible via their own actions. Teachers must exhibit, demonstrate, and explain topics in context. Students' learning experiences should include the opportunity to investigate diverse scientific scenarios in their surroundings, allowing them to make their own observations, findings and document them.
2. Teachers should assist students in learning to classify, compare, evaluate, search for patterns, identify correlations, and draw their own conclusions or deductions. Teachers should avoid rote learning and drill-based techniques in science and instead stress interactive teaching and learning (Curriculum Research and Development Division, 2010, p.10).

The above objectives seek to strongly encourage learner engagement through participation yet with the government of Ghana investing huge sums of money in procurements of IT resources and establishment of computer labs in most of

the senior high schools (Agyei & Voogt, 2011a: Agyei & Voogt, 2011b), there is a paucity of data on incorporating information technology into the teaching and learning of graphic design in senior high schools in Ghana, following the introduction of information technology into the senior high school curriculum.

Furthermore, Sawyer, Butler, and Curtis (2010) believe that teachers can use the internet and webcam to demonstrate a range of visualizations and activities for students. These authors' argument highlights the critical role that technology may play in geography instruction. However, with a reportedly narrow technological structure (Agyei, 2014; Agyei & Voogt, 2011), a lack of pervasive ICT implementation in the curriculum (Agyei, 2014), and a senior high school average of thirty participants per workstation, incorporating information technology in educational settings remains a difficult task in Ghana (Mereku, Yidana, & Hordzi, 2007; Tete-Mensah & Williams, 2014).

Statement of the Problem

Ghana's government, as well as other interested parties seems to be especially committed to improving educational quality through information technology integration. However, during my excursions to several senior high schools, I discovered that certain information technologies, such as computers, projectors, digital cameras, television, application programs and so forth, were not being employed in the teaching of graphic design apart from core information and communication technology (ICT). Furthermore, most graphic design instructors lack the necessary skills, experience, and ability to teach graphic design. In view of the above, the researcher deemed appropriate to undertake a research investigation on the information technology challenges in teaching graphic design in high schools in the Cape Coast Metropolis.

The quality of classroom instruction and learning Graphic design within Ghanaian senior high schools continue to create worry among all educators due to its low practical performance. Low learning results in graphic design are related to a variety of reasons, one of which is inadequate instructional techniques (Ogembo, 2012). This reveals that graphic design education in Ghanaian senior high schools may not be as effective as expected (Mensah, 2014). Traditional approaches, mostly teacher-centred and including chalkboard visuals, represent the majority of senior high school graphic design classes (de Graft-Yankson & Avoke, 2010) and little integration of information technology (Eshun 2012), raises some questions on the quality of teaching graphic design in Ghanaian senior high schools.

This form of instruction is extremely tedious, making graphic design difficult for most students to like and comprehend. To increase students' comprehension, teachers must adapt their methods and endeavour to make them comprehend tasks correctly by employing improved teaching and learning tools (Chief Examiners Report, April 2011). Available research on information technology divulged that its use in the classroom instruction can stimulate intellectual curiosity, enhance understanding of concepts, provide individualized instruction as well as effective interaction and immediate feedback to the learner (Tyagi, 2014). For this reason, use of information technology in graphic design classroom may help enhance students learning in graphic design.

Efforts have been made by the Government of Ghana to provide policy, infrastructure and resources that supports IT integration in the Ghanaian senior high schools. For example, the Ghanaian government

pioneered the use of IT in educational settings through initiatives such as the Education Ministry, Youth, and Sport (Mensah, 2015). Similarly, non-governmental organizations (NGO) like MTN have also made numerous efforts by equipping schools and colleges with computers (MTN Newsletter, 2017). It is stated that the solution to the issue resides in the application of information technology (IT) in graphic design education. However, it indicates that little research has been undertaken to investigate the information technology challenges in instructing graphic design at senior high schools. As a result, the goal of the study was to investigate information technology challenges that instructors have when teaching graphic design, particularly schools within Cape Coast metropolitan area.

Purpose of the Study

According to Wang (2017), usage of information technology can create teaching scenarios, enhance classroom teaching, and more fully mobilize and introduce students' learning enthusiasm and the spirit of inquiry. It involves the use of computer technology to optimize the combination of dynamic video, animation, photos, and sound to express oral content in real life (abstract content) clearly to students, highlights the focus of teaching activities, and resolve those doubts and difficulties in the teaching content to achieve the best teaching results. Information technology in classroom foster one-to-one interaction, freedom to experiment or practice with different options and to provide immediate feedback to the answer elicited and it also help teachers to devote more time to individual students (Chaubey & Wang, 2015). The main purpose of this study is to examine the challenges associated with employing information technologies in teaching graphic design at senior high schools in

the Cape Coast metropolis. It also attempted to determine the state of information technology centres in the schools selected for the study, as well as the barriers to their use. Again, the purpose was to find out the level of how information technology is employed in graphic design teaching in Cape Coast metropolitan senior high schools. Furthermore, the purpose of the study was to find out the teacher's level of comfort and effectiveness in teaching senior high school graphic design with information technologies.

Objectives of the Study

The study's particular goals are to ascertain:

1. The state of information technology centres in the schools selected for the study.
2. The extent which information technologies are employed in graphic design teaching in Cape Coast metropolitan senior high schools
3. The challenges of incorporating information technologies into senior high school graphic design instruction.
4. The teacher's level of comfort and effectiveness in teaching senior high school graphic design with information technologies.

Research Questions

The study was based on the following research questions:

1. State the current situation of the information technology centers in the schools selected for the study?
2. What extent is information technologies are employed in graphic design teaching in Cape Coast metropolis senior high schools?
3. What are the challenges of incorporating information technologies into senior high school graphic design instruction?

4. What is the teacher's level of comfort and effectiveness in teaching senior high school graphic design with information technologies?

Significance of the Study

This research will provide visual art instructors, curriculum designers, and policymakers with the opportunity to gain knowledge about and consider the IT problems associated with teaching senior high school graphic design. Research indicates that students that use information technologies demonstrated significant gains in their ability to recall vocabulary words in comparison to students who did not use information technologies (Kilickaya & Krajka, 2010; Gorjian & Lin, 2011; Kayaoglu & Fehr, 2012; Boling & Chui, 2013, Buabeng-Andoh, 2017). Lack of qualified teachers, cost of equipment, management attitudes, inconsistent erratic power supply, inadequate telephone lines, particularly in rural areas and non-inclusion of IT programmes in teachers training curricula has been reported to be a major obstacle associated with implementation of IT in teaching graphic design at the senior high school (Voogt, Kwacha, Lewis & Smith, 2011).

According to the results of the Goktas, Yildirim, and Yildirim (2009) & Amosun (2016) studies, a lack of in-service training, inadequate teaching techniques, inexperienced instructors, an insufficient number of appropriate software and materials, and a lack of hardware are the primary impediments to integrating IT. Furthermore, instructors lack computer access and have unfavourable attitudes regarding integrating technology into the classroom (Chong, Horani, and Daniel, 2010). In reality, many instructors are still afraid of adopting ITs and are hence hesitant to include them in the classroom instruction (Chris, Khaemba, Martin, 2011). They have contributed greatly to

computer-based educational tools having a limited impact (Kay and Lauricella, 2011).

The incorporation of technology in the learning environment has been variously canvassed as a panacea and found to increase students' performance in many course offerings, including fine arts (Aladejana & Idowu, 2009; Abbass, 2011; Appiah & Cronje, 2013). The outcomes of this research will identify the challenges presented by information technology in teaching senior high school graphic design, and they will expand our knowledge and ability to create an effective information technology program that could be helpful in minimizing the issues related to the adoption of information technology in teaching graphic design. Lastly, the findings of the study will contribute to the existing literature on the impact of information and communication technology on teaching and learning outcomes.

Delimitations

The focus of this study is relatively narrow and focuses on senior high schools that offer visual art and study graphic design as a subject. Therefore, information technology is a broad subject with many dimensions. However, this research is delimited to investigate information technology challenges in teaching senior high school graphic design. This study's respondents included senior high school graphic design tutors.

Limitations

This study was hampered by factors outside the researcher's control. The study was carried out in government senior high schools and not private means that generalization of the results obtains should be done carefully. The

other limitation in this study was response rate, holidays delaying research and getting access to teachers.

Organization of the Study

This study will be divided into five chapters. Chapter one will discuss the background to the study, including the problem statement, the purpose of the study, objectives of the study, research questions, significance of the study, delimitations, and limitations. The second chapter will review the existing literature. Chapter three will discuss the research design, population, sample and sampling procedures, instrumentation, data collection, and data analysis. The fourth chapter will present the findings of the study as well as relevant discussions based on the findings. The fifth chapter will comprise of summary of the findings, conclusions and recommendations for future study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviewed literature related to the challenges of information technology in teaching graphic design at senior high schools in the Cape Coast metropolis. The following categories will be employed to organize the literature review: Framework for ICT Policy in Ghana, Information technology in the classroom, Integrating Information Technology into the curriculum, Information Technology and Art Education, Perceived benefits of integrating information technology into the syllabus. The perceived challenges in integrating information technology into the syllabus.

Framework for ICT Policy in Ghana

A framework is nothing more than collection interrelated goals which collaborate in order to accomplish a particular range of objectives (Milli, Fayad, Brugali, Hamu, and Doris, 2014). This paradigm for the national curriculum, then, is indeed a working goal which thus emphasises the individuals, their connections, and the collection of interaction scenarios among the participants (Ukeje 2000; Young, 2015; Linda Darling-Hammond, Lisa Flook, Channa Cook-Harvey, Brigid Barron & David Osher, 2020). A framework for the national curriculum can assist in establishing the roles and duties of academic institutions, stakeholders such as policymakers, administrators, instructors, learners, funding bodies, development organisations, and civil society (Hayes & Bulat, 2017). An educational policy framework, like a blueprint, may be a mechanism within which diverse

stakeholders and policymakers transform educational policies into practice (Akyeampong, 2009; Adu-Gyamfi, Donkoh, & Addo, 2016).

Despite the advantages of the above-mentioned regulatory framework, Ministry of Education, Ghana has failed to establish a policy for implementing information technology (Buabeng, Owusu, & Ntow, 2020). Approximately six years after certain elite and urban schools had their initial experiences with ICT, the Education Ministry has finally presented a proposed policy document to the Cabinet for consideration (Mahama & Robinson, 2019).

Information technology implementation in the education is presently unmanageable due to a lack of a policy framework independent of government efforts (Ismail, 2002; Philips, 2013; Mahama, 2011; Buabeng, 2020). The studies on ICT framework indicated that presently collaboration with planned nationwide ICT strategy (Ewurah, 2017). Second, both other agencies are really not participating currently engaging in policymaking. Thirdly, Ghana has an inadequate level of competence develop; establish an adequate ICT framework (Ismail, 2002; Philips, 2013; Mahama, 2011; Buabeng, 2020). Some strategy issues make ICT integration in education extremely difficult (Russell & Johnson, 2016).

This is a problem that affects not only Ghana's system of education but most educational systems in developing countries. While several educational ministries worldwide are officially dedicated to implementing digital classrooms, several have created cohesive plans to properly incorporate their utilization as educational resources in the classroom, according to Hawkins (2013). Despite the limitations listed above, education policymakers are excited about using information technology in Ghanaian senior high schools

(Ministry of Education, 2013). There have been various challenges with equipment, infrastructure, and energy since the incorporation of ICT in the school curriculum, among other things (Mensah, 2011).

Information Technology in the Classroom

In the twenty-first century, the term "technology" is an essential topic in many disciplines, including education. This is because technology has become the primary mode of knowledge transfer in most countries. Nowadays, technology integration has gone through advancements and transformed our society, which has totally affected the way people think, work, and lives (Ciatti, 2009; Grabe, 2007; Mensah, 2014; Adu, 2017). As part of this, schools and other educational institutions that are supposed to prepare students to live in a "knowledge society" must consider integrating information technologies into their curricula (Ghavifekr, Afshari & Amla Salleh, 2012).

Information technology, according to Lever-Duffy, McDonald, and Mizell (2003), includes the use of both a personal computer and the internet, in addition to physical and logical networks and a wide range of gadgets that transform relevant data (text, images, sounds, and motion) into overall electronic files. In this context, information technology (IT) represents a new method for improving information transmission, and it will be used, integrated, and included in education on the basis of conceptual knowledge. Computers were employed in educational institutions from the moment they were commercially available, and teachers (Becker, 1999; Bracey and Wachira, 2005; Ampofo, 2019) stressed that computers should be used to promote learning.

The utilization of computer-based interaction that is integrated into the everyday classroom learning process is described as "information technology" (IT) integration in education. (Daniels, 2002; Rampersad, 2011). Teachers are viewed as crucial participants in employing IT in their everyday classes, in addition to educating pupils for the contemporary digital environment. This is because IT is capable of delivering an atmosphere of active learning and teaching. (Perkins, 2010; Arnseth and Hatlevik, 2012). While the goal of IT integration is to improve and raise the quality, accessibility, and cost effectiveness of instruction delivery to students, it also refers to the advantages associated with networking learning communities in order to meet the difficulties of present globalization. (Albirini & Fubells, 2012). The adoption of information technology is not a one-time event, but rather a series of continuing and continuous activities that completely support teaching and learning as well as information resources. (Young, 2003; Adayinka, 2012).

The Qualifications and Curriculum Authority (2014) information technology is defined as "a collection of tools and methodologies directly related software, hardware communication systems, both aimed directly and transmitted. This implies that information technology (IT) seems to be a subset of computer systems that encompasses equipment, applications, and network connectivity. The use of the internet, local storage systems, and teleconferencing as well as internal information technology communication (Shelly & Cashman, 2011; Gunter, 2002). Toomey's explanation goes further into the core objectives of employing ITs in classroom. Toomey defines information technology as a tool for obtaining, collecting, changing, displaying, or transferring data" (UNESCO, 2010). This signifies that

information technology is a resource or tool in the learning setting that may be utilized for a variety of objectives.

Integrating Information Technology into the Curriculum

Several attempts have been made to describe exactly what "IT integration within the curriculum" entails (Yeboah, 2015). This comprises a number of methods utilized by numerous academic educators to employ information technology in their individualized education programmes. "Three parameters may indeed be recognized as a preliminary step when collecting viewpoints regarding essential problems in IT-based instructional strategies," writes (Bottino 2004).

1. The learner-centred approach;
2. the communication framework
3. Participative approach

The learner-centred approach includes drill-and-practice programmes designed to aid students in developing restricted skills as well as tutoring technologies that replace instructors as knowledge transmitters. The learner-centred approach is founded on the assumption that learners learn better when they are given the chance to discover and explore topics by themselves. This implies thinking about active investigation and autonomous sharing of knowledge rather than effective learning. Finally, the participative approach organizes learning activities in a social setting (Bottino, 2004; Agyei, 2013). Bottino's theories illustrate the link between educational theory and the use of technology in the classroom.

Improving efficiency using IT aids instructors in improving by empowering individuals with precise and productive tools (Mishra, 2020). A

word processor is employed to make letters, prepare documents, and modify documents, whereas a spreadsheet is employed to plot graphs. Increasing the scope of instruction and learning through IT refers to educators' utilization of the World Wide Web to enhance instructional content (Rolando, Salvador, & Luz, 2013). This allows both the educator and the learner to access updated information from all over the universe. However, instructor should keep an eye on the search process by teaching students how to utilize the Internet to study an agreed-upon issue (Rolando et al. 2013). Using IT to change the subject's perception Teachers assist students in developing a feeling of independence via the use of technology at this level. Learners are allowed to independently study and engage with many types of data. The teacher's responsibility is to help students improve their judgement, abilities, and capacity to evaluate critically what is important (McKenzie, Cook, & Roulston, 2022).

Bialobzerska and Cohen's three stages of IT integration are comparable to McCormick and Scrimshaw's three levels (2005). Bialobzerska and Cohen (2018) propose three stages of IT integration:

1. Functional practice: Computer systems are used to aid in activities that may be carried out manually, such as handwriting, and involve the spreadsheets and word processors.
2. Multidisciplinary approach: Instructors start to employ computers in ways to assist the learners; for example, when students are asked to compose articles on the computer, teachers employ editing software to verify syntax, punctuation, and more choices of words.

3. Revolutionary practice: This level takes into account "learning that occurs a consequence of events and possibilities that would not exist in a computer-free setting." It involves using communication technologies to connect learners with individuals from different nations.

While the writers cited above focused on teacher degrees of transformation, UNESCO, Yeun, Law, and Wong (2003) look at IT incorporation in a larger framework of IT integration within a school environment.

According to the UNESCO study, there seem to be four different stages of integrating technology in the educational setting:

1. Formation,
2. Implementation,
3. Integration, and
4. Conversion

Formation stage

This level apparent only an institution has a few computers that can only be used by teachers and administrators. Instructors are taught how to employ computers at this stage. The goal of this level is to get instructors acquainted with IT literacy abilities. Instructors learn when using a range of instruments and apps (Hammond, Reynolds, & Ingram, 2011). Teachers come to comprehend why they must use ITs in their classroom instruction (UNESCO, 2003). The primary goal is to train instructors so that they are comfortable and confident in their usage of software applications (Becta, 2005).

Implementation stage

When instructors are somewhat comfortable with IT applications, this is really clear. Individuals can comfortably employ computer software and communications tools, as well as access the Internet. Instructors are prepared to use advance technology in the classroom to educate students. Teachers need to know how, what, and when, as well as how IT devices will aid in the achievement of the particular lesson purpose. Instructors then need to be equipped to select the most appropriate IT instrument to assist students in understanding the new approaches to the learning experience. This includes the ability to select whether a whole-class or group multimedia presentation will be beneficial (British Educational Communications Technology Agency (BECTA), 2005; Douglas Education Center (DECedu), 2020). It is also critical that instructors determine how and when they should aid students in locating, comparing, and analysing material downloaded from the Internet. At present, not only instructors but also managers, secretaries, and clerks have begun to employ ICTs in their administrative activities (UNESCO, 2003).

Integration stage

This becomes apparent because of the educational advantage of incorporating all they've studied into every element with professional instruction. It is vital for instructors to experiment with and be innovative with ICTs (Gakii Murungi, Mwoma, & Ashiono, 2018). They can stimulate and control learners' learning, utilizing various learning modes to achieve their objectives (ibid.). When instructors confidently use IT tools, they have reached the "transforming stage" (UNESCO, 2003; BECTA, 2005; DECedu, 2020). They can use them in their classrooms as well as in other elements of

their instruction. The emphasis shifts from the instructor to the student during the transition stage (McKay & Barton, 2018). The stages of incorporating IT applications are therefore no longer applicable regulated by that of the instructor as it reaches a new phase. Teachers no longer serve as both motivations as well as reservoirs of IT related knowledge. Collaborative abilities are honed. Learners collaborate in groups to address real-world challenges (Kayombo & Mlyakado, 2015). Changes in learning styles cause teachers' evaluation techniques to shift (UNESCO, 2003).

Three IT incorporation models were designed by Yuen, Law, and Wong (2003), using a slightly distinct theoretical structure:

1. Technological adoption,
2. Catalytic integration,
3. Ethnic exploration.

Technological adoption

However, at the moment, the education system is considering appropriate technological installation, functional and divisional expansion, and instructor technical knowledge. The primary focus of both teachers is the ability to properly use technology to publish articles that would benefit teachers mostly in the delivery and grading of respective lessons (Badeni, 2019). The administration is currently deeply engaged in encouraging the use of networked computers. Professionals set clear goals and timetables for gaining specific IT skills. The most important component, however, is thought to be improving educational quality by piquing participants' curiosity in the classroom through the use of technology (Meral, Akuner, & Temiz, 2012). Because the number of students who participated is limited, modernization can

be considered a step toward effective ITs implementation (Yuen, Law, & Wong, 2003). For trained instructors to assist inexperienced instructors in grasping technical knowledge and establishing competence, there remains a period of adjustment.

Catalytic integration model:

IT incorporation is now a fundamental element of both learning and instruction. Learners get the most influence over their learning by participating in problem-based activities (Bahrami & Ketabi, 2013). The school principal oversees the integration process. He or she ensures that all instructors are able to incorporate technology into their teaching. Teachers collaborate to meet the goals of curricular innovation (Boateng, 2019).

Ethnic exploration

This concept applies to schools when infrastructure and teacher development do not clash. IT is seen as a component of the school's purpose and vision (Ronen, 2018). There are several leadership styles, which implies that the principal is less concerned with monitoring IT use because instructors are allowed to utilise it according to their opinions (Chai, 2011). This implies they include IT in the curriculum when they believe its usage will help the lesson. Teachers do more than simply incorporate technology into their lessons; they create IT packages that other teachers may use. There are no official teacher development opportunities (Jung & Lim, 2021). Teachers empower one another in a casual atmosphere by exchanging information. The efficiency of this method is unknown because the phase does not indicate how long it will take to prepare instructors before they begin applying IT in their disciplines.

Information Technology and Visual Art Education

In a study, Haddad and Drexler (2010) found that a successful teaching and for individuals to move from the neutral state of forms of information towards the proactive one among data creators, the formative assessment must inspire a curious mind and create a feeling of fulfillment. However, involving students throughout this approach appears to represent the most difficult assignment to instructors. ITs excellent educational assistance for involving students in the education process (Todd, Anyikwa, Ryan, Tobin & Wood, 2014).

As learning shifts from the "teacher-centered model" to a "learner-centered model", the teacher becomes less the sole voice of authority and more the facilitator, mentor and coach from "sage on stage" to "guide on the side" (Lee, 2021). The teacher's primary task becomes to teach the students how to ask questions and pose problems, formulate hypotheses, locate information and then critically assess the information found in relation to the problems posed (Seok & Johann, 2009). Students also learn more quickly, demonstrate greater retention, and are better motivated to learn when they work with computers (Kwak & Lee, 2019).

According to the findings, the right use of modern digital various news outlets instructors and learners play a part heavily towards the field of graphic design curriculum (UNESCO, 2010). Information technology provides a revolutionary approach to visual arts educators by enabling computer vision applications as well as enhancement (Madeja, 1993, as described throughout Phelps & Maddison, 2017), opens up new avenues for stimulating creativity (Brown, 2011), and expands visual art beyond ceramics, pastels, and paints

(Stankiewicz & Fenner, 2012). The above option had first been identified throughout the 1980s when Crowe (1988) stated information technology may aid in the exploration of design challenges, improve creativity. According to D'Angelo (2010) stressed well the computer an educational setting may genuinely improve young artists' creative ideas and productivity. D'Angelo (2000). Ever since the literature has evolved to emphasise the possibilities for IT to help visual art classroom instruction, "these are extraordinarily excellent opportunities regarding creative instruction with fresh ideas." (Long, 2001).

According to the National Society for Education in Art and Design (NSEAD) said its 2004 "Art and IT Advocacy Statement" that the effective use of modern digital media by both instructors and students greatly adds to arts integration and improves learning. It allows instructors to improve their competence by recording, assessing, investigating, and sharing their progress with their peers. According to NSEAD (2010), among the prospects that learners are provided by information technology within the arts include the following:

1. Allow them to experiment with their own ideas and take creative risks by providing them with fresh possibilities.
2. Explore their creative potential by participating in a variety of activities.
3. Work in progress in two and three dimensions is reviewed, refined, and modified.
4. Collaboration with others (peers, instructors, specialists, etc.) is required to generate ideas (Page 201).

According to the Apple Classroom of Tomorrow (2010) research, learners connect with their peers and instructors more in classrooms where technologies are employed than in traditional classroom settings. According to the study, learners modify the way they arrange and complete their work and prefer to work collectively to address difficult challenges. According to ACOT (2010) research, students commonly use inquiry, teamwork, technology, in contrast to conventional programs. As a result, cooperation becomes a teaching opportunity or a means to a goal rather than just an opportunity for learners to connect (Ambinintsoa, 2020).

According to a 2013 study by Apple Classroom of Tomorrow (ACOT), information technology has the potential to enhance instruction through built-in pedagogical approaches and provide opportunities to stimulate human thought development in ways that would be difficult in a classroom without technology. One of the most contributing significant modern technologies brings with education seems to be the impact it has on students' attitudes toward learning (McSpadden, 2018). The investigation subsequently discovered when children frequently learned and studied with technology, they graduated from high school and were more likely to contemplate attending college. Fewer than half of the ACOT students entered the programme with no intention of attending college. Only 15% of the graduating students at the school where the study was conducted went on to college. Not only did every student in the ACOT classroom graduate, but more than 90% went on to college.

According to Agyapong (2011), the students should take charge for themselves learning. Researchers discovered when computers are included in

the curriculum, students are more inclined to participate and perhaps even control studying tasks. In general, they discovered that when students have the opportunity to meaningfully take part in the learning process using technology, they generally respond favourably. They arrive at class motivated to learn and to take greater pleasure in their work (Kader, 2012).

According to Endeavor Research Group (2011), technology enables the students should take charge over own learning. Researchers observed indicated they were more likely to start using technologies in the classroom wherein innovation is incorporated into the curriculum. and even direct learning-based activities. In general, they discovered that when students are given the opportunity to actively engage in the learning process using technology, they respond positively. They arrive at class motivated to learn and to take greater pleasure in their work (Kader, 2012).

Perceived benefits of incorporating information technology within the curriculum

Prior to actually digging further into the positives noticed by instructors in all the other studies, it is crucial to note that the advantages of incorporating information technology into classrooms manifest when it is used appropriately (Lee, 2002; Selwood & Pilkington, 2010). According to Becta (2005), educators who are already comfortable and knowledgeable with computer technology may profit from introducing it throughout the syllabus.

Internet connectivity

The National Council for Educational Technology (NCET), according to Lee, highlighted a number of possible benefits, one of which was enhanced accessibility to more reliable sources (Lee, 2002). Thus, according to Granger

(2002), Carnoy (2011) and BECTA (2005), teachers consider that the internet is a valuable asset that may provide the ability to access a variety of curriculum-related content. Granger et al. notice that instructors used the online services for surfing measurements, interacting with friends and family on-the-job conversations, and collaborative efforts with peer groups and/or students in response to the information retrieved and Peters and Knobels' concern about "acknowledging the path scholars comprehend and methodically use the Internet" (Howie, 2010).

Utilization of IT applications

According to Howie (2010), instructors regarded information technology integration as offering a chance to use information technology applications. These are some examples:

1. Dynamic modelling of natural or man-made systems, as well as graphical modelling of mathematical functions.
2. Simple manipulation and data analysis software.
3. Desktop publishing and word processing.
4. Software that aids in the creation of creative works (music and art).
5. CD-ROM interactive media encyclopedia (2005, p. 64)

Becta (2010) showed that instructors regard Particular topics in technology have been identified as crucial to integrating technology in their particular LAs when comparing the possibilities of employing IT applications in the integration of IT.

Administration and storage facility improvements

The enhancement of administration for both teachers and the school administration are key to the advantages of employing IT tools. Teachers use a

word processor and spreadsheet to establish school timetables, plans, and budgets for administrative purposes. "Some schools use specifically designed software programmes which enables educators as well as the institution to analyse students' performance on tests" (Carnoy, 2011, p. 7), as well as for distributing and keeping individual employee information, implies that computers have become a permanent presence in certain school offices (Carnoy, 2011, p. 5).

The workload of teachers

Overburdened teachers have long been a source of worry in the teaching profession. Administrative use of information technology seems to have the ability to lighten the strain on teachers' burden (Selwood & Pilkington, 2005; Anim, 2018). This, however, is really only achievable if instructors gain access to appropriate information technologies and are capable of using them successfully (Selwood & Pilkington, 2005). (Becta, 2010). Sharing duties with several other instructors from some of the other schools, both within and outside the region is an important part of effective utilization. This minimises preparation time and gives teachers more time to interact with their students (Selwood & Pilkington, 2005).

Transforming Education

Teachers' duties are evolving as modern technology is used (Pearson & Naylor, 2006). Teachers who use information technology typically shift their worldview from one of the knowledge transmitters to one of the information creators (Lee, 2002, p. 8). Therefore, regard information technology as a motivator for transforming professional teaching techniques (Maholwana & Sotashe, 2010). According to Mumtaz's (2000) research, "teachers believed

that their approaches were much more learner-centred; the more intensely involved professors were in contractual responsibilities, the farther participants were probably from considering particular concepts congruent with learner-centred approaches." This indicates that IT may operate as a trigger to shift classroom instruction away from the instructor and toward the learner. The roles of learners shift from passive to active "partners in constructing lessons learned and more, after that interaction production strengthened" (Dede, 2000).

Perceived challenges in integrating information technology into the curriculum.

Successful information technology usage leads to a wide range of advantages in information technology integration, but instructors cannot employ information technology successfully when there are issues that impede their pedagogical approaches (Ayebi-Arthur & Owusu, 2015). The act of incorporating IT into teaching and learning is a complex process and one that may encounter a number of difficulties. These difficulties are known as “barriers” (Amedahe, 2010). A barrier is defined as, “any condition that makes it difficult to make progress or to achieve an objective” (Boakye & Banini 2010).

Infrastructure is not available.

The availability of infrastructure is essential for IT integration. Technologies, programs, and facilities are critical components in integrating information technology into the educational curriculum. The absence of appropriate, modern technology inhibits the implementation of IT throughout

education. According to Williams, Tuson (2010), "the availability of technology seems to overcome all other criteria in deciding use".

Software and Hardware

According to Veen (2010), "there might be no usage of information technology in any way without software and hardware" (1993, p. 1). According to Granger (2010), one of the challenges impeding the incorporation of information technology into classrooms is a lack of sufficient and available resources. The unavailability of technology comprises a scarcity of technology that corresponds to content knowledge as well as an absence of technical assistance to guarantee daily activities are not hampered by unreliable equipment (Veen, as cited in Maholwana-Sotashe, 2010).

Inadequate internet access

Aside from topic-specific applications, internet connectivity has been identified as a barrier to IT incorporation, particularly in areas where connectivity is scarce or Internet service is inadequate (Becta & Stone, 2010; Adu, 2018). Instructors who have IT access acknowledged speed as a barrier to their online access (Becta, 2010; Korsah, 2012). The major barrier in classrooms in which there is no access (Hodgkinson-Williams, Sieborger, & Terzoli, 2011).

Insufficient training and qualified teachers

A dearth of IT-competent instructors who can easily and confidently incorporate IT is frequently addressed by a number of academics (Hennessy, 2005; Loveless, 2003; Lee, 2002; Ofori, 2015). Incompetence appears to breed insecurity. "Instructors need to be persuaded of the advantages of IT since many teachers regard themselves as technically stupid and frequently feel

unemployable and disheartened when they first start to utilize technology in the classroom. This indicates that qualifications alone will not assist instructors in integrating IT into their instruction; additional training that includes how computers might be utilized in conjunction with curricular knowledge is required. The information gained in such training can assist the instructor in selecting acceptable representations for a certain activity and identifying difficulties that students has specific software (Webb, 2002, p. 246).

According to Muller, and Paterson (2005), teacher incompetence is caused by insufficient training. Even when instructors are IT-savvy, ongoing staff development is required to guarantee that they can keep up with evolving technology. This implies that instructors must have some type of training before they can properly integrate IT into their classroom instruction. However, some instructors are resistant to change, which makes incorporating information technology into education complex (Lee, 2010). The majority of academics, a common hurdle is a lack of appropriate training. According to a Pelgrum study conducted in 2001, there were insufficient training options for instructors regarding the use of technology in the classroom.

It is challenging to train instructors in the incorporation of technology in the process of teaching and learning. This is due to the fact that it requires a variety of intricate components to be present in order for the training to be successful. These complicated aspects pedagogical instruction (Bingimlas, 2010). According to Cox's (2009) research, IT training for teachers must include pedagogical components. According to the findings of this study, even when instructors obtained basic IT learning despite embracing the

instructional aspects of IT, educators nevertheless did not comprehend how to appropriately use IT in classrooms to develop their professional skills.

According to Cox (2009), if instructors are to be persuaded of the importance of incorporating IT into their teaching, their training should focus on pedagogical difficulties. According to them, this is because, even after attending professional development programmes in IT, instructors often did not understand how to successfully use IT in their classes (Drossel & Eickelmann, 2017). This was due to an overemphasis on learning technical IT abilities during training rather than skills in incorporating IT into the curriculum (Batane & Ngwako, 2016).

According to some research, one of the primary reasons instructors do not employ technology in their classrooms is a lack of proper training and expertise. Furthermore, instructors' unwillingness to use computers stems from a lack of trust (Kumar, 2003; Philips, 2013). Another issue has been the impact of a lack of understanding of the adoption of information technology among Ghanaian teacher educators. There seems to be, in fact, an essential requirement for freshman undergraduate or graduate students enrolled in information technology education to achieve satisfactory educational objectives from the use of information technology and to meet the objectives of their head's instructors (Verhoeven, Heerwegh, & De-Wit, 2014). The most essential IT training requirements must include professional skills to support IT instructional and Methodologies for studying types of software competence, capacity building, and research-based preparedness on IT utilization for data processing, summary statistics, and spreadsheets (Abraham, Arficho, & Habtemariam, 2022).

Finally, adequate IT training can overcome some of the challenges to integrating the use of technology in teaching and learning (Ngandeu, 2021). This is due to the fact that learning the requisite skills through training would improve instructors' sources of knowledge and proficiency levels (Pribady, 2019). As a consequence, it would diminish the anxiety that some instructors have of teaching information technology in the long-term. The preceding review of the literature is a compilation of many papers relevant to the research.

Teachers' resistance to change and lack of knowledge

Teachers who are resistant to change may be technologically illiterate (BECTA, 2005; Schenze, 2011), have a different point of view perception of how technology is used in their classrooms or risk losing control. Mumtaz (2000, p. 320) defined this fear as "avoidance," because instructors "avoid technology or maintain a very minimal degree of connection." Instructors' hesitation to use IT in the classroom may be due to a lack of expertise. According to Lee (2002, p. 5), "for instructors to reconsider and reorganize their instruction and learning, they must first acquire sufficient knowledge of the appropriate technology to use in their day-to-day employment and to communicate to their students within the context of the subject matter in a blended learning environment."

That implies that instructors, being the primary facilitators of IT implementation, must be able to incorporate new technology into their teaching methodologies in order to empower students to develop knowledge. It is suggested that instructors' aversion to change stems from a lack of understanding, such as the ability to utilize the Internet efficiently (Lee, 2002;

Jenkins, 2012). This opposition to change is not limited to school administrators. According to NCET (Bryana, 2018), school leadership attitudes influence IT incorporation in classrooms. The "motivation and actions of school administrators are anticipated to have been important to technological advancement processes" (Mooij & Smeets, 2001).

Technical support

As computers are installed in classrooms, they will require ongoing assistance and upkeep; alternatively, their usefulness might be transitory. The importance of having support employees perform frequent updates, repairs, and maintenance cannot be overstated. This is something that not every instructor can do. This is a specialised position that cannot be filled merely by educators (Mensah, Nilholm, & Paulsrud, 2020). The Ghana Education Service (GES) and the schools must establish a structured support system with full-time people to react to troubleshooting inquiries. This function might be contracted to IT companies or maintained in-house within the educational system (Ayinado, 2014). According to Carnoy (2011), "even though instructors are conversant with IT, more technical assistance is required to make IT a vehicle for curricular reform in the teaching-learning process" (p. 9). He also suggests hiring full-time professionals to investigate and resolve significant technological issues.

Teachers who volunteer to do the work in the school system may be taught the fundamentals of simple repairs and adjustments. This is crucial because minor, upsetting gunshots may be dealt quickly, minimizing disruptions to school activities. (Orodho & Kombo, 2020). This, too, may be decided by the instructor's extracurricular time. This commitment must be

assured that it does not interfere with the educator's curricular obligations. Alternatively, the IT instructor might choose a few students who are technologically adept and educate them to undertake minor maintenance and repairs. (Adjei & Atronka, 2002; Akin, 2011).

The Education Ministry must guarantee that experienced support employees are immediately accessible to react to calls in order to avoid unnecessarily disrupting schools due to system failure. If Ministry of Education and the other decision makers resolve issues highlighted above, there is a significant probability that a school, regardless of its location, will profit in some manner from the usage of ITs. According to researchers, most schools' technological support employees are usually overloaded with teacher demands and hence unable to respond correctly (Cuban, Kirkpatrick, & Peck, 2001; Pasuine, 2011). As a result, technology is especially damaged or operates at a lesser even though instructors queue for technological support.

The significantly more difficult requirement that such instructors maintain the tools on their own is frequently frightening and acts as an additional deterrent to integration (Ertmer and Otternbreit-Leftwich, 2010) noted an absence of coordination and instructional assistance among adult learners, as well as insufficient training. Jones (2014) noted that computer breakdowns create disruptions, and if there is a shortage of technical help, it is probable that routine computer maintenance will be neglected, leading to instructors not utilizing computers. Because no one will provide technical help in the event of a technical problem, instructors will be discouraged from using computers out of fear of equipment failure.

According to BECTA (2004), "if there is a shortage of technical assistance accessible at a school, it is probable that technological repairs will be performed on a routine basis, thereby increasing the chance of technical breakdowns". Throughout Ireland, the NCTE survey on IT facilities (as quoted in the information technology strategic planning group presentation, 2008–2013) discovered that approximately 85.3% of school systems rated technical maintenance and support as an "elevated" or "extremely high" primary consideration and that it ought with competent technical assistance, it can be an indispensable feature of the educational IT system. Similarly, Yilmaz (2011) stated in his review of the increasing integration of technology mostly from Turkish public schools, aside from offering institutions computers, high-speed broadband, additionally necessary for continue providing teachers with technology in the classrooms with tech assistance for maintenance and repair in order for IT to be used in classrooms for effective teaching and learning.

Inadequate funding

Information technology and its elements require financial assistance. The overall cost of ITs in education, according to Howell, Lundall, and Patrick (2000), comprises training for teachers, additional advising and technological personnel, equipment, applications, telecommunication networks and content production. According to Smeets (2010), to realize IT objectives, government authorities must make monetary resources accessible to schools.

Inadequate information technology policy

To be successful, information technology integration requires instructions on how the procedure should be followed, from the government level down to the ministry of education. The most commonly reported

impediment to IT policies is schools' unwillingness to establish their own policies. Teachers claim that integrating IT is difficult when the academic calendar does not provide IT accessibility. According to Hennessy et al., the fact that educators have "little mention in developing and executing growth plans for utilizing information technology within their school systems" is impeding the utilization of information technology in instructors' because they "extremely political and do not participate towards the way of life of classroom instruction and the hugely important role of the educator in creating changes" (Hennessy et al., 2010).

IT Policies

Countries all over the world have created strategies to include information technology in the curriculum. In the United Kingdom, technology incorporation attempts to foster educational creativity by employing IT to minimise teacher workloads and improve teaching (UK Connecting Schools and Networking, 2010). According to the Canadian IT strategy (2011), implementing IT in classrooms will increase academic achievement equality among learners and, eventually, students' capacity to utilize information technology into the classroom (Corbett & Williams, 2002).

There are several African nations that use information technology in specialised NGO instructional programmes (Agringo, 2015; Hodgkinson-Williams, 2005), yet, "the establishment of very well-developed government policy on IT education appears to really be present process" (Howie, Muller & Paterson, 2005; Mensah, 2019). IT strategies that seem to exist in the southern African area are limited and ambiguous, with little reference to how IT deployment will be effective (Howie, Muller & Paterson, 2005, p. 4).

ICT4AD refers to IT policies, which include all parts of the economy, especially academia (ICT for Accelerated Development). "Because elements of both the administration's new curriculum aim at "improving the provision of quality education to provide that necessary methodologically effective practical assistance, as well as the creation of an surrounding able to providing the appropriate competencies and sentient resources outlay towards growing and maintaining Ghana's material, experienced, and knowledge base the administration dedicated something like a systematic approach to the successful completion, usage, and commercialization of ITs throughout the educational process (Mensah, 2013).

ICT4AD's mission statement focuses on the utilization of information technologies in the educational system, from basic schools to higher levels. This clearly shows that the Ghanaian government is determined to foster the practical use of information technologies in all stages order to enhance teaching. Furthermore, a primary policy priority of ICT4AD's significant policy goals is always to "support the implementation, use, as well as usage of information and communication technologies within the instructional system for improving instructional availability and delivery and to support the learning process from early childhood on" (Mensah, 2013).

Insufficient knowledge and skills

Despite adequate resources, instructors frequently lack knowledge of specialised technology, innovation instruction, and innovation classrooms. According to Tezci (2011), "large class sizes cause classroom management challenges." Technology may be a terrifying notion for several instructors, especially the others who were not raised with the internet or computers. It

might be easier to avoid using a tool than to admit to lacking understanding. As a result, this may be a considerable obstacle and can be illustrated in three ways (Jelbadini, 2012).

According to Hutchison and Reinking (2011), there is a scarcity of particular understanding about technologies and the way to integrate them with modern pedagogical subject knowledge to assist learning. Instructors, for instance, may not seek to employ any technology-related exercises with their pupils until they first understand fundamental skills such as saving to a home drive. Instructors, especially in senior high schools, may be concerned that pupils are more competent with technology than they are and hence may be hesitant to use it in the classroom. When instructors lack of experience with technological solutions or the chance to investigate the characteristics on their own, technology integration into the syllabus might be hampered (Mundo, 2022).

Lack of time

Incorporating technology into a syllabus can take a lot of time, particularly if it has to be matched with the syllabus, goals, and other purposes. Amengor (2011) and Oppong (2009) discovered in their research that a lack of time was a difficulty. Teachers must spend hours examining websites, becoming acquainted with equipment and software, and becoming familiar with numerous tools. Instructors that are prepared to put in longer hours to accomplish sometimes suffer a personal price in the form of "burnout" and eventual dismissal from the classroom (Hew & Brush, 2007).

Inadequate access

Lack of access to technology may also be a barrier for instructors. For instance, Zhao, Pugh, Sheldon, and Byers (2010) Although computer labs are ubiquitous in institutions, educators could be denied computers if they were required to compete with other educators for classroom time. Access is limited in the classroom, the school's second-most technologically demanding place after the computer lab (Harwood & Asal, 2008). Learners often have access to the library's resources, mostly during their assigned class visit hours. General authorization is usually provided either before or after class. Although computers are accessible, they are less useful unless they are equipped with a diverse collection of appropriate and higher-level programmes and a reasonably high-speed internet connection.

Summary of Reviewed Literature

To sum up, considerable expenditures must be allocated to the adoption of information technology across all educational levels in Ghana for the government to accomplish a successful outcome in its socioeconomic development work. Many countries recognize the essential role that information technology can play in providing access to education for a larger share of the population and creating educational provision and training at all levels. Although graphic design is internationally recognized as a contribution to human growth and contemporary technologies, the examined literature demonstrated that there is an inequity regarding the use of machines in instructional circumstances, particularly in developing nations (Daisy, 2007; Adebayo, 2014).

Graphic design instructors are hired to adapt and incorporate technology into their instruction and learning, but it is the instructors' readiness to incorporate technology into their curriculum that defines the technology's success, not its sheer presence in the school. Instructors' attitudes and ideas about technology are one of the aspects that determine the full implementation of IT in education (Agyemang, 2020). Finally, instructors' preparedness to teach IT has little effect on the deployment of computer equipment in the classroom (Niederhauser & Stoddart, 2010). Researchers have discovered that the utilization of information technologies increases student involvement and discovery, allowing the student to be innovative while studying. This study demonstrates that information technologies are timely in Ghanaian senior high schools and favourably impact learners' achievement in graphic design as well as other subjects.

However, there has been a fear that instructors may struggle to employ information technologies to instruct graphic design because most of them will lack knowledge of this field. It seems that no research has indeed been undertaken in the Cape Coast metropolis regarding the challenges of integrating IT into teaching graphic design in senior high schools. Thus, there is a research gap in this field. As a result, this research was designed to fill that gap. This research aimed to discover the challenges of incorporating information technologies into senior high school graphic design instruction in the Cape Coast metropolitan area.

CHAPTER THREE

RESEARCH METHODS

This chapter presents the research design, study area, population, sample and sampling procedures, instrumentation, pilot study, data collection, data analysis, validity and reliability of the instrument and ethical concerns.

Research Design

Creswell (2014) states that the objective and goal of a study affect the type of study design used for the investigation. The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way (Trochim, 2010; Creswell, 2014). Considering the nature of the research problem and purpose of this study, the most appropriate research design that will be used is the descriptive survey design.

The descriptive research design was appropriate since the researcher wanted to describe certain features of a specific group using an equally represented group that answered questionnaires or conducted interviews. According to Osuala (2002), a descriptive study evaluates, synthesises, and documents by highlighting implications and linkages. The bigger benefit of this survey design is its capacity to collect enormous amounts of data from a relatively large number of individuals. According to Hale (2018), the investigator is capable of obtaining previous knowledge and difficult-to-find data, without which the investigator would be unable to inspire or influence participants' replies. Sproull (1995, referenced in Iddrisu, 2010) suggests the survey approach for research that examines attitudes, thoughts, remarks, and public opinion on a subject or issue. McNabb (2016) also recommends that,

the purpose of a descriptive survey is to generalize from a small selected sub-group of the population to the entire population so as to infer about some behaviour or characteristics of the population.

Study Area

The survey locations are senior high schools in Cape Coast Metropolis, Ghana's Central Region. Cape Coast is located between the latitudes of 5 degrees south and 6 degrees and 3 minutes north, as well as the longitudes of 1 degree and 35 minutes east and 2 degrees and 30 minutes west. The entire surface area of Cape Coast is 2,255 km2 (Arhin, Jonah, Adjei-Boateng, Agbo, Mensah, & Edziyie, 2015). It is both the municipal capital and the official seat of the Cape Coast Metro Area (Duedu, 2010; Cape Coast Metropolitan Assembly, 2011).

It served as the former Gold Coast's first capital town (now Ghana). With a populace of 65,763 in 1984, Cape Coast constituted the only prominent urban centre in the Metropolitan Area (Ghana Statistical Service, 2010; Korkoi, 2020). Overall, the total population of the city is 169,894 people, as reported by the Ghana Statistical Service (2012). Fante, one of Ghana's Akan dialects, is the native tongue spoken on Cape Coast (Omondi, 2017). Since the establishment of the very first colleges and universities on the Gold Coast, Cape Coast has been the epicenter of Ghana's education system. Various educational developments occurred, beginning with the Castle School, which was located inside the Cape Coast Castle during colonialism.

It now includes a university (the University of Cape Coast), a technical institution, eleven senior high schools, one technical school, one teacher education institution, and two advanced nursing education institutions

(CCMA, 2011; Baker, Amoah, & Kankam, 2016). It is also dominated by some competitive senior high schools in the country (Ghana Education Service, 2022).

Population

Creswell, Denzin, and Lincoln (2011) define a population as a group of people, things, or components who meet the researcher's (broad or narrow) criteria for research participation. According to Baškarada (2014), the population places constraints on the units analyzed. Furthermore, the research population includes people from all across the cosmos who have certain traits (Baškarada 2014).

As a result, the selected individual units of analysis reflect the complete research population to whom the final conclusions will be generalized (Baškarada, 2014; Ralph, Birks & Chapman, 2014). The population of this research will consist of all senior high schools within the Cape Coast metropolitan area, from which sampling will be taken. According to Ghana Education Service (2020), there are thirteen (13) senior high schools in Cape Coast, with a total teaching personnel of 1,356, of which sampling will be selected.

Sample and Sampling Procedure

Sampling is the practice of selecting a number of people or topics from a population so that the selected group has characteristics similar to those found in the overall group (Clark, 2013). The significance of a sample derives from the fact that when researchers use probability sampling techniques to choose a sample from a well-defined population, they may be pretty assured, within the bounds of sample variance, that what researchers discover can

really be generalized (Creswell, Plano, & Clark, 2011; Leedy, 2010; Light, Singer, & Willett, 1990).

This study's sample included all senior high schools in the Cape Coast metropolitan area that offer visual arts programmes. The sample size of the study was qualified visual art instructors who have acquired bachelor of art in education degree and a minimum of a master's degree. According to Ghana Education Service (2020), there are eleven (11) senior high schools that offer visual arts in the Cape Coast metropolis with a teaching staff of one hundred and thirteen (113). This number will be purposefully used solely to conduct the research.

Data Collection Instrument

The study's primary item for collecting data for this research is a self-created survey question. The survey question seemed ideal since it was relatively inexpensive and could be distributed to a significant number of people in a minimum amount of time (Neuman, 2007; Creswell, 2012). According to Roulston, (2008), a questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. The researcher might use a questionnaire to better understand the goal of the study and provide context for confusing items (Best & Kahn, 2012; McLeod, 2018). The surveys employed in this study are semi-structured and include a combination of restricted and open-ended items. According to McLeod (2018), suggestive or compelled inquiries have several benefits. This is despite the difficulties involved with closed-ended questions, such as providing responders with a sufficient range of answers. According to McLeod (2018), closed-question surveys are simpler to code, and thorough

replies are recommended as a solution to the difficulties. The questionnaire was divided into four sections (A-D).

The section A focused on the demographic information of respondents (teachers). The section B of the survey instrument focused on availability of ICT resources. Section C of the survey instrument dwelt on items designed to measure the extent computer assisted instruction were used in the teaching and learning of graphic design, response sought for these items were based on 'Daily', 'Weekly', 'Monthly', 'Once or twice a year', 'Never' and 'Not Available'. Section D of the survey items contained items designed to measure the difficulties of incorporating information technology into the classroom graphic design at the senior high school level. Responses ratings were based on Likert scale: 'one (1) as most important challenge to six (6) as the least important challenge.

Section E also measured the comfort level and effectiveness of using ICT technologies in teaching graphic design. Responses on the comfort levels were based on a four-point Likert scale as "extremely comfortable," "moderately comfortable," "require assistance," and "need a lot of assistance." A Likert scale was used to assess effectiveness: 'Very comfortable', 'Moderately comfortable', 'Need help' and, 'need a lot of help'. The effectiveness was based on Likert scale: 'I know and can use effectively', 'I know but cannot use effectively, 'I do not know what this is', Finally with this section, participants were required to respond to whether some selected graphic design applications were available and taught how to use during their teaching practice years. Participants were just required to affirm to this enquiry and not respond if were not in affirmative.

Data Collection Procedure

An introductory letter was be obtained from the College of Distance Education, University of Cape Coast, to seek consent from the respondents to participate in the study. Furthermore, as part of the data collection procedure, school entry processes were followed to professionally introduce the investigator to respective department heads of the Visual Arts programmes in the sampled senior high schools. The questionnaire which is the only instrument employed in the study followed a pattern on its data collection as detailed below. In eliciting data from respondents, 113 questionnaires were administered to Graphic design teachers of the Visual Arts programs in the selected schools in the Metropolis. In the various schools, the Graphic design teachers were targeted in order to provide responses to the objectives raised in the questionnaire. The questionnaires were administered were English language, because most teachers could express their opinions and experiences by documenting them on the research instrument. The questionnaire administration for each respondent was appropriately 20 minutes.

Data Processing and Analysis

The data analysis step included editing, coding, and statistical computations. After data gathering, the questions on each questionnaire were sequentially numbered to enable simple identification, prevent mistakes, and ease coding. IBM Statistics software (version 22) was used for data analysis. According to Field (2009), the IBM Statistical Program is employed to perform statistical data analysis, quantitative data processing, and the creation of tables and graphs that illustrate the data obtained. Descriptive statistics were used for analysing research questions 1, 2, 3, and 4.

Pilot Study

In order to ascertain the reliability of the research instruments, a pilot study was carried out. According to Kerlinger, Fred and Howard (2010), a pilot study was conducted to confirm the suitability of the instrument for its adequacy and for the effectiveness of the instrument. A pilot study was conducted among 12 visual art teachers from Sammo and Moree senior high schools in order to check survey items for reliability. These schools were chosen for the study simply because they were nearby and had access to current technologies and it is believed to be more or less equivalent to in term of standard to the schools used for the study and was not part in anyway involved in the main study. Hence, the research instrument which is 15 items of open and closed ended questions were administered to 12 senior high school visual art teachers from above stated schools.

The pilot study demonstrates that respondents comprehended the data collection instruments and assessed the researcher's capacity to contact respondents. My supervisor, a learning management system specialist, and a friend who is also an expert in educational measurement and evaluation examined the self-developed questionnaire to ensure that the items were worded appropriately, that the language used was suitable, and that the items were relevant to each component. These experts judged each of the items on the questionnaire in the context of generality and clarity in order to ensure that the items measured the objectives of the study. The recommendations and suggestions from these experts were used to modify the instrument prior to the study. The pilot study gave highly helpful information that informed how the main study was carried out.

Validity Issues

The degree to which a measures test accuracy and significance of conclusions drawn from research findings are known as "instrument validity" (Mugenda & Mugenda, 2003; Creswell & Clark, 2013). According to Warner (2013), "a measure is legitimate if indeed the results offer information about the fundamental construction or theoretical factor that it is supposed to assess" (p. 902). Validity indicates to the researcher how effectively a measure makes whatever assessment the researcher desires (Light, Singer, & Willett, 1990; Oluwatayo, 2012).

A test, according to Tuckman (1999) and Warner (2013), would provide an alternative to establishing an individual's behaviour and activities throughout the whole range of study settings instead of putting individuals in each one. To protect and assure the study's content validity, the researcher submitted a drafted instrument for data collection to three experts in the fields of information technology, research methods, and educational measurement and evaluation. These items were subjected to thorough scrutiny and proofreading by these experts to ensure that their contents were in line with the research questions. The suggestions from the experts were used to modify the instrument in order to secure and assure its validity. This supported the view of Berge (1995; Warner (2013), who stated that any research instrument to ascertain its validity should be given to a panel of experts to determine if its items (contents) can elicit the desire data they are intended to elicit and this in essence to ensure its content validity to ensure that necessary adjustments are made thereafter.

Reliability Issues

According to Light (1990), Leedy (2010) as well as Cresswell (2012) every time data is collected, measurement of errors may happen. As a result, the errors in the research instrument may not produce accurate results, which may result in less accurate data for the researcher. Rather than focusing on measurement mistakes, researchers commonly assess research measurements in terms of dependability. Reliability is the degree to which a research instrument produces consistent outcomes or data after multiple tests. According to Kothari (2004) and Darren and Mallery (2014), a survey instrument is deemed credible if it produces accurate results.

After the pilot testing, Cronbach's alpha was used to estimate the reliability coefficient. This was of the view that the items were measured on a five-point Likert scale. After the reliability analysis, the reliability coefficient for the subscale that measures the state of information technology in the schools selected for the study was 0.87, whereas the reliability for the subscale that measures the extent to which information technologies are employed in graphic design teaching was 0.74, while the reliability analysis for the challenges of integrating information technology in teaching graphic design was 0.74. The reliability test, which is based on the teacher's level of comfort and effectiveness, was 0.88, and the total reliability for the actual questionnaires was 0.93. According to Pallant (2010), for data collecting, a reliability coefficient of 0.70 or above is deemed trustworthy.

Ethical Concerns

The problem of ethics is a crucial aspect of human participation in the study (Best & Kahn, 2012). The rights to privacy, voluntary involvement, no

damage to participants, secrecy, dishonesty, and research dishonesty were among the ethical problems considered in this study. All research studies present a number of ethical and moral dilemmas which must be identified and addressed in order to protect all respondents and participants from potential harm (Seidman, 2013).

Ethical issues were strictly be adhered to in this study. The researcher satisfied the Institutional Review Board policy requirements to get ethical clearance from the College of Distance Education, before proceeding to the field to collect data. The study also followed participant information ethics. Respondents were not pressured into taking part in this research on ethical or legal grounds. Participants were made aware that their involvement is entirely optional. They were given enough details about the study to make a well-informed choice regarding whether or not to participate in it. Furthermore, because it was critical to preserving the information acquired, the researcher would guarantee that replies were not traceable to specific respondents.

CHAPTER FOUR

RESULT AND DISCUSSIONS

This chapter presents the results and related discussions based on the results. The objectives of the study were:

1. To state of information technology centres in the schools selected for the study.
2. To extent to which information technologies are employed in graphic design teaching and learning in Cape Coast metropolitan senior high schools.
3. To examine challenges of incorporating information technology into senior high school graphic design instruction in the Cape Coast metropolitan area.
4. To examine level of comfort and effectiveness in teaching senior high school graphic design with information technologies.

Demographic Information (Respondents)

This section takes the respondents' demographic information into account. This includes the number of graphic design and information technology teachers in the selected school for the study, number of years taught at the SHS and level of education. The acquired findings are shown in Table 1 below.

When asked how many years they had taught, the plurality of respondents 45, (39.8%) said they had taught between one and five years (Table 1). 45 (39.8%) of the 113 respondents had a master's degree, 3 (2.7%) had a bachelor's degree, 2 (1.8%) had a diploma in education, and 1 (0.9%) had a diploma in arts. A teacher with a Diploma in Arts is the least suited to

teach at a senior high school, according to Table 1. The lack of a graphic design resource centre was confirmed by 85 (75.2%) of respondents (Table 1). This affirms Ghana Education Service (GES) standards requiring educators to have a first degree and appropriate understanding of the subject and abilities necessary for teaching at the senior high school level (Ghana Education Service, 2011). According to the findings, each and every graphic design instructor who participated in the study have the professional and educational qualifications needed to instruct at a senior high school. According to a survey conducted by Boakye and Banini (2014), the majority of instructors who teach in graphic design have the credentials and perhaps graduate degrees.

Table 1: Demographic Data on the Selected Teachers

Description		Frequency (f)	Percent (%)
No. of graphic design teachers			
	1 – 3	31	27.4
	4 – 7	59	52.2
	8 – 10	20	17.7
	11 and above	3	2.7
No. of years taught			
	Below a year	6	5.3
	1 – 5 years	45	39.8
	6 – 10 years	30	26.5
	11 – 15 years	22	19.5
	16 years and above	10	8.8
Education level			
	Master of Education	23	20.4
	Bachelor of Education	3	2.7
	Diploma in Education	2	1.8
	Master of Art	39	34.5
	Bachelor of Arts	45	39.8
	Diploma in Art	1	0.9

Source: Fieldwork, 2020

Research Objectives 1: The current situation of IT resources centers in the schools selected for the study.

The initial research goal was to determine if information technology items were accessible in the study's settings. Participants were required specify which IT resources were accessible to address this issue at the graphic design department, IT resource center of the school. Respondents were also asked to indicate software packages available on the computer for teaching graphic design, and their opinions are reported in Table 2.

Table 2: The State of IT Resource Centers

Description		Frequency (f)	Percentage (%)
Presence of graphic design resource center	Yes	28	24.8
	No	85	75.2
Presence of IT resource center	Yes	108	95.6
	No	5	4.4
Software packages for teaching graphic design	Yes	61	54
	No	52	46

Source: Fieldwork, 2020

Of the respondent, Seventy-five percent (n=85) affirmed they had no Graphic Design Resource Center (GDRC) in their schools. Table 2 summarized the state of IT resources in schools. Regardless of the quality and the quantity of technology placed in these classrooms, the key to how such tools is used largely rest on the teacher (Hegedus, Tapper, Dalton & Kadel, 2014). According to the responses from the respondents, the graphic design departments in the various senior high schools chosen for the study do not have their own resource centres or information technology facilities required for graphic design lessons, but the school as a whole does have a resource centre for teaching general ICT lessons. According to Asante (2014), a nation cannot operate a 21st century economy without a 21st century electronic infrastructure, embracing computers, data communications, and the other new

media. This confirms the study by Asano, Amponsah, Baah-Yanney, Quarcoo, & Azumah (2021), which revealed that graphic design departments in senior high schools in Ghana have no computers or other IT resources. This is indicated in literature's research study on instructors (BECTA 2004; Dgobwe 2014); several more significant impediments were discovered. There were three of them: a lack of resource centres, a lack of accessibility, and a lack of time. The result further buttresses other works that indicate lack of graphic design resource center in senior high schools makes teaching difficult (Woodley & Abrahams, 2011; Backer, Wickman, & Muller, 2013; Larbi & Aziz, 2015; Bosson-Amedenu, Amoah, Jacobs & Avoke, 2018).

With regard to software packages installed on the computers for graphic design lesson, 61 (54%) teachers responded that they had software packages installed on the computers for teaching graphic design lessons. The response from the respondents revealed that software packages for teaching graphic design lessons have been installed on the computers for teaching graphic design lessons while other respondents also indicated that they have the computers but no software package is installed it to be used for lessons. This confirms the study by (deGraft-Yankson & Avoke, 2010) which revealed that computers in IT resource centers in senior high schools have adequate software packages installed on it for teaching and learning.

Research Objective 2: The extent which information technologies are employed in graphic design teaching in Cape Coast metropolitan senior high schools

Of the participants, 44 (38.9%) responded that they used computer in general, weekly, 29 (25.7%), on monthly basis 18 (15.9%), once/twice a year

10 (8.8%); 11 (9.7%) indicated they had never used or integrate computers in teaching graphic design lessons while 1 (0.9%) responded they had no IT applications for teaching graphic design in their school. Regarding to word processing packages, 13 (11.5%) responded that; they used word processing packages daily in teaching graphic design lessons; weekly 55 (48.7%), monthly 16 (14.2%), once or twice a year 10 (8.8%), 18 (15.9%) of the participants responded that they had never used word processing packages in teaching graphic design lessons while 1 (0.9 %) of the respondent responded they had no word processing packages for learning graphic design.

Twenty-four of the participants (21.2%) responded that; they used publishing programs in teaching graphic design lessons; weekly 32 (28.3%); monthly 25 22.1%); once or twice a year 10 (8.8%); while 18 (15.9) of the participants responded they had never used publishing programs in teaching graphic design lessons. Majority 47, (41%) and 32 (28.3%) of the participants indicated using photo editing application and interactive CDs respectively on weekly for teaching and learning of graphic design. The rest of the data regarding how often selected IT applications were used with students is indicated in the table below.

Table 4: How Often Selected IT Applications Are Used by Teachers for Teaching Graphic Design

IT Applications	Daily	Weekly	Monthly	Once or Twice a year	Never	Not Available
Computers in general	44	29	18	10	11	1
Word processors	33	55	16	10	18	1
Publishing software	24	32	25	10	18	4
Photo editing appli.	22	47	26	6	11	1
Graphical programs	32	48	20	5	7	1
Presentation software	30	29	20	13	17	4
Animation programs	17	29	27	13	19	8
Interactive whiteboard	24	26	27	9	20	7
Search engines	33	34	25	9	9	3
Interactive CDs	18	32	24	15	19	5
Programming language	15	28	20	12	32	6
Overhead projectors	23	37	21	14	4	3
Simulation programs	14	30	23	14	15	17
Webpage authoring	18	27	22	14	19	13
Educational portals	23	26	25	8	24	7
Drill/Practice program	26	20	26	14	20	7

Source: Fieldwork, 2020

The result from the respondents revealed that the majority of graphic design teachers do not frequently used IT applications or information technologies in teaching graphic design. This means that the participants' schools' restricted number of available information technologies did not facilitate the utilization of IT applications such as publishing software, photo editing applications, graphics programmes, animation programs, programming languages, simulation programmes, webpage authoring, etc., they are quite

efficient at imparting graphic design ideas. The analysis also shows that because internet access was limited to computer labs, instructors did not frequently use search engines and educational portals and/or interactive whiteboard in promoting graphic design concepts. According to Chigona and Chigona (2010), Lau and Sim (2008), and Tezci (2011), a variety of factors impact instructors' usage of IT tools in the classroom. Accessibility to technology resources, the reliability of both software and hardware, and school assistance and training are examples of these.

According to student testimonials, this supports Sipila (2011) research, which discovered that instructors frequently use IT apps for informational, organizational, entertaining, and differentiated instruction objectives. Demiraslan (2007) discovered in a related study that teachers primarily used IT programmes for administrative tasks such as preparing learning materials and learners' assessments and ratings rather than to achieve instructional objectives. Wikan and Molster (2011) discovered that while the majority of educators utilized IT for preparation for lessons as well as data collection, just a few used IT to boost student retention and participation. They also discovered that 60% of instructors used IT in their classes less than once a month, whereas 22% used it every day. Wikan and Molster (2011) claim that integration with IT is seldom utilized to stimulate higher-level thinking in pupils or to enable educational experiences that are constructivist. This conclusion is supported by the observation that teachers' use of technology for training is poorly understood (Yafaei & Attamimi, 2019; Ainley, Cooper, Fitzgerald, Loughran, Phillips, & Smith, 2020), as well as the variables that influence their educational use of technology (Chen, 2010; Wong, Teo and

Russo, 2012). As a result, Ainley et al. (2008) said that a study is required to discover how IT is utilized in schools and the elements that influence students' usage of IT (Wong et al., 2012; Chen, 2010).

With regards to teachers requiring their students to use IT applications for coursework, majority of the teachers on a daily basis required their students to use IT tasks/activities to organize and store information 53 (46.9%), manipulate, analyze, interpret data and creating visual presentations for solving problems related assignments 45 (39.8%) and for gathering learning experiences required for learning 48 (42.5%). For weekly usage, 51 (45.1%) of the teachers required their students to use IT task/activities for performing calculations, 49 (43.4%) for collecting data and performs measurements, 41 (36.3%) for manipulating/analyze/interpret data, creating graphics/visuals of non-data products, and solving problems related to assignments and 45 (39.8%) for creating visual displays of data or information. For monthly usage, 24 (21.2%) of the teachers required their students to use IT task/activities for planning, drafting, proofread, revise and publish written text and remediation for basic skills, 21 (18.6%) for organizing and storing information, and 17 (15.0%) for creating models or simulations and supporting individualized learning. Between 3 to 9 (2.7 to 8.0%) of the teachers never required their students to use IT task/activities. Table 5 summarized the data related to how often graphic design instructors ask students to do certain IT activities.

Table 5: How frequently graphic design tutors forced pupils to complete certain IT duties.

IT Task/activity	Daily	Weekly	Monthly	Once or Twice a year	Never
To organize and store information	53	26	21	9	4
To collect data and perform measurement	32	49	16	7	9
To manipulate/analyze data	42	41	19	4	7
To create visual displays of data/information (graphs, charts, posters, banners, flyers)	39	45	14	9	6
To plan, draft, proofread, revise and publish written text	34	40	24	7	8
To create graphics or visuals of non- data products (e.g., diagrams)	34	41	23	6	9
To create visual presentations	42	47	16	2	6
To perform calculations	30	51	10	13	9
To create models or simulations	35	39	17	13	9
To support individualized learning	37	47	17	7	5
For remediation for basic skills	38	42	24	3	6
To solve problems related to assignment	45	41	18	6	3
For gathering learning experiences required for learning	48	41	15	6	3

Source: Fieldwork, 2020

Studies indicate that an appropriate use of ICT can raise educational quality and connect learning to real-life situations (Lowther, 2008; Weert & Tatnall 2005; Afshari & Amla, 2012; Ampofo, 2019). Learning is an ongoing lifelong activity where learners change their expectations by seeking knowledge, which departs from traditional approaches. As time goes by, they

will have to expect and be willing to seek out new sources of knowledge. Skills in using information technologies will be an indispensable prerequisite for these learners (Ampofo, 2019).

According to the outcomes of the research, majority of instructors encouraged the learners utilize information technologies on a daily and weekly basis to do some specified IT jobs and tasks for graphic design instruction. In addition, several respondents indicated that they needed their pupils to use information technologies on a monthly basis to execute specified IT duties and activities. The results from the table 4 above also revealed that some participants had never required their students to perform task with IT. This may be due to lack of skills or self-confidence on the part of the teachers in terms of in using information technologies in instructing in a particular field of the study reveals their pupils' failure to do particular activities, which may have an impact on their academic success. This opinion was mirrored by Amosun (2016), who said that a teacher's lack of trust in IT contributes to pupils failing in discipline.

In addition, the findings of this study concur with Olakanmi, Gambari, Gdodi and Abalaka (2016) findings which revealed that teachers who require their student perform task using information technologies turn to have confident, skills and perform better than those who perform task without using information technologies. The findings of the present study are in agreement with Jesse, Twoli and Maundu (2014) study, which showed that the students taught through CAI performed significantly better than students complete task using information technologies performed significantly better than students who complete graphic design task without using information technologies.

Generally, there are several research findings concurs that teachers who make students to perform task with IT performs better and gain much confidence in using computers than students taught using conventional instructional techniques (Olga, 2008; Serin, 2011; Ahiatrogah, Madjoub, & Bervell, 2013; Jesse, Twoli, & Maundu, 2014).

Research Objective 3: The challenges of employing information technology in teaching graphic design.

Inadequate availability of technologies was evaluated by the majority of participants as 83 (73.5%), a scarcity of software for use on accessible computers 79 (70%), and an inadequate amount of time on the timetable for instructing graphic design and information technology as 77 (68%) as a major problem they face in their schools. Fifty-nine (52.2%) of the respondents did not have the adequate IT skills to employ IT into teaching graphic design. Results for the above research objective are presented in Table 6 below.

Table 6: Ranking of the Challenges of Employing Information Technologies in Graphic Design Instruction.

Description	Ranking					
Challenges	1	2	3	4	5	6
Inadequate access to technologies.	83	11	6	4	2	7
Teachers' inadequate skills.	39	8	12	12	5	37
Inadequate data on the selected target issue	79	9	9	4	3	9
a total absence of defining specific curricula that involve information technology	74	12	10	9	1	7
There is insufficient time on the schedule for instructing graphic design and technological advances.	74	17	9	6	3	4
Insufficient time is allotted for teaching graphic design and computer technology.	77	13	8	8	3	4

Most challenging = 1, Least challenging = 6

Integrating information technology into classroom instruction and learning is indeed a complicated process that might also meet a variety of challenges. These problems are classified as "impediments" (Amedahe, 2010). An obstacle is described as "any circumstance that makes it challenging to proceed or attain an aim" (Wellman, 2002; Boakye, 2008; Ahiatrogah, 2013). Numerous recent studies have demonstrated that several instructors are competent and confident with using information technology in the classroom, yet they generally rely on these devices rarely due to a lack of time to integrate information technologies in teaching (Al-Alwani, 2005; BECTA, 2004, Beggs, 2010; MaKinster, & Trautmann, 2014; Rastogi, & Malhotra, Schoepp 2013; Doering, Koseoglu, 2014; Goktas, Jo, 2016).

The most common challenge reported by all the teachers was the lack of time they had to plan lessons that involves the use of technology, explore the different internet sites, or look at various aspects of educational software (Alicia, 2016). According to BECTA (2010), the problem of time allocation impacts teachers' capacity to accomplish tasks in various elements of their profession, with some attending instructors noting explicitly which aspects of IT demand more time. These include the time spent looking for online assistance, preparing classes, exploring and practising with technology, dealing with technological issues, and receiving proper training.

According to the comments of the respondents, they were unable to gain entry into the IT structure required for graphic design training. Furthermore, learners have no software for use on available computers; The participants also indicated that there is no material usable data about the desired focus topic. In addition, the result also indicates that GES has no

specific or relevant curriculum that include information technologies in teaching graphic design. The result from the table above also indicate that the inadequate time allocated on timetable for teaching graphic design are the major reasons why information technologies are not integrated in teaching graphic design lesson. The findings corroborate other studies that demonstrate inefficiently IT use by instructors due to a lack of items (Goktas, Yildirim, 2009; Hennessy, Harrison, & Wamakote, 2010; Rastogi & Malhotra, 2013; MaKinster & Trautmann et al., 2014; Kihoza, Zlotnikova, Bada, & Kalegele, 2016). Instructors reported difficulties in integrating IT in literacy instruction and writing due to a shortage of materials, a low level of expertise on the part of instructors, insufficient time given on the timetable for instructing information technology, and large classes (Nuuyoma, 2012). According to research done by the National Center for Education Statistics (2010), 78% of instructors polled mentioned insufficient access to technology as a hindrance to efficiently employing computer systems in their courses.

According to the paper "Incorporating IT Material MSC Malaysia (2010) feel that it has insufficient time and an excessive amount of material to present for the test, which necessitates an evaluation of what is truly important in instructing. Time restrictions, according to Kay (2011) and Goktas and Yildirim (2009), are among the reasons instructors are hesitant to incorporate IT into their instruction. Furthermore, research and experiences in classrooms demonstrate that instructors employ IT systems in instruction and learning throughout all stages in a limited or unsuitable manner (MSC, 2007).

Surprisingly, some participants expressed the lack of necessary skills and technologies that can be used in teaching Graphic Design lessons and how

to incorporate it throughout the curriculum, and how to plan teaching practices throughout instruction. This was in line with a study by Kumah, (2017), Nuuyoma (2012), Yusif (2015) They observed that instructors prefer to neglect technologies, regardless of whether participants lack the necessary expertise or competence to incorporate everything into classroom courses. The above investigation backs up the conclusions of Amenyo (2003), Mangesi (2007), and Natia (2015), who discovered significant support services are a barrier to information technology deployment. It is asserted that the most significant challenge confronting institutions with access to technological expertise is a lack of funding and underperforming employees (Mangesi, 2007; Natia, 2015). This is also in line with the findings of Goktas, Yildirim, and Yildirim (2018), who found that perhaps a lack of in-service education, a lack of acceptable applications, incorrect materials or themes, and a scarcity of equipment are the biggest impediments to integrating information and instructional technology.

In addition, instructors do not have access to personal computers or information technology (Chong, Horani, & Daniel, 2010; Mishra & Koehler, 2006; Awuah, 2012). This study confirms the findings by Martin, Khaemba and Chris (2011), which found that many instructors still have reservations about using digital technology in their classroom instruction. They have contributed towards computer-based education technologies' minimal influence (Kay and Lauricella, 2011). The majority of instructors, according to Pelgrum (2001) and Morgan (2012), lack the requisite IT training. The findings are congruent with those of Schoepp (2011), who argued that employing information technology in the field of education is a complicated

process fraught with obstacles. These problems are referred to as "obstacles." Instructional variables such as instructors' personal literacy and educational background scores, the availability of resources, and the time provided for instruction all have a vital influence, according to Zhao, Pugh, Sheldon, and Byers (2011). Similarly, previous research has discovered that the main significant factors that determine teaching staff's use of IT in the syllabus include educators' dispositions, aptitude, lack of independence, and lack of understanding of the implementation and usefulness of IT in schools.

Furthermore, Schoepp (2010) appears to believe that even if technological innovation is to be incorporated into teaching, instructors should really be trained on how to utilize the related special tool, whereas Trotter (1999) and Agyemang (2020) reach the conclusion that IT integration learning must always be preceded and augmented by basic capacity building. This is in line with a study conducted Morgan (2014) which indicate that lack of accessibilities, lack of time, fear of changes are the barriers that prevent teachers to integrate IT technologies in classroom. According to Newhouse (2012), instructors still require extensive training, understandings, dispositions towards successful incorporation of technology. He claimed that maintaining this suitable knowledge and competencies also necessitates ongoing professional growth.

According to Osborne and Hennessy (2003) and Worlanyo (2011), whenever innovative techniques and tools in instruction are introduced, a teaching method is required in order for them to be integrated into their instruction. Research undertaken by the Organization for Economic Cooperation and Development (OECD) and reported in Rodden (2010)

revealed the existence of a number of impediments or challenges to the use of information technology in education. These obstacles included an inconsistency in the amount of computers available to pupils, a lack of maintenance and technical support, and, ultimately, a lack of computer skills and/or knowledge among teachers. (OECD 2009f). Jenson, Lewis, and Smith (2012) defined these limitations as follows: insufficient equipment, insufficient skills, insufficient assistance, time restrictions, and a lack of motivation or expertise on the part of teachers.

Lastly, the findings indicate that instructors faced obstacles due to inadequate and unsatisfactory IT facilities, as well as a lack of school-based practices, which hampered the effective integration of IT in graphic design teaching and learning. This study's conclusions are consistent with those of CFSK (2008), which noted a shortage of instructional software as one of the reasons for a shortage of school-based IT integration. This study's findings are consistent with Ramorola's (2013) results of inadequate technology equipment in South African senior high schools. An assertion demonstrated in this current research participants. The following are also some of the challenges raised by participants with regards to computer assisted instruction challenge in teaching graphic design.

A participant indicated:

> ‘*’There is no Ghana Education Service (GES) recommended books available for teaching and learning of graphic design. In my school library, there no reference materials or books on graphic design. The Ghana Education Service (GES) has also failed to identify the specific tailored software for learning graphic design.*

Another respondent is of the view:

> *"Basic ICT trainings or seminars have not been particularly valuable to graphic design instructors because most trainings or workshops are based on the use of basic software such as Microsoft Office Suit instead of graphic design applications designed to support creativity''.*

Another participant indicated:

> *''In my school, the Visual Art Departments do not have its own IT resource center. The free SHS has increase the entire student's population so the IT resource centers in my schools need to equipped with more IT tools to decrease the student's computer ratio and also to make teaching and learning very easy''.*

Another participant indicated:

> *''The computers in the IT resource center in my school cannot contain most high earn graphic design applications such as Adobe master collection because of the VGA and processing speed of the computers''.*

Another participant emphasized:

> *"My school does indeed have a science resource centre with certain equipment I really ought to present graphic design teachings, but due to the lack of coordination between both the IT Department and graphic design, I am unable to gain access to the information I would require for graphic design teaching."*

Research Objective 4: To determine the teacher's level of comfort and effectiveness in teaching senior high school graphic design with information technologies.

Majority of the teachers were very comfortable in using computer in general 89 (78.8%), search engines for the internet 81 (71.7%), word

processing packages 76 (67.3%), presentation software 74 65.5%), photo editing applications 71 (62.8%), and graphical applications 69 (61.1%). Of the participants 3 to 47 (2.7-43.3%) needed a lot of help with using some of the selected application for teaching. Majority of these were related to programming languages 49 (43. %), simulation programs 37 (32.74%) and animation applications 23 (20.35%). Table 7 illustrates the remaining findings.

Table 7: Teacher's Level of Comfort in using Selected Information Technologies in Teaching Graphic Design

IT Applications	Very Comfortable	Moderately Comfortable	Need Help	Need a lot of Help
Graphical applications	69	24	13	7
Computers in general	89	18	3	3
Word processors packages	76	29	4	4
Publishing software	56	30	14	13
Photo editing applications	71	26	10	6
Presentation software	74	23	10	6
Programming languages	17	26	21	49
Search engines	81	20	8	4
Interactive whiteboards	47	31	23	12
Simulation programs	22	28	26	37
Drill/Practice Programs	44	34	25	10
Interactive CDs	43	32	29	9
Overhead Projectors	65	29	16	3
Webpage authoring application	40	32	25	16
Multimedia authoring program	40	34	22	17
Educational Portals	54	35	18	6
Animation Applications	32	24	34	23

Source: Fieldwork, 2020

According to studies, the effective implementation of information technology into education is heavily reliant on instructors' comfort levels, (BECTA, 2004; Irfan & Noor, 2012; Tondeur, Coopert & Newhouse, 2010;

Papanastasiou & Angeli, 2008; Plomp, Anderson, Law, & Quale, 2009; Johnson, 2005). According to Newhouse (2010), in an Australian study, several instructors lacked the basic expertise and abilities to utilise information technologies but were enthused about the innovations and incorporation of additional teaching connected with using information technologies within the teaching techniques. Furthermore, current studies show that the amount of this barrier varies by nation. According to a study, in industrialized regions, instructors' insufficient technological proficiency is indeed a hindrance towards the acceptance and utilization of information technology (Pelgrum, 2001; Al-Oteawi, 2002; Newhouse, 2010; Amadola, 2014). In Syria, for instance, instructors' lack of technical ability has indeed been identified as the key impediment (Albirini, 2006; BECTA, 2011).

Similarly, in Saudi Arabia, a lack of IT knowledge is a major impediment to integrating technology into teaching and learning (Al-Alwani, 2005; Almohaissin, 2006; Hassan-Abdul, 2015). This is also in line with a study conducted on the teacher's comfort level in using information technologies in Europeans schools, and the findings revealed that teachers who do not use information technologies in classrooms claim that ''lack of skills'' are a constraining factor preventing teachers from using information technologies for teaching. Another study conducted by Owusu (2010) indicated that ''In Ghana'' many teachers lack employing information technologies in instructing situations.

Response from participants in table 7 below also indicates that some classrooms were furnished with technological tools, but instructors lacked the necessary skills to use these devices in the classroom. The participants'

inadequacy of capabilities for using information technology within the classroom shows an ability to offer instructions that may generate practical learning exercises, evaluation, performance appraisal, and education.

From the table above, it could be said that some teachers are incomplete or had no IT skills, they used IT's for classroom instruction to a less extent. Here are some of the responses or verbatim expressions from the respondents:

A participant indicated:

> *"Ghana Education Service (GES), including stakeholders in education, should do well to organize workshops, seminars, or in-service training that would be beneficial to us because I completed teacher preparation schools long ago before computers were introduced in the education system in Ghana."*

Another is of the view:

> *''I feel reluctant about using computers or information technology tools in my lessons because graphic design in our time is based on brushes and paints. I don't have the confidence to employ ICT tools and devices, mostly in teaching"*

Another view is this:

> *"I prefer real-life experiences to look at monitors." As a result, using IT technologies in graphic design classrooms is not effective. Traditional forms, on the other hand, are more effective.*

Another participant is of the view:

> *"I am not very effective at using information technologies to instruct students." I wasn't taught any of the graphic design programmes at my teacher preparation school. The only*

software I could use was the Microsoft Office Word application program, PowerPoint, and Microsoft Excel.

Another participant further stressed:

''I have no competency in using information technologies during instruction because I have some fear that I will not be able to control the class or what the students will be doing on their screens. Due to the free SHS introduced by the government, I have about 65 students in each class.

Newhouse (2010) found that teachers who have skills in using ITs identified those technology is beneficial in both instructional and professional work, and its usage should be expanded in the long term. This study's findings are congruent with the National Council for Science and Technology's (2010) report, which found that instructors were developing their IT abilities and, to a lesser extent, employing IT in teaching and instruction assistance. Instructors should thus be encouraged to enhance their IT abilities for instructional objectives.

With regards to participants effectively using selected ITs for teaching, 98 (86.7%) knew and could confidently use computers in general for teaching 100 (88.5%) for search engines, 94 (83.2%) for word processing packages and presentation software 94 (83.2%) responded affirmatively. While 58 (51.3%) and 52 (46%) of the respondents expressed that despite knowing regarding programming language and simulation programs respectively they could not effectively use it, a further 14 (12.4%) had no idea what simulations programs, interactive CDs and webpage authoring programs were. The reluctance of graphic design instructors to employ information technology for instruction in a particular field of the study reveals the learners' lack of willingness to employ IT for creating, which may influence performance in the subject.

Amosun (2016) agreed, claiming that an instructor's lack of trust in IT contributes to learners failing the subject. Table 8 summarized the remaining information on teachers' effective using IT for teaching.

Table 8: Graphic Design Teachers Effective Level

IT Applications	I am familiar with it and can utilise it effectively.	I know, but I cannot use it effectively.	I'm really sure what this is.
Computers in general	98	14	1
Word processors	94	10	9
Publishing software	77	33	3
Photo editing applications	87	21	5
Graphical applications	89	23	1
Presentation software	94	17	2
Programming languages	35	58	20
Search engines for the internet	100	10	3
Interactive whiteboards	59	43	11
Simulation programs	47	52	14
Drill/Practice Programs	67	33	13
Interactive CDs	66	33	14
Overhead Projectors	84	22	7
Webpage authoring application	60	39	14
Multimedia authoring program	66	38	9
Educational Portals	73	35	5
Animation Applications	64	41	8

Source: Fieldwork, 2020

According to studies conducted, the effective incorporation of information technology into education is heavily reliant on instructors' egos (Noor, 2012; Tondeur & Newhouse, 2010; Papanastasiou & Angeli, 2008; Anderson & Quale, 2009). In Becta's (2004) study of professionals, the problem of a lack of confidence in using information technology for instruction drew the greatest replies from the individuals who took part. Beggs (2010), for instance, argued that instructors' "fear of failure" promotes a lack of self-assurance to effectively integrate technology into teaching.

According to participant comments, some institutions were supplied with technological tools, but instructors were still not trained to use them in the classroom. As a result, the respondents' lack of knowledge and abilities revealed that they have been inefficient in employing information technology to promote teaching and learning. Several of them stated that, despite knowing the most about technological tools such as programming languages, interactive whiteboards, interactive CDs, overhead projectors, and animation programmes, they were unable to utilize them successfully in the classroom. Listed below are some of the comments or verbatim expressions from survey participants:

A participant indicated:

> *"In reality, I can efficiently use picture editing and graphical apps for teaching graphic design lectures, but my department or school lacks an IT lab." All of the machines in the computer laboratory are broken, making it impossible to integrate information technology into graphic design lectures.*

A participant indicated:

> *"I can use some information technologies effectively in teaching students but the allocated on the time table for teaching practical aspect is not encouraging. The management or stakeholders in education should allow students to bring their mobiles devices to support the one we have in the school''.*

Another participant stressed that:

> *''I completed University not long ago and I can effectively use some information technologies such as the photo editing and graphical application when the lesson needs to be taught using computers.*

Another participant also indicated:

> *''During my first degree, I was taught how to use of graphic design application such as CorelDraw, Adobe photoshop, Adobe Illustrator so I can effectively use it in teaching students.''*

Another participant stressed that:

> *''I know there are numerous of graphic design application but using it effectively for teaching and learning will be very difficult because I wasn't taught at the teacher preparation school.''*

Hardly any instructors are comfortable using a variety of IT materials. The lack of confidence, therefore, influences how the instruction is delivered (Martin, Khaemba, and Chris, 2011). This is also in line with Newhouse et al. (2010) found that limitation in teachers IT knowledge make them feel anxious about using IT in the classroom and thus not confident to use it in their teaching. The respondents' loss of confidence in utilizing IT in classroom instruction implies an inability to provide instructions that can really arouse practical learning tasks, constructive criticism, performance appraisal, and knowledge acquisition. This claim supports Dooley's (1999) and Mensah's (2015) theory, which asserts that when instructors are lacking the necessary self-belief to integrate various and advanced technologies in and out of their learning, those who tend to overlook it. According to Mumtaz (2002), the availability of materials, the dependability of both software and hardware, simplicity of use, motives towards change, encouragement, fellowship mostly in curriculum, and dedication to professional growth all seem to be variables that impact instructors' willingness to effectively integrate technology into their instruction.

The responses from the participants in Table 8 also indicate that some participants (graphic design teachers) had confidence or IT skills, but they used IT for classroom instruction to a lesser extent. This confirms a study by Newhouse (2010), which found that teachers who have the confidence to effectively use information technologies can identify which technologies are helpful in their personal teaching work. This observation finds support from Wilson-Strydom (2011), he expressed that in several institutions where computers are available, and the emphasis has evolved to concentrate on educating about computers instead of training with or with the aid of computers. According to Minae (2014), the application of computer systems to teaching topics rather than computer studies has yet to gain traction. This study's findings are congruent with the National Council for Science and Technology's (2010) report, which found that instructors were developing their IT abilities and, to a lesser extent, employing IT in teaching and training assistance. Teachers should thus be motivated to develop their IT abilities for instructional objectives.

Chapter Summary

The study was carried out to investigate the challenges of employing information technology in teaching graphic design at senior high schools. This was done by finding answers to a set of questions designed based on the research questions to elicit information from the teachers from selected senior high schools. Using a descriptive survey design, structured questionnaires and interviews were used to collect data from 113 participants (teachers). The data collected included demographic features of the participants, information regarding the state of the information technology resource centres in the

selected schools, problem facing graphic design teachers so far as IT integration is concern.

This study has revealed that most of the participants teaching graphic design at Senior high schools have a good deal of knowledge and skills about integrating information technology (IT), mostly in relation to student's engagement, inspiration and job prospects. Regarding teachers' perception towards the information technology integration in teaching of Graphic Design, the majority of participants agreed on the necessity of employing information technology in graphic design education. According to the research, none of the chosen schools was surveyed. had information technology resource center for its visual art department, almost all the schools rely on the general information technology resource center for school. This situation had made the teachers teach graphic design with more theoretical with little practical work.

The result from the study indicated that some teachers receive help from the information technology instructors in their school but governments free SHS has drastically increased student's computer ration to 1:9 makes it difficult to incorporate information technology in teaching graphic design very difficult at the senior high school level. Furthermore, the majority of graphic design teachers do not frequently used IT applications or information technologies in teaching graphic design due to the pressure on the IT instructors.

The research also indicated that instructors and learners faced tremendous problems which were hindrances to the accomplishment of quality graphic design education envisioned by the educational policy makers. The lack of physical resources was great concern to the respondents. The study's

findings indicated that participants lacked accessibility to the information technology resources required for graphic design training and also lacked motivation. Inadequate time allocated on timetable for teaching graphic design are the major reasons why information technologies are not integrated in teaching graphic design lesson. This really has negatively affected the teaching of the subject a great deal.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This final chapter presents the summary, conclusions and recommendations based on the purpose of the study. The main purpose of this study is to examine the challenges associated with using information technologies in teaching graphic design in senior high schools in the Cape Coast metropolis. The objectives of the study were:

1. To state of information technology centres in senior high schools in the Cape Coast metropolis.
2. To extent to which information technologies are employed in graphic design teaching and learning in Cape Coast metropolitan senior high schools.
3. To examine the challenges of incorporating IT into senior high school graphic design instruction in the Cape Coast metropolitan area.
4. To examine level of comfort and effectiveness in teaching senior high school graphic design with information technologies.

A descriptive survey approach was employed to accomplish the study's objectives. A survey was employed as the primary data collection tool for collecting data on the present condition of the phenomenon. I created survey instrument with assistance of my supervisor. The study population also included government senior high school teachers in the Cape Coast metropolitan area. A sample of 113 instructors from the population chosen was drawn from 11 of the 13 public senior high schools. The simple random sample technique's randomly generated approach was employed in the sampling procedure. Prior to the main study, a pretest was conducted with 12

visual art teachers from Sammo and Moree senior high school to ensure the survey items' reliability. Hence, the research instrument which is 15 items of open and closed ended questions were administered to 12 senior high school visual art teachers from above stated schools. The data gathered from the pilot study indicate that the survey instrument was easily understood by respondents, putting the researcher's ability to contact respondents to the test.

The questionnaires were distributed by instructors who promised to help at all of the schools that participated. I described to the volunteer instructors the purpose of the surveys and how they needed to be completed, and a collection date was agreed. The main data gathering period lasted three weeks, from March 7 to March 27, 2020, and the actual response total was 111, representing 98.23% of respondents who completed all activities or responded to the questionnaires. The survey data were coded and processed using IBM Statistics Version 22. Furthermore, frequencies and percentages from the statistical analysis approach were employed in the presentation and analysis of the survey questions in order to answer the study questions. Based on the four-point Likert scale, a mean score of 2.5 or above will be considered a positive perception, with scores lower than 2.5 representing negative perceptions of the respondents.

Summary of the Findings

Research Objective 1:

The first research objective was to discover whether IT resources were accessible for usage in the schools selected for the study. Participants were required to specify which IT resources were accessible to address this issue at the graphic design department, IT resource center of the school. Respondents

were also asked to indicate software packages available on the computer for teaching graphic design and the findings of this research confirm this assumption. Results from the majority of participants (graphic design teachers) (Table 2) indicated that graphic design departments do not have resource center or information technology facilities needed for graphic design lessons but the school as whole have resource center for teaching general IT lessons. This confirms the study by Amakye (2019) which revealed that graphic design departments in senior high schools in Ghana have no computers and other IT facilities for teaching and learning. The result further buttresses other works that indicate lack of graphic design resource center in senior high schools makes teaching difficult (Amoah, Jacobs, & Avoke 2018; Backer, Larbi & Aziz, 2015; Woodley & Abrahams, 2011; Wickman, & Muller, 2013).

Most participants (Graphic design teachers) revealed that they have the computers but no software package is installed it to be used for lessons. This confirms the study by (deGraft-Yankson & Avoke, 2010) which revealed that computers in IT resource centers in senior high schools have adequate software packages installed on it for teaching and learning.

Some participants (graphic design instructors) said they frequently rece ive assistance from information technology instructors whenever they need access to the internet in order to download files that can be used to support my lessons.

The majority of participants (graphic design teachers) stated that they had never sought assistance from information technology teachers because there are a lot of pressure on them due to population of students in my school'. For example, my schools have only four IT instructors handling more than

2000 students''. This supports the findings of Tella, Tella, and Toyobo (2007) and Adika and Adeyinka (2010), who discovered that inadequate technical assistance in school systems and instructors' inadequate knowledge when using information technologies were among the most significant factors impeding instructors' preparedness to use information technologies (Harris, 2002; Dimitriadis, 2003; Ampofo, 2019).

Research Objective 2:

Research objective 2 was meant to extent to which information technologies are employed in graphic design teaching in selected schools for the study. Surveys indicate that an appropriate use of IT can raise educational quality and connect learning to real-life situations (Lowther, 2008; Weert & Tatnall 2005; Afshari & Amla, 2012; Ampofo, 2019). Majority of graphic design teachers indicated do not frequently used IT applications or information technologies in teaching graphic design due to the limited IT instructors they have in their school.

Some participants (graphic design teachers) indicated that access to the network was restricted to computer labs; teachers rarely used search engines and educational portals and/or interactive whiteboard in promoting graphic design concepts. This is consistent with the results of Chigona (2010), Tezci (2011) and Lau and Sim (2008) discovered a wide range of characteristics that motivates instructors' incorporation of information technology. Examples include access to technological resources, the quality of software and hardware, and school help and training. According to student testimonies, this also confirms research done by Sipila (2011), who discovered that instructors

commonly use IT apps for informational, organizational, recreational, and lesson-planning objectives.

Majority of graphic design teachers do not frequently used IT applications or information technologies in teaching graphic design. This means that the respondents' schools' limited access to technology did not encourage the use of IT applications such as publishing software, photo editing application, graphical program, animation programs, programming language, simulation program, webpage authoring etc. which are very efficient in teaching graphic design concepts.

The majority of teachers expected their pupils to use information technologies on a daily and weekly basis to execute some specified IT tasks and exercises for graphic design lessons. Furthermore, the outcomes of this study corroborate the findings of Olakanmi, Gambari, Gdodi, and Abalaka (2016), who discovered that instructors who require their student perform task using information technologies turn to have confident, skills and perform better than those who perform task without using information technologies.

Some participants (graphic design teachers) had never required their students to perform task with IT. This may be due to lack of skills or self-confidence on the part of the teachers in terms of in using information technology in the field of study exposes the pupils' ability to employ them to fulfil particular activities, which may impact their overall performance in the topic. Amosun (2016) agreed, claiming that an instructor's lack of trust in information technology contributes to pupils failing the subject.

Research Objective 3

Many recent studies have shown that many instructors are competent and confident in using information technologies in the classroom, but they only use these devices on a limited basis due to a lack of time to integrate information technologies in instructing (Al-Alwani, 2005; BECTA, 2004, Beggs, 2010; Schoepp, 2013; Rastogi and Malhotra, 2013; Doering and Koseoglu, 2014; Goktas, Jo, 2016; MaKinster and Trautmann, 2014).

Most participants (graphic design teachers) indicated that inadequate time allocated on timetable for teaching graphic design are the major reasons why information technologies are not integrated in teaching graphic design lesson. The current study's findings are corroborated by Mensah's (2010) work, which found that GES has no specific curriculum that include the incorporation of information technologies when instructing graphic design at the senior high school level.

Results from this current study showed that the general IT training or programmes have not been extremely useful to graphic design instructors because most trainings or workshops are based on the use of basic software such as Microsoft Office Suit instead of graphic design applications designed to support creativity''. This affirms the by Haydn, Hennessey (2010) who indicated that, in most schools, information technologies such as Microsoft word deemed very important in teaching and learning than other information technologies.

The teachers (graphic design) indicated that free SHS introduced by government has increase the student-computer ratio. Most participants indicated that government or Ghana Education Service fail to share IT tools

and equipment's equally among all senior highs across the country. Usually, category A and B schools have these tools and equipment's than other categories. This finding is in line with a study by Agyekum (2016) who indicated that most category A and B schools receive greater parts of information technologies shared by the government.

Majority of teachers indicated that the perception and attitude of some headteachers and teachers need to be change because they view entire visual art course as a course meant for students which are academically not good. This sometimes discourages students offering visual art.

The results from Table 6 above also demonstrate that the school does indeed have a science resource centre, including some establishments for instructing graphic design instruction, but due to the lack of collaboration between both the IT Division and the graphic design department, teachers are unable to gain access to the resources they may require for graphic design lessons.

Research Objective 4

According to studies, the successful implementation of information technology into education is heavily reliant on instructors' degree of comfort (BECTA, 2004; Irfan & Noor, 2012; Tondeur, Coopert & Newhouse, 2010; Papanastasiou & Angeli, 2008; Plomp, Anderson, Law, & Quale, 2009; Johnson, 2005). In reference to this study, almost 90 percent of the respondents (graphic design teachers) indicated they are adept at emailing, online internet browsing, storing data, and Microsoft Office Word. However, respondents lacked knowledge of programming software, interactive

whiteboards, and multimedia authoring programs, drill/practice programs, interactive CDs and webpage authoring application.

Result from the participants (graphic design teachers) indicates that some institutions have been equipped with information technologies; however, instructors lack the necessary skills to use these devices in the classroom. The participants' inadequacy of skills in using information technology within the classroom implies a failure to present instructions that may generate hands-on exercises, feedback, performance evaluation, and learning.

Results of the current study showed that the Ghana Education Service (GES), including participants educational institutions, should do well to organize workshops, seminars, or in-service training that would be beneficial to us because I completed teacher preparation schools long ago before computers were introduced in the education system in Ghana."

Majority of the participants (graphic design teachers) indicated they are not good when it comes to the use of information technologies in teaching students because they were not taught any of the graphic design programmes at my teacher preparation school. The only software I could use was the Microsoft Office Word application program, PowerPoint, and Microsoft Excel.

Results from this current study showed that the participants (graphic design teachers) use photo editing and graphical applications effectively for teaching graphic design lessons but my department or school does not have IT lab. All the computers at the computer laboratory are malfunctioning and this makes it difficult to integrate information technologies in graphic design lessons.

Conclusions

Information technologies offer veritable tool for ensuring the success of the educational reform programmes of the Ghana government. The value of information technology is globally recognized. However, there is a big gap in IT skills between average Ghanaian student and teaching staff of comparable economies around the world which is similar to Nigeria and other developing countries (Aniebonam, 2007, Agyei, 2014). From the above findings, the following conclusions were made:

To begin with, the vast majority of instructors are competent to teach graphic design at the senior high school level. Graphic design instructors nowadays are using graphic design degree credentials and even master's degrees to teach.

Second, the findings of this study show that good in-service training and meaningful career development are required to optimize the advantages of IT expenditures.

Third, the government must supply sufficient computers and auxiliary equipment for teachers to give the lesson. Learners are often skilled in how to utilize technical tools, have obtained more information and understanding, and may utilise the technology to perform a variety of tasks that will provide them with future benefits.

Fourth, most instructors do not participate in practical teaching, which has an impact on them.

Recommendations

Transformation is essential throughout all human endeavours, and thus all stakeholders must always be encouraged to accept it and enable the full

implementation of ITs in the classroom in order to ensure a nation's economic potential is competitive internationally. In context, the following comments and proposals for future use are made:

1. Teachers who are teaching the course must be properly qualified.
2. To facilitate more efficient teaching, the government and other parties involved in Ghana's education must consider giving a wide range of information technology or resources to all senior high schools in Ghana in equal measure. This is really essential since technological innovations are much more efficient in various lesson circumstances; however, in the situation of public senior high schools Cape Coast metropolis, computer systems were discovered to be the primary IT resources, which would discourage diversification in IT resource utilization.
3. Instructors that lack practical abilities in employing information technologies to improve the teaching of graphic design should seek training so that they may utilize them properly and confidently in their specific subjects.
4. Courses in teacher education programmes at universities and colleges should include realistic techniques of incorporating IT into classroom instruction of diverse graphic designs for preparing future educators to successfully incorporate IT into their lectures following training.
5. Timetables for senior high schools must always be changed to allow appropriate time for both instructors and pupils to practice using computers. This will help them improve their skills.

6. The government should hire experienced IT experts to handle any maintenance concerns at IT resource centres so that instructors and students may focus on their work without discontent or fear.

Suggestions for Future Research

The current research focused on the information technology challenges of instructing graphic design at the senior high school in the metropolis of Cape Coast. Due to time and financial limitations, as well as a restricted coverage area and a low number of participants, the research is indeed not comprehensive. As a result, comparable studies could be carried out in some other districts, a metropolitan area, or the entire region to create a case for generality. Similar research might be undertaken in educational institutions that provide graphic design courses.

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APPENDIX

QUESTIONNAIRE

The most important objective of this research is to investigate the challenges associated with employing information technologies in teaching graphic design as well as the difficulties and potential solutions. This survey is intended to assist authorities and decision-makers in improving the implementation of information technology in graphic design teaching in senior high schools. The results from the study are used in variety of ways, including assessment, institutional improvement, and prompting discussion in teaching and learning initiatives. Please be assured that your responses will be confidential and kept anonymous to anyone. Your participation is voluntary, though I know that you will respond. Please complete the survey as soon as possible. Your help is essential to the success of this important study.

SECTION A: DEMOGRAPHIC INFORMATION

1. How many graphic design teachers are in your school?

   ☐ 1-3 ☐ 4-7 ☐ 8-10 ☐ 11 and above

2. How many Information Technology teachers are in your school?

   ☐ 1-3 ☐ 4-7 ☐ 8-10 ☐ 11 and above

3. How many years have you taught graphic design?

   ☐ Below a year ☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16 years & above

Please indicate your educational level (check one).

☐ Master of Education
☐ Bachelor of Education
☐ Diploma in Education.
☐ Master of Art.
☐ Bachelor of Arts.
☐ Diploma in Art.
☐ Other qualification

SECTION B: AVAILABILITY OF AN IT RESOURCE

4. Is there a graphic design resource room or computer laboratory at your school where you teach graphic design? ☐ Yes ☐ No
5. Is there a technological learning centre in your school? ☐ Yes ☐ No
6. How frequently did you acquire support in presenting graphic design lessons from an information technology teacher (or teachers)?
7. ☐ Very frequently ☐ Frequently ☐ Occasionally ☐ Rarely ☐ Never
8. Does your school own or have any software packages for teaching graphic design lessons? ☐ Yes ☐ No

   If yes please name it/them.

   ……..

SECTION C: THE EXTENT ON WHICH INFORMATION TECHNOLOGIES ARE EMPLOYED IN THE TEACHING GRAPHIC DESIGN.

9. How consistently do you utilize each one of the following equipment with your pupils in the classroom? (Check one) in the appropriate boxes.

	Daily	**Weekly**	**Monthly**	**Once or twice a year**	**Never**	**Not Available**
Computers in general						
Word processing packages						
Publishing software (e.g., QuarkXPress, Adobe InDesign, Publisher)						
Photo editing applications						
Graphical applications (e.g., CorelDRAW, Illustrator)						
Presentation software (e.g., PowerPoint)						

Animation applications						
Interactive whiteboard						
Search engines for the Internet						
CDs with interactive features						
Programming languages						
Overhead projectors						
Simulation Software						
Webpage authoring application (e.g., FrontPage, Adobe Dream Weaver, Adobe Muse)						
Multimedia authoring application applications (e.g., Adobe Premier, Power Director)						
Educational portals						
Drill/Practice Programs, Tutorials						

1.2 How frequently do you encourage your students to employ digital technologies (IT) to complete the following tasks?

	Daily	**Weekly**	**Monthly**	**Once or twice a year**	**Never**
to organize and store information					
to collect data and perform measurements					
to manipulate/analyze /interpret data					
to create visual displays of data/information (e.g. graphs, charts, posters, banners, flyers)					
to plan, draft, proofread, revise, and publish written text					
to create graphics or visuals of non-data products (e.g., diagrams, pictures, figures)					
to create visual presentations					

to perform calculations					
to create models or simulations					
to support individualized learning					
for remediation for basic skills					
to solve problems related to assignment					
For gathering learning experiences required for teaching					

SECTION D: The challenges of Employing Information Technologies in Teaching Graphic Design

10. Rank the following in order of importance, beginning with the most impor tant

(1) and ending with the least important (1). (6). A score of one (1) indicate s that this is the most significant issue you have in employing information technology to improve graphic design instruction in your classroom.

Description	Ranking					
Challenges	1	2	3	4	5	6
Inadequate access to technologies.						
Teachers' inadequate skills.						
Inadequate data on the selected target issue						
A total absence of defining specific curricula that involve information technology						
There is insufficient time on the schedule for instructing graphic design and technological advances.						
Insufficient time is allotted for teaching graphic design and computer technology.						

Most challenging = 1, Least challenging = 6

Please state any other challenges:

……

SECTION E: TO EXAMINE LEVEL OF COMFORT AND EFFECTIVENESS IN TEACHING SENIOR HIGH SCHOOL GRAPHIC DESIGN WITH INFORMATION TECHNOLOGIES.

11. Read through the table below and respond appropriately. The **first column** is your comfort level in applying/using the listed information technologies, the **second column** is how effective you can use those technologies listed, and in the **third column** check those technologies you were taught at your teacher preparation school/program. **Finally**, check those technologies that are available in your school now. Please check one in each item provided.

Comfort level **1** – Very comfortable **2** – Moderately comfortable **3** – Need Help **4** – Need a lot of help		**1** – I know and can use it effectively. **2** – I know, but cannot use it effectively. **3** – I have no idea what this is. **4 - TP** – Taught at Teacher Preparation School **5 -** Available **(AV) –** Available in my school now
Computers in general	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Word processing packages	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Publishing software (e.g. QuarkXPress, Adobe InDesign, Publisher)	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Photo editing applications	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Graphical applications (e.g. CorelDRAW, Illustrator)	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Presentation software	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○

(e.g. PowerPoint)		AV
Programming languages	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Search engines for the Internet	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Search engines for the Internet (Google)	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Interactive Whiteboard	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Simulation Programs	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Drill/Practice Programs	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Interactive CDs	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Overhead projector	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Webpage authoring application (e.g. FrontPage, Adobe Dream Weaver, Adobe Muse)	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Multimedia authoring applications (e.g., Power Director, Adobe Premier)	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Educational portals	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV
Animation applications	○1 ○2 ○3 ○4	○1 ○2 ○3 ○TP ○ AV