

**FRAMEWORK DEVELOPMENT FOR INTEGRATING
INFORMATION AND COMMUNICATION TECHNOLOGIES
INTO THE GHANAIAN SENIOR HIGH SCHOOL VISUAL
ART CURRICULUM**

KNUST



By

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Kwame Nkrumah University of Science and Technology, Kumasi
October, 2010

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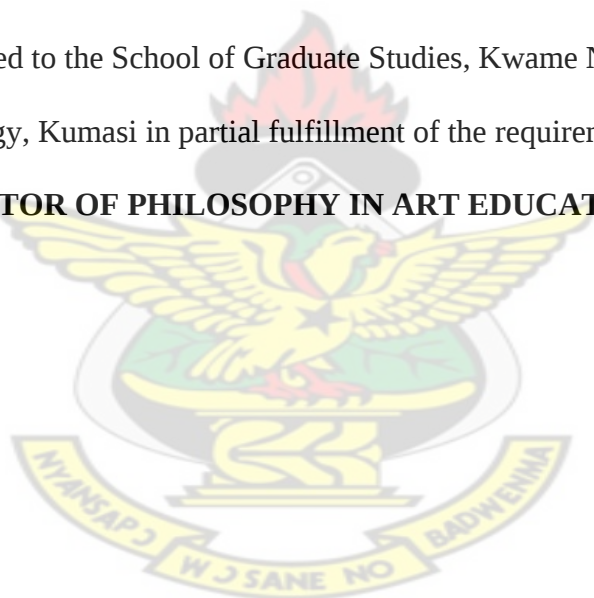
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A Dissertation Presented to the School of Graduate Studies, Kwame Nkrumah University of
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DOCTOR OF PHILOSOPHY IN ART EDUCATION



Faculty of Art,

College of Art and Social Sciences

Kwame Nkrumah University of Science and Technology

October, 2010

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DECLARATION

I hereby declare that this submission is my own work towards the Ph.D. and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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PdY

ABSTRACT

Within the past decade, efforts at integrating ICT into the school curriculum have become popular in the country's educational institutions. Even before the government of Ghana, on the basis of the Anamuah-Mensah committee on education, recommended ICT infusion into the educational system, there were far-flung ICT integration attempts initiated by Parent/Teacher Associations, Old Students Associations, non-governmental organizations and some ICT related establishments. This indeed is a clear manifestation of how conscious Ghanaians have become about the importance of ICT in institutions of learning. Unfortunately, however, a close observation of the emergence of ICTs in Ghanaian Senior High Schools seems to lack definite goals for teaching and learning. Besides, attempts at ICT integration are happening so independently that the extent to which its infusion or introduction (to phrase itrealistically) is benefiting education of the students is uncertain. It is for this reason that a Curriculum Framework aimed at developing the use of ICTs in the teaching and learning of Visual Arts in Ghanaian senior high schools is considered essential. This study begins with an examination of the opinions and knowledge base of Art teachers and students about ICT and Art Education. It also explores the educational goals of existing ICT progarmmes in Ghanaian Senior High Schools which focus on conventional computing that only enables students to use a narrow range of software that have very little benefit for the Visual Art student in particular. The study further seeks the views of ICT experts, curriculum planners/reviewers, teachers and other stake holders concerning effective integration of ICT into the teaching and learning of visual arts in the senior high schools. Two key dimensions emerged from the views sampled from Visual Art teachers, students, curriculum reviewers and ICT experts: (1) Motivation for ICT integration and usage, based on (2) Curricular and pedagogical innovations. Despite the divergence in opinions, beliefs and attitudes, Visual Art teachers and students seem ready and highly motivated by the

promises of new technologies to use ICTs. However, this can be possible only when efforts are formally put in place to ensure innovations in pedagogy through a qualitative change in the existing Visual Art curriculum. The outcome of the investigations formed the rationale for developing a Framework for Integrating ICTs into the Ghanaian Senior High Schools Visual Art Curriculum. The framework aims at exposing students in the Visual Arts to relevant basic skills that are required to develop their computer literacy skills beyond word processing, ultimately developing their creative thinking skills through information and communication technology.

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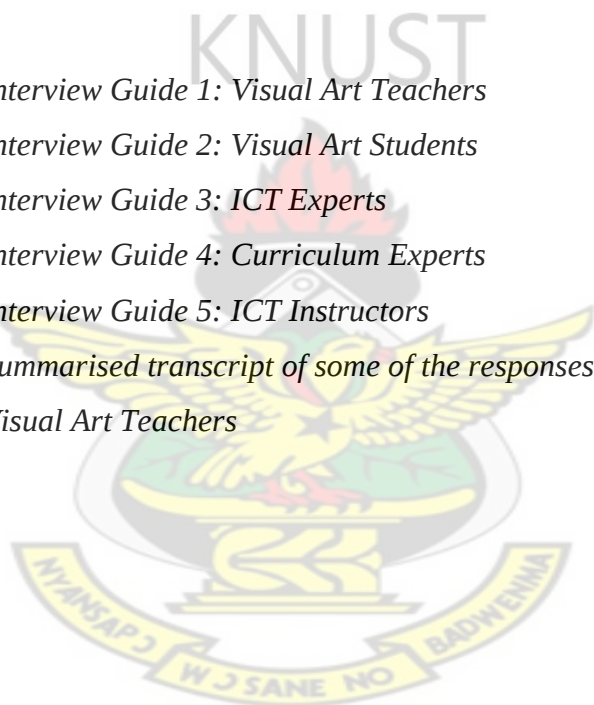
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CHAPTER ONE

INTRODUCTION

Background to the Study

The New London Group (1996) (cited in Way & Webb, 2007) predicted that the closing decades of the 20th century and the beginning of the 21st century were and would be characterized by change in almost every aspect of people's working, public and private lives. In their view therefore, the appearance of information and communication technology (ICT) in schools through improved provision of computer hardware, infrastructure and connectivity should not be seen as an isolated example of change (Way & Webb, 2007). Indeed this is evidenced in the growing interests in investment in ICT with the aim of improving and updating the education provided to the younger generations (Balasubramanian et al., 2009).

In line with these developments, developed and some developing countries are consistently promoting research on ICT use and integration in many educational settings and are depending on their findings for refining of policy decisions. Hardware and software industries continue their fast expansion and development, with new products for the educational system constantly emerging (Davies & Worrall, 1997).

In Art Education, the availability of computers and relevant peripherals such as digital cameras, scanners (and other forms of digitizers), printers and the Internet is posing a lot of challenges to art teachers as they seek novel ways of developing learners' creativity. ICT has literally made available certain learning processes in Visual Art that were previously either not known or just inferred. It is continuously blurring the boundary between traditional art and design forms and is providing opportunities to express ideas in many different ways (NSEAD, 2004).

In Ghana, the use of ICTs in the teaching and learning of Visual Art is a new area of experience for both students and teachers. Even with the coming into force of the 2007 teaching syllabuses which lay some emphasis on ICT integration in schools, instructional procedures and ICT goals for teaching and learning remain disparate. This leads up to genuine concerns for ardent followers of the ICT integration process as to whether school ICT programmes are indeed serving their intended purpose of exposing students to the technological tools that would enhance skill acquisition and promote mastery over subject matter. Considering the changing trends in artistic expressions and praxis in modern society whereby digital media are merging with traditional media, the current process of ICT integration is an ill turn to the study of Visual Art in schools. Already, the job market has started demanding skilled artists with ICT competencies to take care of the emerging technology-based Art and design related industries springing up in the country. This means, very soon, without the appropriate skills in ICT, creative ideas alone will be of little value. This indeed intensifies the challenges faced by art educators in the performance of their duties in the present era. It has become the responsibility of the Art Educator to ensure that technologies in schools are enhancing Visual Art Education programmes or perhaps redefining art education programmes so that students can become up-to-date in the creation of art.

In teaching Art, therefore, there is the need for the consideration of how ICT can be employed alongside and or integrated with Visual Art practices. There is also the need to consider how ICT can be crafted to promote and extend visual understanding in the Ghanaian context. As it manifested in an earlier study conducted to formulate instructional procedures in ICT for Visual Art students, ICTs can support

the implementation of Visual Art activities that currently exist in the SHS Visual Art syllabus (*deGraft-Yankson, 2004*).

This study in effect sought to address one main concern and that is the effective use of ICT in the teaching and learning of Visual Art in Ghanaian Senior High Schools. It approaches ICT integration from a realistic point of view to ensure that ICT is neither over utilized nor under-utilized. The fact that technology is best used as a tool to improve an activity or make a task easier, but not always the answer (*Elston, 2007*), has been duly endorsed by the researcher. This is to ensure the avoidance of unpractical suggestions, unnecessary impositions and any form of overestimation that would frustrate art teachers in their effort towards ICT integration. At the same time the study does not lose sight on the fact that ICT can be underutilized and some art teachers in the deliberate effort at avoiding ICT at all costs end up missing out on discovering the huge benefits that technology can bring (*Elston, 2007*).

Teachers are charged with the responsibility of not only becoming mindful of, but also being capable of skillfully managing at the classroom level the impacts that result from social, cultural, political, and economic trends and educational policies and programmes (*Way & Webb, 2007*). It is also incumbent on them to ensure that students are technologically equipped no matter their fields of study or the cost. As indicated by ACOT (2008), educating young people to be successful in this changing world is no small task, but the consequences of failing to do so are enormous.

In the face of globalization, the information revolution, and increasing calls for a highly skilled work force, the need for a developing country like Ghana to resort to capacity building measures that would effectively utilize technology in Art Education is almost a compulsion. This effort would also complement the general

rationale for integrating ICT in education. It will make sense of the growing importance of ICT based resources and services in society as a whole, the complexity of the tools available, and the pressure to make education more cost effective and employment compliant (European Commission, 2010).

Statement of the Problem

ICTs are supposed to offer teachers and learners opportunities for creativity in all areas of the curriculum, and understanding and mastering the basic skills in ICT is regarded in many countries as part of the core of education (UNESCO, 2002). It has been argued for instance that, within teacher education programmes, ICT must be integrated with curriculum, pedagogy and field experience to model what teachers might use in their own practice (Willis & Mehlinger, 1996). Experts agree that, a focus on the integration aspect of ICT preparation is critical to ensure that ICT is pedagogically supporting a particular discipline area (Vongalis Macrow, Wright & Brew 2004, cited in Lockyer & Patterson, 2007). Therefore the fact that ICT is now going to enjoy the status of one of the core subjects in Ghana's current Educational Reform comes as welcome news for all (ICT4AD Policy, 2003). This means that ICT would be seen alongside Mathematics, English and Science which are mandatory to all students. The move also indicates the country's subscription to the belief that technology can improve the rate, quality, amount, and effectiveness of learning in schools (Henchey, 2001).

Some of the problems identifiable with this provision, however, are that, after almost a decade of its introduction into the Ghanaian education system, ICT is still crawling at the 'emerging' stages. While evidence of the government's interest in ICT integration in the educational system is very clear, no such interest is shown about the form it is actually supposed to take in the curriculum. So far, evidence of

ICT infusion in Ghanaian Senior High Schools as it currently exists fall short of the transformative goals that are supposed to prompt the integration of ICT in the Senior High School curriculum (deGraft-Yankson & Avoke, 2007).

Again, current trends in ICT integration in Ghanaian Senior High Schools suggest so much focus on the physical machine when it comes to what is called ICT classes. In fact, ICT lessons have mainly involved the *teaching of computers*. This raises the question as to whether ICT integration means getting students to be learning *about* computers or getting students to be learning content related to curriculum objectives *through* computers.

Among the Visual Art teachers and students in Ghanaian Senior High Schools, for example, there is certainly a very high interest and will to participate in computer related Visual Art activities. Yet, little is seen on how Visual Art is being considered in line with technology (deGraft-Yankson & Avoke, 2007) and still not enough is known about the impact of ICT on education especially when Visual Art is taken into account. Besides, there is little hard evidence or agreement on the effective utilization of ICT in the study of Visual Art at the Senior High School level.

This gives a clear indication that Government's interest in ICT integration in the educational system though very clear, does not reflect curricular needs. This trend indeed contrasts with the core essence for ICT integration in school which aims at the infusion of technology as a tool that enhances learning in content areas of the curriculum.

This research therefore examines ways of initiating a document that illustrates how ICT can be integrated within the Visual Art curriculum in Ghanaian Senior High Schools.

Objectives

The research sought to:

1. Review current approaches to ICT to determine how these approaches make ICT a catalyst for transformation in the teaching and learning of Visual Art.
2. Study and analyze the Senior High School ICT syllabus in terms of content, scope, objective and responsiveness to of artistic, creative and aesthetic sensibilities
3. Assess the level of ICT integration readiness among Visual Art teachers and students in the Ghanaian Senior High School to aid the determination of breadth of ICT contents for an ICT-based Visual Art curriculum
4. Identify areas in the Senior High School syllabus where ICT could be included in documentation and planning for Visual Art.

Research Questions

This research therefore seeks to find answers to the following research questions:

1. How do current approaches to ICT in the Senior High Schools make ICT a catalyst for transformation in the teaching and learning of Visual Art?
2. To what extent does the core ICT in the new Educational Reform recognize the centrality of artistic, creative and aesthetic sensibility?
3. What is the level of ICT integration readiness among Visual Art teachers and students in the Ghanaian Senior High School?
4. In what ways can a comprehensive ICT-based Visual Art curriculum unleash the full potentialities of ICT for artistic and instructional purposes?

Delimitation

The scope of this research is limited to the critical study of the overt, explicit and written Visual Art curriculum in Ghanaian Senior High Schools in relation to ICT adoption and possible integration.

Definition of Terms Used

Before proceeding it is worth clarifying some of the terminology used in the previous and subsequent chapters.

Art Education. Institutionalized area of learning in the Ghanaian educational system that is based upon the Visual Art subjects.

Applying Approach. An approach to ICT integration which describes the level where institutions begin to use ICTs for some of the tasks already carried out in school management and in the curriculum.

Benchmarks. Standard of curriculum contents by which learning outcomes will be measured.

Connectivist Theory. A learning theory for the digital age, based on the analysis of the limitations of behaviorism, cognitivism and constructivism to explain the effect technology has had on how we live, how we communicate, and how we learn.

Content Standards. ICT skill sets that students are supposed to learn within the various Visual Art study areas in the curriculum.

Curriculum. A sequence of activities that is intentionally developed to provide education for one or more students, in or out of the school's premises.

Curriculum Framework. An organized document that present parameters to assist in the development of curriculum and set standards that defines ICT learning

outcomes for Visual Art students as they relate to the knowledge and skills in Visual Art.

Emerging Approach. An approach to ICT integration which describes the level where institutions begin to acquire computers and peripherals and begin to examine how they can be used to improve performance.

Emic. A term used by anthropologists and others in the social and behavioral sciences to refer to two different kinds of data concerning human behavior.

Exteriorization. A phenomenon in digital experience whereby models of the physical world constructed in the human mind are let out into cyberspace.

Framework. The underlying structure consisting broad areas and concepts for consideration and possible inclusion.

ICT-Based. With elements of ICT integration. For example “ICT-based Visual Curriculum” refers to a Visual Art Curriculum characterized by ICT enabled learning.

Informatics. The science dealing with the design, realization, evaluation, use and maintenance of information processing systems, including hardware, software, organizational and human aspects, and their industrial, commercial, educational, governmental and political implications.

Information Technology. The technological applications (artifacts) of information society.

Information and Communication Technology (ICT). The Combination of informatics technology with other related technologies, such as the communication technology.

Information and Communication Technologies (ICTs). A range of hardware and software such as scanners, digital cameras, draw and photo programs as

well as the telecommunication infrastructures which include phones, faxes, modems, video conferencing equipment and cameras (used interchangeably with *ICT tools*).

Infusing Approach. An approach to ICT integration whereby the curriculum begins to merge subject areas to reflect real-world applications. This is where integration is thought to have actually taken place.

Interiorization. A resultant phenomenon from Vygotsky, Piaget and Bruner's, theory which suggests that human beings create "psychic" equivalents of physical objects as "conceptual" models to be further used to construct versions of their own internal reality or virtual realities.

Key Knowledge. The main, expected or original knowledge.

Key Skill. The main, expected or original skill.

Marquetry. The process of fitting inlaid veneers together to form a design or picture.

Metacognition. Cognition about Cognition or Knowing about Knowing.

Modules. Self-contained units of learning constituting the curriculum Framework.

Module Strands. Break-down of the modules.

Sakawa. A kind of Internet fraud whereby victims are deceived into transmitting huge sums of monies to cone men who either pose as business partners or ladies seeking marriage partners. Victims are most of time foreigners. It is believed that the accomplices resort to 'juju' and other spiritual means to subdue their victims.

Syllabus. Document with an outline and summary of topics to be covered in a course of study.

Technology. Technology is used interchangeably with ICT or ICTs. In certain contexts, it is also used as a generic term for all the technologies in use today.

Technologisation. The technological process.

Transforming Approach. An approach to ICT integration that many people consider to be the future of education. Teaching and learning becomes 100% child centred.

Visualizer. Real-time image capture devices for displaying an object to a large audience.

Windows. An operating system with a graphical user interface

Abbreviations



ACOT:	Apple Classroom of Tomorrow
APA:	American Psychological Association
API:	Application Programming Interface
BECTA:	British Educational Communications and Technology Agency
BMP:	Windows Bitmap
CAB:	Computer Assisted Basketry
CAC:	Computer Assisted Ceramics
CAD:	Computer Aided Design
CAGD:	Computer Assisted Graphic Design
CAJ:	Computer Assisted Jewellery
CAL:	Computer Assisted Leatherwork
CAM:	Computer Aided Manufacturing
CAPM:	Computer Assisted Picture Making
CAS:	Computer Assisted Sculpture
CAT:	Computer Assisted Textiles
CD-ROM:	Compact Disk Read Only Memory
CMYK:	Cyan Magenta Yellow Black

CRDD:	Curriculum Review and Development Division
DTP:	Desk Top Publishing
Email:	Electronic Mail
ERO:	Education Review Office
GES:	Ghana Education Service
GKA:	General Knowledge in Art
GTP:	Global Teenage Project
HIS:	Hue Intensity Saturation
IBM:	International Business Machines
ICT:	Information and Communication Technology
ICTC4VA:	Information and Communication Technology Considerations for Visual Art
ICT4AD:	Information and Communication Technology for Accelerated Development
ICTs:	Information and Communication Technologies
IICD:	International Institute for Communication and Development
IPMC:	Intercom Products and Manufacturing Company
ISP:	Internet Service Provider
JPEG:	Joint Photographic Experts Group
LCD:	Liquefied Crystal Display
M1:	Model one
MOE:	Ministry of Education
MRS:	Material Resource Society
NCCA:	National Council for Curriculum Assessment
NCS:	Network Computer Service

Net:	The Internet
NIIT:	National Institute of Information Technology
NORAD:	Norwegian Agency for Development Cooperation
NSEAD:	The National Society for Education and Art and Design
Ofsted:	Office for Standards in Education
PAP:	Performance Assessment Procedures
PNG:	Portable Network Graphics
QDA:	Qualitative Data Analysis
RGB:	Red, Green and Blue
SHS:	Senior High School
2D:	Two Dimensional
3D:	Three Dimensional
UNECA:	United Nations Economic Commission for Africa
UNESCO:	United Nations Educational, Scientific and Cultural Organisation.
WTS:	World Tech System
WWW:	The World Wide Web
YIQ:	A colour space used by the NTSC colour TV system
ZPD:	Zone of Proximal Development

Importance of the Research

The proposed ICT-based Visual Art Curriculum would set the stage for a more persevering effort towards the proper integration of ICT in the Ghanaian Senior High School Visual Art syllabuses. This would ensure the provision of opportunities for teachers and students to explore the creative and expressive potential of completely different set of media, therefore offering them medium for investigation and decision

making in various artistic processes. Access to ICT resources as a medium of artistic expressions would therefore deepen students' knowledge and understanding in Visual Art.

Organization of the Rest of the Text

This dissertation comprises a six-chapter written report on the context for the research, the cardinal reasons for its undertaking, the methodology used, the presentation and discussion of results and a suggested Framework for Integrating ICTs into the Ghanaian Senior High School Visual Art. Chapter Two reviews the literature that discusses ICT and its importance to the general field of education as well as Visual Art studies and also examines some of the theoretical analyses that support the incorporation of ICT in routine Visual Art classroom practices. Literature substantiation to the course of the study is identified and the contribution to be made by this study in the Ghanaian Educational setting is outlined. Chapter Three provides details of the effectuation schemes for the study. Chapter Four presents and analyses the data gathered from the three types of sources selected: from ICT experts and experts in the Curriculum research, review and design; from teachers and students from sampled schools; and from the ICT and Visual Art syllabi available in Ghanaian Senior High Schools. Chapter Five is the presentation of the proposed Framework for Integrating ICTs into the Ghanaian Visual Art curriculum. Chapter Six summarizes the findings, draws conclusions and makes recommendations for effective integration of ICTs in the Visual Art component of the Ghanaian Senior High School curriculum. The general format for the report is in compliance with the APA format and references have been arranged in alphabetical order according to authors' second names.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Overview

The recent years have witnessed numerous studies on the extent to which schools are developing the capacity to integrate ICT into teaching, learning, and school management processes. For this study to indeed contribute to the volume of knowledge accrued so far, this chapter has been dedicated to review and discuss some categories of literature in support of ICT integration in the Visual Art Curriculum.

In this literature review, focus would be on the examination of the usefulness of ICT in education, generally, and how far some countries have gone with integration by throwing some light on documented ICT integration in the teaching and learning of Visual Art, taking note of success stories and best practices.

Literature reviewed in this study explores three basic positions. It first explores the general field of ICT briefly, as it exists today. The second is a review of ICT roles in general education. Here, an effort is also made at exploring certain educational theoretical concepts that support the integration of ICT in teaching and learning. Finally, it examines closely relationship between ICT and Art Education in terms of pedagogical transformations and provision of creative tools and opportunities for artistic expressions.

Defining Information and Communication Technology

Definitions of ICT are similar in most literature, though it is sometimes directed towards specific objectives and functional biases. Historically, ICT has been emerging from the concepts of IT, meaning basically computers and communication technology, and digital data networks as the latest phase of development, but also TV, satellites, phone, etc. Due to a trend of merging different technologies (all

technologies seem to merge together in one way or another), there was a reason to start speaking of ICT as opposed to IT. ICT captures all the latest technologies used for communication, data processing and data storage (GeSCI Blog, 2009).

Dunmill and Aslangic (2006) share similar view in their definition of ICT as a term encompasses a range of human-devised hardware, software and telecommunications technologies that facilitate communication and sharing of information across boundaries. The term, according to them, is used to describe a range of equipment (hardware: personal computers, scanners and digital cameras) and computer programs (software: database programs and multimedia programs), and the telecommunications infrastructures (phones, faxes, modems, video conferencing equipment and web cameras) that allow us to access, retrieve, store, organise, manipulate, present, send material and communicate locally, nationally and globally through digital media (Dunmill & Arslanagic, 2006). Obviously inclusion of any of the above array of infrastructure would depend on the discipline in which one finds him/herself.

Galoway's (2007) examination of the term ICT distinguishes between IT and ICT, the former "being the tools and skills for the job, the latter being what you do with them". This implies that computers, cables, the internet, wireless connections, handheld devices, digital cameras and mobile phones can be considered separately, while word-processing, emailing, videoconferencing and searching on the internet will be the other (Galoway, 2007, p.1).

Galoway's (2007) observation is further reinforced by Pelgrum and Law (2003) as they trace down the rapid and systematic development of ICT from Ed Roberts' first Personal Computer known as Altair 8800 in April of 1974. In their view, ICT actually emerged with the popularity of the computer. Towards the end of

the 1980s, the focus of computing shifted from computing technology to the capacity to store, and retrieve information. This is when the term ‘computer’ became synonymous with the term information technology (IT).

The term IT was then followed by the introduction of the term ‘ICT’ (information and communication technology) around 1992, when the ability of the computer to share and disseminate information became widespread and e-mail started to become available to the general public (Pelgrum & Law, 2003). From Elston’s (2007) view point, ICT is not dissimilar to IT, and he claims that “the communication part was added relatively recently and has been adopted by educational establishments” (Elston, 2007, p.5).

The Tanzanian *Information and Communication Technology (ICT) Policy for Basic Education* (2007) refers to the term Information and Communication Technology (ICT) as forms of technology that are used for communication and to transmit, store, create, share or exchange information. Their definition also includes technologies such as radio, television, video, telephone (both fixed line and mobile), computer and network hardware and software; as well as the equipment and services associated with these technologies, such as electronic mail, text messaging and radio broadcasts. This obviously is in agreement with Adeya’s definition which claims that ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private knowledge (Adeya, 2002). Adeya’s explanation culminates into a more simplified definition describing ICT as an electronic means of capturing, processing, storing and disseminating information. In line with the above definitions, NORAD (2002) breaks down ICT into the following components:

- *Information channels* such as the World Wide Web, online databases, electronic documents, management and accounting systems, intranet, etc.
- *Communication channels* such as e-mail, electronic discussion groups, electronic conferences, the use of cell phones, etc.
- *Hardware and software* used to generate, prepare, transmit and store data, such as computers, radio, TV, computer programs/tools, etc.

In all of the above definitions, ICT is perceived as an integration of the technologies and the processes to create, distribute and communicate the desired information to a target audience and making the target audience more participative in nature (Lashgarara et al., 2008).

No matter how one looks at it and in spite of how distinct certain aspects and definitions of ICT may be, they are all related and contribute to a common purpose. Today, ICT cover Internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities (UNECA, 1999). Never in the history of the world has the growth of any particular technology been so rapid and comprehensive, an attribute that makes every interest in ICT worth pursuing.

Information and Communication Technology in Education

If computers and for that matter, ICT have become and promise to become even more and more commonplace (even to the point where it attributes are becoming trite and banal) in the very near future, then it is obvious that there is a new form of literacy which is required of people – to be ICT literate. This is the kind of literacy which describes the set of skills and knowledge required by individuals to enable

meaningful use of ICT appropriate to their needs (Pelgrum & Law, 2003).

Consequently, the issue of ‘computers in education’ started to become popular in educational policy-making in the early 1980s, when relatively cheap microcomputers became available for the consumer market (Pelgrum & Law, 2003). It was also noted by Pelgrum and Law that the early introduction of microcomputers in education in 1980s, raised high expectations that it would make education more effective and motivating.

As identified by Ghana’s ICT policy document (2003), the challenge for the future is to create a learning culture that keeps pace with the changes and equips people with the relevant knowledge, skills, ideas and values they need to become lifelong learners. The document observes that to meet this challenge the Ghana education systems must recognise the enhanced breadth, richness and authenticity of learning that can be achieved through ICT. The need for people to use ICT and information to fully participate in society and the workplace; and the importance of specialist ICT skills to economic development must also be exposed (Ghana ICT4AD, 2003).

The literature of postmodernity has as one of its prominent themes the idea that the boundaries associated with ‘modernity’ are dissolving under the impact of technology and social changes that are global in nature (Lawson & Comber, 2000). ICT has within a very short time become one of the building blocks of modern society (UNESCO, 2002). It permeates the business environment, underpins the success of modern corporations, and provides governments with an efficient infrastructure. It has become a major factor in shaping the new global economy and producing rapid changes in society (UNESCO, 2002). Institutions and structures keep changing as a result of access to increased amounts of information (Kelly, 1998), and as Naisbitt

(1995) puts it, the world is getting both bigger and smaller, with new communication technology decimating the tyranny of time and space across a borderless world (Naisbitt, 1995; Ohmae, 1990).

Consequently, educational systems all over the world are under increasing pressure to incorporate ICT in preparing their students for the 21st Century. In the 1998 UNESCO World Education Report, *Teachers and Teaching in a Changing World*, emphasis is laid on the radical implications ICT has for conventional teaching and learning (UNESCO, 1998).

One of the most commonly cited reasons for using ICT in the classroom, according to Tinio (2003), has been to better prepare the current generation of students for a workplace where ICT, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use computers effectively and efficiently, is therefore considered as representing a competitive edge in an ever increasing globalizing job market (Tinio, 2003).

But technological literacy, is not the only skill that well-paying jobs in the new global economy will require. EnGauge of the North Central Regional Educational Laboratory (U.S.) has identified what it calls “21st Century Skills,” which includes digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, technological literacy, information literacy, cultural literacy, and global awareness), inventive thinking, higher-order thinking and sound reasoning, effective communication, and high productivity (Wikibooks, 2002; Tinio, 2003).

In the view of Hobart (1997), however, the introduction of ICT in the educational system has not been driven solely by the need to prepare children for a role in an information economy but also to enhance learning outcomes. It is believed

that ICT has the potential to “pay its way” in improving educational delivery, transforming the nature of education – where and how learning takes place as well as the roles of students and teachers in the learning process (UNESCO, 2002). As a transformational tool, ICT when used appropriately can promote the shift to a learner-centered environment (Tinio, 2003).

Tinio (2003) believes that ICT also has the potential for increasing access to and improving the relevance and quality of education and that it represents a potentially equalizing strategy for developing countries. He writes:

ICT greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others who live in the poorest countries, is their sense of isolation. The new communication technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago.

(p.7)

The increasing need to effectively integrate ICT in education, therefore is not only to enhance students’ chances of getting jobs but also to improve productivity in work places.

In the view of Gooden (1996),

Students need to learn to communicate more effectively, both through speech and through the written word. They need to learn how to work with others to find new and better ways to solve problems and meet the

challenges of everyday life. They need to develop skills they can use in college or the workforce. Perhaps most important, students need to discover the joy of learning. If students are to function effectively in this ever-changing world, they must continue to learn every day of their lives. (p. 24)

ICT Benefits and Roles in Education

Reports on the impact of ICT on education is diverse and numerous (Jhurree, 2005). Literature carries many unsubstantiated claims about the revolutionary potential of ICT to improve the quality of education (Hepp, Hinostroza, Laval & Rehbein 2004). Similarly, some claims are now deferred to a near future when hardware will be presumably more affordable and software will become, at last, an effective learning tool as observed by Hepp, Hinostroza, Laval and Rehbein (2004).

In spite of this, the belief that ICT can improve learning outcomes has largely been supported by research. In many countries, considerable resources have been invested by way of research to justify the place of technology in education, and many research outcomes have revealed the benefits and gains that can be achieved by students, teachers and administrators (Jhurree, 2005). As Demirbilek (2009) puts it, ICT can enhance the quality of education in several ways – by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. While an important area of study in its own right, ICT is also having a major impact on methods of teaching. And that technology can help instil in students the eagerness to learn that will follow them throughout life and better enable them to reach their goals (Tinio, 2003).

Research conducted by Apple Classroom of Tomorrow (ACOT) in 1997 indicates that ICT can be used to improve teaching and learning by enhancing existing

classroom practices, and by opening opportunities to stimulate cognitive processes in ways that are impractical in a classroom devoid of technology.

As observed by Sandholtz et al. (1997), the key to raising student achievement lies with providing students with a solid foundation of basic skills and motivating them to learn. This goal, they contend, can be achieved through technology. In the view of the authors, technology engages students and fires their imagination. It helps teachers to stimulate young minds in ways that make a profound and lasting difference.

Below are some of the research findings that outline the impact of technology on student achievement according to Sandholtz et al. (1997):

- Students, especially those with few advantages in life, learn basic skills—reading, writing, and arithmetic—better and faster if they have a chance to practice those skills using technology.
- Technology engages students, and as a result, they spend more time on basic learning tasks than students who use a more traditional approach.
- Technology offers educators a way to individualize curriculum and customize it to the needs of individual students so all children can achieve their potential.
- Students who have the opportunity to use technology to acquire and organize information show a higher level of comprehension and a greater likelihood of using what they learn later in their lives.
- By giving students access to a broader range of resources and technologies, students can use a variety of communication media to express their ideas more clearly and powerfully.
- Technology can decrease absenteeism, lower dropout rates, and motivate more students to continue on to college.

- Students who regularly use technology take more pride in their work, have greater confidence in their abilities, and develop higher levels of self-esteem. (Sandholtz et al., 1997, p. 4).

The ACOT (1997) study reveals that in classrooms where technology is used, students interact more with their peers and teachers than in traditional classrooms. As observed by the researchers, students change the manner in which they organize and accomplish their work and choose to work collaboratively to solve complex problems. The study indicates that students routinely employ inquiry, collaboration, technology, and problem-solving skills in the classroom, unlike graduates of traditional high school programmes. For this reason, collaboration becomes a learning tool or a means to an end and not just a chance for students to socialize.

A research study on learning with laptop computers conducted by Rockman (2000) shows that the use of laptops encourages even greater collaboration among students. During the study, it was noticed that on the average, students with laptops worked in groups several times a week as compared to a few times a month before the laptops were introduced in their classrooms. In addition to exploring topics more often on their own, students who regularly use laptops assume a greater variety of roles in the learning process, and are thus able to help to teach other students and even their teachers.

Rockman (2000) also asserts that technology provides powerful tools for organizing and analyzing information and modelling concepts and underlying structures. According to the source students who have the opportunity to use these tools gain a deeper understanding of complex topics and concepts and are more likely to be able to recall information later in life and use it to solve problems in non-school situations.

One of the most important contributions technology makes in the classroom is how it affects students' attitudes toward learning. The ACOT (1997) research shows that when technology is a routine part of their school experience, student attendance improves and dropout rates decline. When ACOT students were compared with their non-ACOT peers in the same high school, absenteeism was about half in the ACOT classes compared with the rest of the school. The research also revealed that over the five years of the study, there were no dropouts in the ACOT programme, while 30% of the student body dropped out from the regular school programme.

The research also revealed that more students finished high school and many more considered attending college when they routinely learn and study with technology. Fewer than half of the students in the ACOT study came into the programme without any interest in pursuing college. Overall, in the school where the study took place, only 15% of the graduating students went on to college. Not only did 100% of the students in the ACOT classroom graduate, but also more than 90% went on to college (ACOT research, 1997).

The Endeavor Research Group (1999) concluded that technology encourages students to take charge of their education. They observed that in classrooms where technology is part of the curriculum, students are more likely to initiate learning-based activities, sometimes even directing them. In general, they noted that students respond positively when given the chance to actively participate in the learning process via technology. They come to class eager to learn and take more pride in their work.

In affording students greater control of their education and heightening their motivation to explore and discover, technology plays a major role in ingraining in

students a love of learning that will help them to reach new heights of achievement not only in school, but also after school and beyond (ERG, 1999).

In a similar research, Hepp, Hinostroza, Laval and Rehbein (2004) projected the following reasons for the application of ICT in education:

- *A new society requires new skills:* Due to the fact that ICT are the preeminent tools for information processing, new generations need to become competent in their use, should acquire the necessary skills, and therefore must have access to computers and networks during their school life.
- *Productivity enhancement:* Schools are knowledge-handling institutions; therefore, ICT should be fundamental management tools on all levels of an educational system, from classrooms to ministries.
- *A quest for quality learning:* Schools should profoundly revise present teaching practices and resources to create more effective learning environments and improve life-long learning skills and habits in their students. In order to address the questions of “How can ICT be applied to support education change?” and “How can its application in education in turn support sustained economic development and social transformation?” Kozma (2005) suggests the following four types of approaches in general:

- ICT are used to improve the delivery of and access to education. This approach can improve education on the margin by increasing the efficiency by which instruction is distributed, but it need not involve fundamental change.
- ICT are the focus of learning. By learning ICT skills, students become better prepared for work that increasingly involves the use of ICT.
- ICT can be used to improve student understanding, increase the quality of education, and thereby increase the impact of education on the economy.

- Knowledge creation, technology, technological innovativeness, and knowledge sharing can contribute to the transformation of the education system and to sustained economic growth and social development.

Moreover, Papert (1997), cited in Kok (2006), identified the following positive effects of ICT on students in education:

- enhanced motivation and creativity when confronted by the new learning environments,
- a greater disposition to research and problem-solving focused on real social situations,
- more comprehensive assimilation of knowledge in the interdisciplinary ICT environment,
- systematic encouragement of collaborative work between individuals and groups,
- ability to generate knowledge,
- capacity to cope with rapidly changing, complex, and uncertain environments,
- new skills and abilities fostered through technological literacy.

Furthermore, Kozma and Anderson (2002) claim that ICTs are bringing on unprecedented transformations in schools and classrooms through the introduction of new curricula based on real world problems. It is also noted that ICTs providing scaffolds and tools to enhance learning, giving students and teachers more opportunities for feedback and reflection, and building local and global communities that include students, teachers, parents, practicing scientists, and other interested parties.

Summarily, Hepp, Hinostroza, Laval and Rehbein (2004) put together the entire role of ICT in the educational system under five main headings – pedagogical, cultural, social, professional and administrative.

- *Pedagogical Tool Role:* ICT provide a new Framework that can foster a revision and an improvement of teaching and learning practices such as collaborative, project-based and self-paced learning.
- *Cultural, Social, and Professional Roles:* The cultural, social and professional roles of ICT are exercised primarily through an effective use of the vast amount of information sources and services available today via Internet and CD-based content for the entire educational community: students, teachers, administrators and parents.
- *Administrative Roles:* ICT have important roles to play in making school administration less burdensome and more effectively integrated to the official information flow about students, curricula, teachers, budgets and activities through the educational system information pipelines.

Also, Barron et al. (2002) report the following benefits of integrating technology into education:

- Promotion of active learning
- Promotion of critical thinking
- Offer of diversity and self-paced learning and individual growth
- Motivation and inspiration of students by making learning exciting and relevant
- Provision of flexible outlets for students with special needs
- Promotion of cooperative learning and growth in teacher-student interaction
- Enhancement in communication skills

- Supply of information through multi-sensory channels (supporting students with various learning styles and
- Help to students in building cultural bridges.

With the above benefits in site, Kozma and Wagner (2003) predict that, ICT can affect the pace at which the learning gap is bridged in developing countries, both domestically and in relation to other nations. The greatest challenge they perceive in this pursuit is how we can harness the advantages of ICT, in order to improve the delivery and quality of educational services, as well as to accelerate the rate at which knowledge is distributed and learning chances and outcomes are equalised throughout society (Wagner & Kozma, 2003). Researches such as this obviously hold the key to ushering the Ghanaian educational system into the educational bliss that ICT promises.

ICT in Education – Theoretical Underpinning

Another factor that makes integration of ICT into our educational system an imperative is its commensuration to current educational expectations. As discussed above, apart from the transformations that ICT has brought within sectors of the society, it is also modifying our learning expectancy with regards to the skills to be learnt by students in order to secure a place in the new world economy. Students are expected to be exposed to procedures that would equip them with skills necessary for handling and analysing large amounts of information, making decisions and mastering new knowledge areas in the current technology pervaded society. Students are expected to be lifelong learners, with the opportunities to join forces with others in finding solutions to composite tasks, and effectively represent and communicate knowledge with others by the use of different systems. A shift from teacher-centred

instruction to learner-centred instruction is needed to enable students to acquire these new 21st century knowledge and skills (Sandholtz, Ringstaff & Dwyer, 1997).

In this pursuit, emphasis must be shifted from teaching to learning so that a more interactive and engaging learning environment would be created for teachers and learners. This new environment also involves a change in the roles of both teachers and students. Table 1 below, (adapted from Newby et al., 2000), shows the changing role of the teacher from knowledge transmitter to that of learning facilitator, knowledge guide, knowledge navigator and co-learner with the student. This new role does not decrease the importance of the teacher in anyway, but requires new knowledge and skills. It places students in much responsible positions as far as their own learning in this environment is concerned, as they seek out, find, synthesize, and share their knowledge with others. ICT provide powerful tools to support the shift to student-centred learning and the new roles of teachers and students (UNESCO, 2002).

Changes in Teacher Role	
<i>A shift from:</i>	<i>A shift to:</i>
Knowledge transmitter, primary source of information, content expert and source of all answers	Learning facilitator, collaborator, coach, mentor, knowledge navigator and co-learner
Teacher controls and directs all aspects of learning	Teacher gives students more options and responsibilities for their own learning
Changes in Student Role	
<i>A shift from:</i>	<i>A shift to:</i>
Passive recipient of information	Active participant in the learning process
Reproducing Knowledge	Producing and sharing knowledge, participating at times as expert
Learning as a solitary activity	Learning collaboratively with others

Fig1: Changes in student and teacher roles in learner centred environments (Adapted from one developed by Newby et al., 2000 and obtained for this study by courtesy of UNESCO, 200)

Theories Supporting the New View of the Learning Process

In justification of the new views of the learning process and the shift to student-centred learning discussed above, the UNESCO *Information and Communication Technologies in Teacher Education Planning Guide* (UNESCO, 2002) discusses some of the cognitive learning research from which they emerged and the confluence of several theories that have informed popular understanding of the nature and context of learning. This section highlights some of the most prominent theories each of which is based on the same fundamental premises that students are active agents, purposefully seeking and constructing knowledge within a meaningful context.

They are socio-cultural theory (based on Vygotsky's inter subjectiveness and Zone of Proximal Development), constructivism theory, self-regulated learning, situated cognition, cognitive apprenticeship, problem-based learning (Cognition and Technology Group at Vanderbilt), cognitive flexibility theory (Spiro et al., 1988), and distributed cognition (Salomon et al., 1993). The learning environment that may be derived from this view of the learning process is shown in figure 2:

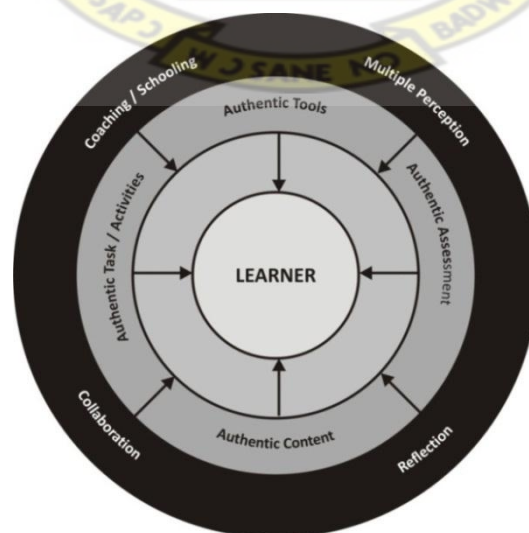


Fig 2: Student-Centred Learning Environment – Adapted from UNESCO *Information and Communication Technologies in Teacher Education Planning Guide* (2002)

This Figure (Fig 1) presents an illustration of how the learner interacts with other students, the teacher, information resources, and technology in a learner-centred environment. In such an environment, everything the learner does is authentic as observed by UNESCO (2002):

The learner engages in authentic tasks in authentic contexts using authentic tools and is assessed through authentic performance. The environment provides the learner with coaching and scaffolding in developing knowledge and skills. It provides a rich collaborative environment enabling the learner to consider diverse and multiple perspectives to address issues and solve problems. It also provides opportunities for the student to reflect on his or her learning. (P. 24)

Considering the various opportunities provided by ICT as indicated earlier in the literature, it is obvious that ICT can provide functional tools to help learners access vast knowledge resources, collaborate with others, consult with experts, share knowledge, and solve complex problems using cognitive tools. ICT also provide learners with powerful new tools to represent their knowledge with text, images, graphics, and video (UNESCO, 2002).

It is clear from available literature on the demands of the new learning environments that research that have emerged from theoretical Frameworks on human learning have provided a lot of impetus for the current new view of the learning process. Many of these theories reflect a constructivism view of the learning process which encourages learners to be active participants in the construction of knowledge through the integrating new information into their schema or mental structures (UNESCO, 2002).

In a constructivism learning environment, testing of ideas and approaches experienced through students' exposure to new learning environments and situations aid them to construct their own knowledge. As indicated by its funding premise, constructivism advocates for the construction of personal understanding of the environment in which we find ourselves, thereby fashioning out learning experiences through the adjustment of our mental models to accommodate new experiences (Brooks & Brooks, 1999).

Expatriating further on the essence of a constructivist classroom and the reason for its adoption in new learning, Brooks and Brooks (1999) present a chart, juxtaposing two types of classrooms, Traditional classrooms and Constructivist Classrooms:

Traditional Classrooms	Constructivist Classrooms
Curriculum is presented part to whole, with emphasis on basic skills.	Curriculum is presented whole to part with emphasis in big concepts
Strict adherence to fixed curriculum highly valued.	Pursuit of student questions is highly valued.
Curricular activities rely heavily on textbooks and workbooks.	Curricular activities rely heavily on primary sources of data manipulative materials.
Students are viewed as “blank slates” onto which information is etched by the teacher.	Students are viewed as thinkers with emerging theories about the world.
Teachers generally behave in a didactic manner, disseminating information to students.	Teachers generally behave in an interactive manner, mediating the environment for students.
Teachers seek the correct answer to validate student learning.	Teachers seek the students' points of view in order to understand students' present conceptions for use in subsequent lessons.
Assessment of student learning is viewed as separate from teaching and occurs almost entirely through testing.	Assessment of student learning is interwoven with teaching and occurs through teacher observations of students as work and through student exhibitions and portfolios.

Fig. 3: Traditional Classrooms versus Constructivist Classroom (Adapted courtesy of Brooks and Brooks, 1999)

As indicated by the chart, a constructivist environment is established through conscious development of “learning communities comprising students, teachers and experts who are engaged in authentic tasks in authentic contexts closely related to work done in the real world” (UNESCO, 2002).

Below are details of four of the most influential theories that relate to new views of the learning process as indicated by UNESCO (2002):

Vygotsky’s Sociocultural Theory.

This is a theory of human learning which describes learning as a social process and the origination of human intelligence in society or culture. Vygotsky’s theoretical Framework emphasises on the fundamental role played by social interaction in the development of cognition as its major theme. He identified two-way learning levels for everything that is learnt. First, through interaction with others, and then integrated into the individual’s mental structure. Vygotsky (1978) writes:

Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first between people (inter psychological) and then inside the child (intra psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals. (p. 57)

Being one of the foundation theories of constructivism three major themes deductible in Vygotsky’s theory involve:

- The fundamental roles played by social interaction in the process of cognitive development. It is on this base that Vygotsky asserts that learning precedes development and not the other way round.

- The importance of the More Knowledgeable Other (MKO) in the learning experiences of the child. In Vygotsky's view, anyone or anything that has a better or higher ability level than the learner in the performance of any particular task, process or concept is important. The MKO can therefore be a teacher, coach, an experienced adult, a peer (who may even be younger than the learner) or even a computer.
- The Zone of Proximal Development (ZPD). This "zone" is the area of exploration for which the student is cognitively prepared, but requires help and social interaction to fully develop (Briner, 1999). The ZPD is the distance between a student's ability to perform a task under adult guidance and/or with peer collaboration and the student's ability in solving the problem independently. According to Vygotsky, learning occurred in this zone (Learning Theories Knowledge base, 2010).

Vygotsky theorists therefore are of the view that effective learning can take place when learners are provided with to a variety of social situations that afford them the opportunity to interact extensively with students, teachers, experts and technologies. Experts are of the opinion that "ICT can be used to support the learning environment by providing tools for discourse, discussions, collaborative writing, and problem-solving, and by providing online support systems to scaffold students' evolving understanding and cognitive growth" (UNESCO, 2002, p. 26).

Jean Piaget.

Piaget developed his learning theories through his research on children and their process of making sense of the world around them. Because his study mainly highlighted on the development of children's cognitive functions, Piaget's work is

regarded by many as the founding principles of constructivist theory (Learning Theories Knowledge base, 2010). As noted by UNESCO (2002):

He observed that learning occurs through adaptation to interactions with the environment. Disequilibrium (mental conflict which demands resolution) gives rise to Assimilation of a new experience, which is added to the existing knowledge of the learner, or to Accommodation, which is modification of existing understanding to provide for the new experience. (p. 26)

Piaget's deductions from his study identified how the existing cognitive structures of the learner determine how he perceived and processed information. It was observed that the learner's cognitive structures were susceptible to new information that makes sense to the existing mental structure of the learner. Data so incorporated forms part existing structures resulting in a process known as *Assimilation*. Data which are so different from existing structures are either rejected or transformed into formats that would fit them into existing structures in a process known as *Accommodation* (UNESCO, 2002).

Like *Vygotsky's* theory, the learner is placed at a central position in the construction of his or her own knowledge. Judging from how children have become apt at responding to both the 'thrill and chills' of modern technologies with great ease and alacrity, it is obvious that data provided by and through ICT make a lot of senses to their cognitive structures. One would, therefore not be far from right to predict that ICT is capable of providing learners with those new information that would help them to acquire the complex and powerful minds that would enrich their understanding of the world around them.

Jerome Bruner – Discovery Learning.

In line with Piaget's theory, Bruner's maintained that it is best for learners to discover facts for themselves. In his opinion, active learning involves learners' ability to construct new ideas or concepts based upon their prior knowledge and experience. His enquiry based learning, also posits that learners ought to be exposed to an environment where exploration and manipulation of objects, wrestling with questions and controversies or experimentation would be a regular practice (Learning Theories Knowledgebase, 2010). He also identified three principles to guide the development of instruction. These include: (1) instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness); (2) instruction must be structured so that the student can easily grasp it (spiral organization); (3) instruction should be designed to facilitate extrapolation and/or fill in the gaps (going beyond the information given) (UNESCO, 2002).

According to Kinelev, Kommers, and Kotsik (2004), the theories of learning propounded by Vygotsky, Piaget and Bruner are seminal works which have given rise to the term *interiorization* of physical objects. This term suggests that human beings create "psychic" equivalents of physical objects as "conceptual" models to be further used to construct versions of their own internal reality or virtual realities. According to the authors, cyberspace prompts a reverse process, which could be called *exteriorization* – models of the physical world constructed in the human mind are let out into cyberspace. So, people should proceed from the understanding that it is necessary to develop in an individual a particular perception of his or her habitat, which comprises objects of the physical world and the ideas of these objects in the human mind, as well as the system of ideas in information space (Kinelev, Kommers, and Kotsik, 2004). It was therefore assumed that, ICT does not merely enhance

intellect but also designates new dimensions of the human mind, produces an orderly system of a new global culture and opens up vast and exciting perspectives of their use in improving quality of education (Kinelev et al, 2004). It is therefore important to take into account the fact that parallel to education as a means of preparing students to life, cyberspace as another educational milieu is developing.

Self-Regulated Learning.

In Self-regulated learning, learners develop consciousness of their own knowledge and understandings. In other words, self-regulated learners are aware of what they know and what they do not know or need to understand. It is built on the premise that “Self-regulation plays a crucial role in all phases of learning and has the potential to increase the meaningfulness of students’ classroom learning” (Schoenfeld, 1987, cited in UNESCO, 2002, p. 29), and therefore combines self-observation, self-judgment, and self-reaction. In this direction, it has been ascertained that ICT tools can be used to bring out the hidden capabilities of students, thereby enabling them in the development of self-learning skills that would render them more reflective and self-regulated learners (Hsiao, 1999, cited in UNESCO, 2002).

Going by the principles of Self-Regulated learning, a new method of assessing students’ performance can also emerge whereby students would be leading factors in the determination of their own levels and achievements.

Summarily, the UNESCO ICTs in Teacher Education Planning Guide (2002) perceives these theories as undergirding factor that braces up the new views of the learning process to help shape the new pedagogies for learning.

There are also indications from the above theories that whatever positive gains available in the use of ICTs, ultimately, hinge on teachers’ ability to introduce and

implement ICT tools positively “to create rich, new, and engaging learning environments for their students” (UNESCO, 2002, p. 21).

It is therefore important that any curriculum consideration (in any field of study) should be tied to the core issues in some of the learning theories that support constructivist approach to learning which is enhanced through the integration of ICT in the teaching and learning process.

ICT and Art Teaching

Overseas research on the impact of ICT on teaching, particularly studies from Australia (Newhouse, 2002) and the UK (Loveless, 2002), have identified the following characteristics of classroom teaching when utilising ICT to support programmes of learning:

- Students may learn outside the teacher’s own area of expertise and experience, making management and direction of learning more difficult. This suggests that less teacher directed approaches are better suited to ICT rich classrooms.
- Students on the other hand, may be more highly motivated by the task at hand – a factor that can also create a distraction from the intended learning.
- Teacher tasks that have traditionally been incorporated in learning programmes may become less consequential and too linear for many students as they work more ‘chaotically’ to discover new learning opportunities.
- Extension work and support for students with greater learning needs can be more easily facilitated.
- Independent learning may not direct itself towards the teacher’s objectives.
- Additional coordination of the classroom, students and materials is required.

Planning to extend students’ thinking becomes paramount.

- Teachers need to continually work at updating their skills and knowledge in the operation and use of ICT.

In a report issued in 2002 on *An Evaluation of Art Professional Development Online in Support of the Art in the New Zealand Curriculum*, respondents agreed on the positive influence of online initiatives on their professional learning, mainly in Visual Art. The document reported on many teachers (interviewees) who believed that, as a result of the online professional development they received, they could now teach in ways that exposed their students to more challenge in the less familiar disciplines of Visual Art.

In the research on *Student Learning in the Art*, the art disciplines were regarded by students and teachers alike ‘as qualitatively different from other learning at school. This different quality in art learning is recognised by teachers as demanding a more flexible, informal approach to teaching than is required or perhaps even possible in traditional transmission models’ (Holland & O’Connor, 2004:3). This student-centred inquiry-based, ‘chaotic’ approach to teaching and learning has been identified in the literature on ICT teaching. Inquiry approaches to learning, exemplified in Jerome Bruner’s Discovery Learning (see page 32), are recommended to meet student interests and needs in order that they may have greater opportunities to realise their creative potential and access independent and collaborative pathways to improved achievement.

Barriers to effective utilisation of ICT in teaching are reflected in a number of studies that found that personal access for teachers to a computer for the purpose of preparation and planning is one of the strongest influences on the success of ICT training and subsequent classroom use (The National Union of Teachers, 2002). Also

noted was the need for supportive, enthusiastic and visionary leadership which has a positive impact on teachers' attitudes and behaviours.

The British research (Newhouse, 2002) concluded that students had positive attitudes and good skills due to the ICT curriculum and home use of computers but teachers undervalued the potential by considering it to be "just a tool". The report concluded by emphasising how ICT can impact positively on classroom activities if it is situated within the right environment and in the right manner (Becta, 2002).

Importance of ICT in Visual Art Education

From the above and many other study findings, it is clear that the appropriate use of new electronic media, by both teachers and learners, contributes significantly to art and design education and enriches learning (UNESCO, 2002). ICT provides a creative device for image creation and enhancement for Visual Art educator (Madeja, 1993, cited in Phelps & Maddison), presents unique opportunities for supporting creativity (Brown, 2002) and extending Visual Art "beyond clay, crayons and paint" (Stankiewicz, 2004, p. 88). This potential was recognised as far back as the 1980s when Crowe (1988) commented that ICT could assist with exploring design problems, enhance artistic decision making and provide new opportunities for learning. In 1990, D'Angelo pointed out how "the computer in the art classroom can actually enhance the creative thinking and output of student artist" (D'Angelo, 1990, p. 42). Since then the literature has continued to highlight the potential for ICT in supporting Visual Art teaching: "For visual education these are incredibly exciting times offering new possibilities" (Long, 2001, p. 262).

Drawing and painting software, digital still and video cameras, electronic portfolios, scanners, colour laser printers, samplers and sound mixers, image manipulation, video editing, 3D animation, Internet and web page construction can all

play a role in supporting students' artistic expression (Ashford, 2002; Brown, 2002; Neylon, 1996; Taylor, 1999, cited in Phelps & Maddison, 2008). Furthermore, as a medium for exploring solutions to design problems (Crowe, 1988; Freedman, 1991; Matthews, 1997), students are able to record and save ideas quickly, manipulate line and colour, modify and incorporate images and employ motion (Hubbard & Greh, 1991). ICT can allow students who might not possess skills with traditional media to focus more on the message and less on execution of art works, thus enhancing self-expression (Long, 2001; Wang, 2002; Wood, 2004). In the world of ICT embedded art, mistakes can be easily corrected, resulting in decreased anxiety and promotion of experimentation, which lies at the heart of creativity (Freedman, 1991; Hicks, 1993; Wood, 2004). While new technologies do not, of course, replace traditional art processes they do extend the possibilities of art expression, communication and perception (Wang, 2002; Wood, 2004).

With an ever increasing emphasis on still and animated imagery, symbols and iconography in society, analysis, interpretation, extrapolation and evaluation of visual imagery has become just as important as art creation. Students need to be wise consumers, familiar with how the mass media operates (Hicks, 1993) and Visual Art education has an important role to play in preparing students as visually literate and critical members of society (Brown, 2002; Schwartz, 1991).

Popularity in the use of digital media has also ushered in new career opportunities for Visual Artists (Phelps & Maddison, 2006). Students with knowledge, skills and proficiency in digital art and design are in a better position to obtain employment in commercial Visual Art contexts, such as advertising, film, animation and other computer graphic industries than their colleagues with no such skills (Matthews, 1997; Taylor, 1999).

Phelps and Maddison (2006) again assert that technology provides exciting opportunities for enriching and transforming Visual Art teaching, providing teachers and students alike with new tools to access, organise and present information and to enrich lessons through multimedia (Bridwell and McCoy, 1991; Garnons-Williams, 2002; Schwartz, 1991; Wood, 2004). Technology enables the establishment of communities of practice and cooperative learning (Henning, 2000; Hicks, 1993; Neylon, 1996), with communication not only between students and teachers, but between students from different schools, countries or cultures, and with practicing artists from around the globe. The World Wide Web also provides a virtual international gallery for students' work (Loveless, 2003).

In the '*Art and ICT Advocacy Statement*' issued by NSEAD, in 2004, it was observed that the appropriate use of new electronic media, by both teachers and learners, contributes significantly to art education and enriches learning. It provides a means for teachers to develop their professionalism, through documenting, assessing, researching and sharing their developments with other colleagues.

NSEAD also enumerates the following as some of the opportunities ICT in Art provides for students. It states that the use of ICT in Art provides opportunities for learners to:

- access to works of art and trans-cultural artefacts, on a global scale, past and present, through visiting virtual galleries on the Internet;
- provide a new range of opportunities to develop their own ideas in an experimental way and take creative risks;
- discover their creative potential by engaging in different kinds of activities;
- review, refine and modify two and three-dimensional work in progress;
- work with others (peers/teachers/experts etc.) to develop their ideas;

- share their ideas (and promote the school) with a wide audience of peers, colleagues, parents and prospective parents;
- develop work across subject areas.

The provision of the above stated opportunities is made possible through the extraordinary range of new resources that “offers a powerful and dynamic means of visual communication and expression, potentially reaching new audiences and ... new opportunities for collaborative working”. The need for sophisticated and well-developed visual literacy skills, along with understanding of the use of digital technology in the creative industries, in the context of education, entertainment, leisure and for the workplace, will provide many of the essential skills for all aspects of future life (NSEAD, 2004).

ICT provides excellent opportunities for Visual Art students to develop skills in a wide range of software and communication technologies, e.g. DTP (Desktop Publishing), animation, digital photography, image manipulation, video, three-dimensional and web page design. In addition as enhancing general investigation, problem-solving, critical thinking and communication capabilities, expertise in these new technologies helps prepare people to work in the creative industries.

The researcher’s own teaching experience also shows that children and students are strongly engaged and motivated by Art and Design work that involves the use of ICT. They often sustain an extended interest in response to alternative and challenging approaches inherent in the media, redrafting their ideas through processes that can integrate conventional and digital media. This always led them back into more conventional art forms utilising ideas gained through these digital processes.

With all the above benefits in sight, the researcher believes that they are also achievable even in our low economies. This can be possible through continuing

consideration of curriculum content and examination requirements and in the sustained investment in professional development and classroom resources.

Integrating ICT into the Visual Art Curriculum

More than ever before in the history of mankind, the emergence of ICT has brought the future of what is called knowledge economy and knowledge societies closer. Knowledge economies refer to the economies in which wealth, prosperity and economic development depend on people's capacity to out-invent and outwit their competitors, to tune in to the desires and demands of the consumer market, and to change jobs or develop new skills as economic fluctuations and downturns require (Hargreaves & Shaw, 2007).

Unfortunately, as Hargreaves and Shaw (2007) observe, the gap between these preferred futures of knowledge economies and knowledge societies and the current realities of most developing countries is still yawning, where industrialism, unemployment, subsistence living and vast informal economies define day to day life for most of the population.

In the face of this reality, it is obvious that the only way through which the gap could be closed is education and training. Though improved access, universal basic education and foundations of literacy are the first steps on the path to becoming successful knowledge economies, they are not enough. The demands of knowledge economies go beyond just more education into what Hargreaves and Shaw refer to as education and training that is also better and different. In the context of knowledge economy aspirations, the challenge of educational reform is therefore not just to *increase access* or even raise conventional tested achievement, but also to *change the nature* and *improve the quality* of learning, teaching and training so that they address knowledge economy objectives (Hargreaves, & Shaw, 2007).

In this pursuit, teaching and learning in the knowledge society must assume the following characteristics:

- Foster creativity and problem-solving capacity
- Be amenable to collaborative and team-based organization,
- Be ready to encompass a broad curriculum that is not confined to the minimal requirements of technical training or the basics of literacy and numeracy,
- Be able to incorporate new technology,
- and be sensitive to offering flexible and personalized forms of delivery.

These undoubtedly can be achieved through ICT integration into the school curriculum. Some of the more important roles ICT can play in education are pedagogical, cultural, social, professional and administrative. ICT if sensibly deployed and with carefully selected software, can positively affect many aspects of school life, from a healthy questioning of present teaching practices to a gradual improvement of the quality, scope and depth of the learning environment, as well as to provide a remarkable opportunity for teachers' development (Hepp, 2004).

With continuous occurrence of various forms of reforms in the educational system every now and then (Jhurree, 2005), there cannot be a better time for proper integration of ICT than now.

Approaches to ICT Curriculum Development

Due to the complexities in technological advancements, and the dynamism in ICT integration, it is always important that schools deal with ICT incorporation on the basis of their peculiarities. Schools are therefore expected to fashion out integration plans within the context of their own system and to fit out options that best suit their unique situation and culture. It should even be possible for variations of integration approaches to occur with schools. It is for this reason that approaches to ICT

curriculum development proposed by UNESCO comes in handy. The approaches are hierarchical with the emerging approach as a beginning point, and the transforming approach as a goal many perceive as the future of education.

Model for ICT Curriculum Development.

Following the case with any attempt at curriculum development, it is important that considerations for ICT curriculum development include a researched model for ICT development. As indicated by UNESCO (2002), such models are not miniature replications “of some three dimensional object but rather a representation of the essential characteristics of ICT development to provide a scaffold or Framework” (UNESCO, 2002, p. 14). A model of such nature, according to UNESCO, is intended to provide a Framework that shows the interrelationship of various components within a system and aids understanding by educational administrators and policymakers (UNESCO, 2002). In providing such a Framework, the two models described below are to be considered.

Continuum of Approaches to ICT Development.

In the Continuum Approaches to ICT Development, ICT development is conceptualised as a continuous non-spatial process “along which an educational system or an individual school can pinpoint the approach that relates to the growth of ICT for their particular context” (UNESCO, 2002, p. 14).

Stages of Teaching and Learning With and Through ICT.

Having identified the line along which the integration process should travel, it is now essential to outline the different stages for discovering ICT tools, learning about ICT tools, understanding and specialization in the use of ICT tools. *Stages of teaching and learning with and through ICT* ensure that teachers and students are systematically guided through the expected proficiencies.

The two models mentioned above would provide the basis for the proposed Framework for ICT-based Visual Art Curriculum, the major consideration of this study.

The Continuum of Approaches.

Through studies of ICT development in developed and developing countries, four broad approaches through which educational systems and individual schools proceed in their integration and use of ICT has been identified by UNESCO (2002). These four approaches, termed *emerging*, *applying*, *infusing*, and *transforming*, represent a continuum depicted as the model in figure 2.



Fig. 4: Model depicting a continuum of approaches to ICT development in schools
(Adopted from UNESCO, 2002)

The Emerging Approach.

This approach is associated with schools which are freshly ushering themselves into ICT development. It is at this stage that schools begin to acquire computers, peripherals and software. Various sections of the school begin “to explore the possibilities and the consequences of adding ICT for school management and the curriculum” (UNESCO 2002, p. 21). ICT at this stage has nothing to do with instructional delivery and classroom activities as schools may still be “firmly grounded in traditional, teacher-centred practice” (UNESCO 2002, p. 21). Teaching and learning continues to involve the teacher being solely responsible for the provision of content through lecturing and other teacher-centred methodologies whilst students listen and take notes. Students have no direct access to technology. A student

who wishes to access technology for any purpose can do so only through individual teachers (UNESCO, 2002).

Applying Approach.

The applying approach is attributed to schools at the point where they begin to develop new understanding of the contributions ICT promises to make in their academic activities. This is the point where teachers and administrators begin to harness some of the ICT tools in carrying out some of the routine practices in school management and curriculum (UNESCO, 2002).

At this point, some ICT tools such as computers, slide projectors, LCD projectors and other forms of presentation aids and software begin to surface in the instructional procedures. Hand-outs are prepared and presented to students in word-processed formats. ICT tools are also deployed in the completion and assessment of lessons. For example, examination questions would be prepared with word processors whilst marks and grades are computed and recorded with spread sheets. Discrete time periods are provided for ICT studies. Because schools attributed to the *Applying Approaches* have computer laboratories and possibly some few computers in the classrooms, access to technology becomes easier for students. ICT is taught as a separate subject area and teaching and learning is mostly on the ICT and its constituent hardware and software components (UNESCO, 2002).

Infusing Approach.

In the infusing approach, a more comprehensive approach towards integration begins to materialise. Associated schools can boast of facilities that encompass a range of computer-based technologies for laboratory, classroom, and administrative use. ICTs now avail themselves as novel tools for exploration into new ways of changing their personal productivity and professional practice. ICTs also afford

students the opportunity to “choose projects and ICT tools that stimulate learning and demonstrate their knowledge across subject areas”. Schools that are linked with the infusing approach are more responsible for their learning and assessment. Other indications include fashioning out ICT as a subject area at professional level for selected students; adoption of a project-based ICT curriculum; and the involvement of the community in the learning environment and as resource providers (UNESCO, 2002).

Transforming Approach.

This is the approach perceived by many to be the future of education. School linked with the transforming approach have developed a completely new thinking about school organisation through the creative use of ICT. ICT becomes fully integrated to daily personal productivity and professional practice. The curriculum becomes “much more learner-centred and integrates subject areas in real-world applications”. Students, for instance develop the capability of “working with community leaders to solve local problems by accessing, analyzing, reporting, and presenting information with ICT tools” (UNESCO, 2002).

Access to information becomes unlimited and unrestricted for learners and students become much more responsible for their own learning and assessment. Teaching of ICT becomes more comprehensive as a subject area “at an applied level and is incorporated into all vocational areas” (UNESCO, 2002).

Besides the UNESCO’s continuum approach discussed above, Downes et al (2001), provide a classification of school ICT use that represents significant progress towards a comprehensive Framework for the description of ICT integration in schools. An overview of the Downes et al. (2001) classification as cited by Way and Webb (2007) is as follows:

Type A: ICT as an object of study

- Encouraging the acquisition of ICT skills as an end themselves;
- ICT skills are taught as a separate subject; and
- Traditional subjects continue to be taught the same.

Type B: ICT as tool for learning

- Using ICT to enhance students' abilities within the existing curriculum;
- Whole school focuses on integration of ICT; and
- Some teachers change their pedagogical approach through the use of ICT while others continue to use existing pedagogical approaches.

Type C: ICT as integral to both subject matter and pedagogy

- ICT transforms the classroom;
- Introducing ICT as an integral component of broader curricular reforms; and
- Teacher's pedagogy and content are changed through the use of ICT.

Type D: ICT as integral to reform of schooling

- ICT transforms education;
- Organisation and structural changes take place to schooling itself;
- Student learning through authentic, challenging multidisciplinary tasks;
- New roles for teachers and students;
- Culture of inter-related learning within and beyond the school; and
- Changes in the professionalism of teachers.

Research on the impact of ICT in art education is a new field of study in Ghana, and there is currently little information available that directly considers this in depth. The case is however different in the international world. In their literature review, Dunmill and Arslanagic (2006) outline some efforts at making a strong case for ICT and Art. They observed that though studies have been carried out, particularly

in the United Kingdom, on ICT in the National Curriculum, art and design (as independent curriculum subjects) still receive little acknowledgement.

Internationally, research is growing in finding evidence of the benefits of creativity and ICT, while government ICT mission statements cite the role of creative thinking in economic, social and cultural goals of their countries. It is ironical, therefore, that so few studies and funded initiatives are in place for the arts when art, as the cultural and social creative expression of humanity, are pivotal to ICT developments notably in virtual technologies and collaborative digital projects that connect people world-wide (Dunmill and Arslanagic, 2006).

International education websites make specific links and feature examples of best classroom practice in ICT in art contexts. For example the New South Wales Department of Education and Training site has included an area on ICT specifically for each art discipline to support teachers and students in enhancing achievement in the art by meeting specific curriculum requirements in technology in the art. Teacher professional learning, student tutorials, databases of software, case studies in ICT in the disciplines, and cross curricula links feature on this site.

It is obvious that Ghana is far behind as far as ICT integration in Art Education is concerned. Today's world is one of rapidly expanding information and communication technologies (ICT). Young people, as so-called 'digital natives', are fast becoming literate in multiple new and dynamic ways, challenging the very notion of literacy as has been traditionally espoused for the past two centuries (Dunmill & Arslanagic, 2006).

Juxtaposing Ghana alongside the international world, one is bound to ask questions such as: When is Ghana going to begin a serious effort towards a complete transformation of our current Visual Art programmes into an ICT-integrated? When

is Ghana going to develop sites in ICT integrated Visual Art within a key educational portal so that student learning and teacher practice can be enhanced and be brought up-to-date with international initiatives. When is Ghana going to create sites with links to community artists and e-learning opportunities in the art, as identified in the United States, the United Kingdom, and increasingly in Australia?

For ICT to impact most effectively on traditional school-based art teaching and learning as existing in our current educational system, educators need to critically review the few available ICT provisions in schools to benefit Visual Art programmes. Support for art teachers is also crucial to implement ICT effectively in their art programmes. It is important for teachers to develop awareness of progression in learning in the arts as it is prevailing in other countries so that they can plan towards a comprehensive use of ICT. As teachers and students selectively utilize digital assets to create their own digital materials and learning objects, there will be more meaningful engagement in learning and this can positively impact on student achievement (Dunmill & Arslanagic, 2006). As identified by Loveless (2002) and Newhouse (2002), it is also likely that when teachers are confident in using ICT they will be able to better integrate it into specific pedagogical approaches that enhance learning and effect long-term communities of practice. This should hold true for art as in other learning areas. The economic, social, cultural and educational benefits of such developments should be researched to inform initiatives to support this important area of art and technology development for creative thinking students of the 21st century (Dunmill & Arslanagic, 2006).

Finally, conscious efforts at getting teachers, students and the school community, including parents and all stake holders, to clearly understand the purposes of utilising ICT in art education need to be made. It must be made known how ICT in

art programmes can enhance both student and teacher motivation. Teachers and students must be exposed to the ever-developing range of sophisticated hardware, software, and multimedia digital tools needed to render them up-to-date in current artistic practices. The need for teachers and students to exploit the opportunities of, what Dunmill and Arslanagic (2006) termed, *connectivism* must be exposed in the Ghanaian educational system. This would create opportunities for refinement and reflection in and on the creative processes specific to art practices. It also gleans avenues for student and teachers to learn new, dynamic ways of thinking and knowing about art and culture of the world's peoples for greater understanding and guardianship of the world in which we live (Dunmill & Arslanagic, 2006).

It is also obvious that partnerships between the art and interactive technologies are essential to the future of quality Art Educational practices and improved art outcomes. Visual Art has always offered other ways of seeing and knowing ourselves, and the world we live in considering especially its role in Visual culture. This alternative view often challenges prevailing world views. Visual Art offers new and imagined possibilities, different pathways and non-linear processes that enhance learning and provide learning in the creative, higher-order thinking processes much needed in the world of today and more importantly for the future. 'Partnerships between the art and interactive computer technologies are necessary... if we wish to see technology develop from assumptions about what counts and what has value other than the travelling consumeristic worldview' (Gigliotti, 1998, p. 92 cited in Dunmill & Arslanagic, 2006). Curriculum objectives for art need to articulate ICT specific requirements for today's students to access and achieve rich art learning opportunities that best engage with and further develop new media. In this way assessment of improved outcomes based on ICT in art praxis may be monitored and evaluated. As

educational tools, ICT are as good as how they are used. It is now the value-added focus of ICT in art praxis that needs to be researched (Dunmill and Arslanagic, 2006).

This study therefore is in adherence to the suggestions and observations raised by Dunmill and Arslanagic (2006) through their literature review in Art education. The time is more than ripe for an informed and unconditional look into proper integration of ICT into the Ghanaian educational system. Education in Ghana owes it a great responsibility to ensure that ICT usage, especially among the youth is directed towards more dignified and rewarding embarks. ICT applications in Visual Art practices hold answers to a lot of uncertainties about the positive sides of technology that have been gloomed by Internet fraud, *sakawa* and other associated vices.



CHAPTER THREE

METHODOLOGY

Overview

This chapter constitutes the blueprint for the plan and structure of investigation which ensured that the proposed Framework developed for Integrating ICTs into the Ghanaian Senior High School Visual Art Curriculum reflects the educational needs and goals in Ghana. The plan, which constitutes the overall scheme of the study, includes an outline of the research design as well as methodologies used to collect data for each of the research questions.

Paradigmatic Perspective

The assertion by Lincoln and Guba (1985) that qualitative methods are the procedures of choice if one wants to do research that is consistent with the new view of knowledge and reality provided the grounds for the positioning of this study within the qualitative paradigm.

Efforts being made by art educators to incorporate modern technological trends into traditional Visual Art practices worldwide provoke a critical look into the Ghanaian educational viewpoint on this reality. Investigating this phenomenon calls for qualitative procedures that would enhance description or provision of further understanding of a subject and its contextual setting; provide explanation of reasons and associations; evaluate effectiveness; and aid the development of theories or strategies (UK Office of National Statistics, 2004). Research techniques in this pursuit also sought insights through loosely structured mainly verbal data rather than measurements and make interpretative, subjective, impressionistic and diagnostic analysis possible (Strauss & Corbin, 1998).

Another factor that informed the selection of qualitative methodology for this study were the research questions which sought to discover the degree of Visual Art consideration in the school ICT programmes. With the aim of the research questions being to describe ‘what is in the Senior High School ICT curriculum’ as well as ‘what should be in it’, the adoption of qualitative approach which focuses on describing the patterns observed seems to be in line with the research questions (Marshall & Rossman, 2006). As Marshall and Rossman advice, researchers should design the study according to the research questions they seek to answer.

Research Design

Research design can be thought of as the structure of research. It provides the glue that holds the research project together. A design is used to structure the research, to show how all of the major parts of the research project – the sample selection, treatment of research questions and methods of data collection – work together to address the central research questions (Trochim, 2006). The research design involves the overall approach and the way the study was carried out (Marshall & Rossman, 2006).

For each of the research questions posed, there is a discussion on its methodology with description on research approach used in its investigation. The selection of methodologies to answer the four main research questions is also grounded on epistemological considerations. It was based on the assumption that curriculum designers, teachers and students are aware of the benefits of ICT integration in the teaching and learning of Visual Art. This necessitated an approach which identified data of people and their views, observations and suggestions as appropriate sources that would enhance subjectivity, in analysis.

The following are the descriptions of details of the methodologies used to collect data for each of the research questions:

Investigating Current Approaches to ICT in the Senior High Schools

(Research Question 1).

As indicated by earlier studies, ICT integration in Ghanaian Senior High Schools has been so diverse in structure, form and contents (deGraft-Yankson, 2004). Approaches are therefore disparate and to a very large extent dependent on the *nature* of every single school that has adopted ICT. The process of investigating current approaches to ICT in the Senior High Schools therefore involved the study of hardware, software and ICT infrastructural profiles of the sampled schools. It also needed to include the detailed study of contents of ICT study programmes available to ICT teachers/instructors and or Visual Art teachers in the sampled schools. The levels of ICT competencies of instructors and teachers were of important as well.

Investigating the Recognition of Artistic, Creative and Aesthetic Sensibilities in Core ICT in the New Educational Reform *(Research Question 2).*

This research question was considered against the background of government's continuous emphasis on the importance of ICT in education and her determination to ensure that institutions respond briskly to the call for ICT integration. The Ghanaian ICT Policy statement on Education resounds government's commitment to a comprehensive programme of rapid deployment, utilization and exploitation of ICTs within the educational system from primary school upwards. This, the government hopes to achieve by so many means including the promotion of technical and vocational training (which the Visual Arts form part) with emphasis on the use of ICTs to facilitate the training and learning process (ICT4AD Policy, 2003).

This research question therefore sought information about the linkages between policy and practice based upon the content of current Visual Art syllabus (which came into existence after the policy was made) and information about happenings in schools from the point of view of Visual Art teachers and students. Research design therefore incorporated ethnographic techniques such as non-participant observation and unstructured interviews as well as short direct observations. This was to enhance school-based interpretations of ICT policies and also to uncover and interpret the shared practices of individual schools (Hickman, 2008).

Investigating the level of ICT integration readiness among Visual Art teachers and students in the Ghanaian Senior High School (*Research question 3*).

This research question was considered from an emic perspective where Visual Art teachers and students, as insiders of the school community, divulged information about their own views, beliefs and attitudes on ICT integration in Ghanaian Senior High Schools. The emic data collection approach also justified the emphasis on collecting data in the form of verbatim texts from teachers and students to preserve the original meaning of the information (Pelto & Pelto, 1978). This research question sought to discuss four key issues:

- Knowledge base of Visual Art teachers regarding ICTs as supporting tools in the teaching of Visual Art.
- Teachers' and students' opinions on ICTs as supporting tools for teaching and learning of concepts and skills in Art in Ghanaian Senior High Schools.
- ICT Infra structural profile of Ghanaian Senior High School.
- Content of SHS ICT and Visual Art syllabi.

Framework Development for Integrating ICTs into the Visual Art

Curriculum (*Research Question 4*).

The suggested Framework for the Integration of ICTs into the Visual Art curriculum emerged from the conglomeration of all the data assembled and analyzed. The collection of ideas required for the model building was influenced by axial principles. Axial coding is a procedure for the development of grounded theory (theory derived from data) when analyzing qualitative data (Benaquisto, 2008). In this procedure, open coding, where the raw data (i.e. interviews, in this case) were broken down so that as many ideas and concepts as possible were identified and labelled. This set the stage for axial coding, where the data were reassembled and this made it possible for the researcher to identify relationships more readily (Benaquisto, 2008).

Experiences with the data generated insights and questions which were pursued with further data collection (Ary, Jacobs & Razavieh, 2002). This stage of data collection deployed content analysis procedures. This involved analysis and interpretation of recorded materials within the context of ICT and Visual Art such as textbooks, software, articles, manuals, course outlines, course descriptions and syllabi.

The development of the proposed Framework for Integrating ICTs into the Ghanaian Senior High School Visual Art curriculum was grounded in the data collected from ICT experts, curriculum developers and writers, Visual Art teachers and students.

Population

Population refers to a collection of individuals, entities or elements who fits the criteria (broad or narrow) that the researcher has laid out for research participants (Given 2008). Rubin and Babbie (2001, p. 225) define the study population as “the

aggregation of elements from which the sample is actually selected”. In DeVos et al., (2002) view, the study population set certain restrictions on the units that are studied. Their definition for the study population embraces individuals in the universe who possess specific characteristics. Therefore, the individual units of analysis that are chosen represent the total study population towards which the final results will be generalized (DeVos et al., 2002). The population for a study therefore “is that group (usually of people) about whom we want to draw conclusions” (Babbie, 2007, p. 111). The selected population for this study entailed Senior High School headmasters, Visual Art teachers, Visual Art students, ICT experts, computer artists, professional artists, experts in curriculum research, development and review.

Sampling and the Sample

Considering each and every individual who is of interest to the issues under investigation across the entire population would be most of the time infeasible and delusive. Consequently, sampling is conducted in order to permit the detailed study of part, rather than the whole, of a population (Ross, 2000), and the process by which the actual data sources are chosen from a larger set of possibilities is what is referred to as sampling (Babbie, 2007; Given, 2008).

Leedy (1993) therefore defines sampling as the process of choosing from a much larger population, a group about which a generalized statement is made, so that the selected part represents the total group. Rubin and Babbie (2001) describe the sample unit as that element, or set of elements, that will be considered for selection at some stage of the sampling. This overall process actually consists of two related elements: (1) defining the full set of possible data sources—which is generally termed the *population*, and (2) selecting a specific *sample* of data sources from that population (Given, 2008). Writing about the functions of sampling in research,

Neuman (2003) posits that sampling, if well executed, enables the researcher to measure variables on the smaller set of cases, and to generalize results accurately to all cases. The information derived from the resulting sample is customarily employed to develop useful generalizations about the population (Ross, 2000). These generalizations are informed by logical statistical reasoning that has been repeatedly tested with empirical evidence. Neuman's position therefore emphasizes on the importance of sampling in research and the need to ensure its appropriateness and representativeness to the chosen population.

Definition for the participant to be included in this study was generally considered along the postulations of purposive sampling, which inherently required an explicit definition of the kinds of data sources that are of interest. In selecting the sample, the researcher used his experience and knowledge to select a sample of participants that he believes could provide the relevant information about the topic (Ary et al., 2002). For instance the Visual Art teachers and students sampled for investigation needed to come from schools that have significant levels of ICT use in their schools, since subjects were expected to respond to issues concerning ICT use *in school* specifically.

The choice of purposive sampling therefore was to ensure that the researcher's sample is tied to the objectives of the study so that he can think of and focus on the persons, places or situations that have the largest potential for advancing his understanding.

Sample for the study was drawn from the three sources that describe the target population: first, from Visual Art teachers and students to study their opinions on ICT integration in the teaching and learning of Visual Art; second, from experts/reviewers of Visual Art curriculum for their perception, views and experts' advice on the

successful integration of ICT in the Senior High School Visual Art programme; and third, from ICT experts, instructors and researchers for their perception, views and interpretation of ICT as a tool for Visual Art.

It must be noted, however, that sample originally selected for this study was terminated when it was realized at a point in time that no new information was forthcoming from new units. The decision not to proceed with data collection in some selected schools was as a result of data saturation. The sample size recorded in this report was therefore determined by redundancy of information.

The sample of Teachers and Students.

Sampled Visual Art teachers and students for the study were purposefully drawn from 12 Senior High Schools, situated in the Central, Eastern, Greater Accra and Ashanti Regions of Ghana. Participants consisted of 2 Visual Art students and 2 Visual Art teachers from each of the sampled school and 4 headmasters. The criteria for the inclusion of schools within the sample frame were based on the availability of Visual Art courses and ICTs in the schools.

The students included in the study were considered on the basis of extreme or deviant case purposive sampling alternative. In this study, extreme cases were of interest to represent the starkest and most distinct instances of the issues under investigation. With the main object being the development of Framework for an ICT based Visual Art curriculum, Visual Art students with some background in ICT were considered as subjects with the largest potential for advancing the understanding of the study objectives. Teachers in the schools therefore played a major role in the selection of students for the study.

The Sample of Curriculum Experts/Reviewers.

The sample in this category comprised 8 members of the curriculum review team in the 2007 educational reform, each representing one of the eight Visual Art disciplines studied in the Ghanaian Senior High Schools; 1 expert in the Visual Art curriculum design and 2 experts in ICT curriculum development at the tertiary level.

The Sample of ICT Experts, Instructors and Researchers.

This category embraced 12 ICT instructors/teachers selected from the twelve sampled schools (one instructor/teacher from each of the schools); and 5 ICT experts from private and public ICT institutions. Also included in this category were 10 Visual Art teacher trainees who are taking courses in ICTs and are therefore looking forward to ICT integrated Visual Art classrooms on the field.

Data collection Procedures

The data collected during this study was to enable the researcher to answer the research questions posed at the beginning of the study. The research generally focused on the subjective experience and perception of the research subjects in ICT. The researcher was the key instrument of data collection. Tools used included semi structured interviews, ‘conversations’ and on-site visits to gather data for this study. Additionally there was a document scrutiny of Visual Art and ICT syllabi, course outlines, course descriptions and other ICT related materials obtained from schools, individual/public/school libraries and CRDD archives. Opinions were also sampled from friends on Email discussion groups, Facebook and Twitter.

Development of Interview Guide.

The Interview guides developed for the study were fashioned out of the research questions, and they summarized the content that was to be covered during interviews. The interview guides dwelt largely on James Spradley’s ethnographic

interviewing, which avoids substantively oriented topics in favour of general questions that draw out the participant's own accounts (Given, 2008). The interview guides designed for this study provided very minimal directions, leading to "less structured" interviews since they were designed primarily to explore the participants' own perspective on the research topic.

Interviewing Types and Procedures.

Interviews conducted in this study were mostly conversational. Conversational interviewing is an approach used by research interviewers to generate verbal data through talking about specified topics with research participants in an informal and conversational way (Roulston, 2008).

In spite of the fact that all qualitative interviewing relies on speakers' everyday conversational resources, conversational interviewing highlights aspects of sociability, reciprocity, and symmetry in turn taking found in everyday conversation.

Conversational interviewers therefore emphasise features of everyday conversation through the facilitation of a research environment in which participants feel free to take part in the discussions of research topics no matter how lengthy they may be. This normally occurs in a less hierarchical environment than that convened in structured interview settings (Roulston, 2008).

According to Roulston, discussions on qualitative interviewing have in many instances associated conversation with research interviews in terms of methodology. He notes that in spite of the fact that different methodologists take to divergent theoretical orientations, the notion that conversation is synonymous with interview is widespread and the qualitative interview has been described variously as a "guided conversation," a "conversation with a purpose," a "professional conversation," and a "directed conversation" (Roulston, 2008).

Conversational interviews, According to Roulston (2008), therefore have long been used by anthropologists and sociologists to talk to people for the purpose of generating data in field studies and ethnographic work. Although this form of interviewing is used by ethnographic researchers undertaking prolonged fieldwork, it is also popular among qualitative researchers who use open-ended, in-depth, or unstructured interview (Roulston, 2008).

Interview procedures varied for each of the three categories of participants. Interviews with curriculum and ICT experts were basically *in-person*, also referred to as face to face because the researcher and participant face each other during the interview conversation. This procedure was considered appropriate, firstly because of the smallness of their number, and secondly because, apart from one participant, all participants were in the same location as the researcher. All interviews were scheduled in advance and locations that were conducive for both the researcher and the participants were agreed on. Most of the interviews in this category took place in the offices of the participants, except in one situation, where the participant agreed to grant at a workshop. Interview types were semi structured and questions were mostly open.

Interviews with students and teachers were also face to face and were held in groups. This is because group interviews are often quicker than individual interviews and hence are time saving and involve minimal disruption (Cohen, Manion & Morrison, 2000). Interviews with students involved closed questions and they lasted between ten and fifteen minutes.

Closed question types of questions posed for students were to ensure that the parameters within which students can frame their answers were specified for them. This made it possible for the researcher to provide possible responses in the questions,

since the objective was to solicit specific information from them. In some cases, responses were limited to “yes” or “no”.

Consequently, interviews with students happened to be more structured, and all the students sampled for the study were treated as focused group from whom the same information was needed from a large number of participants.

Documentary Data.

Softcopies of the Core and Elective ICT syllabi for Ghanaian Senior High Schools, as well as the reviewed syllabi for all the eight areas in Visual Art were obtained on CD-ROMS. Other documents obtained from the Internet included ICT *for Accelerated Development* (ICT4AD) (Ghana’s policy statement on information and communication technology). Documents obtained from schools, libraries and CRDD sources included books, course outlines, descriptions and schemes of work and brochures from CRDD training workshops on ICT. A lot of useful information, including tips and suggestions on ICTs and Visual Art, sample curriculum Frameworks, software and hardware consideration for Visual Art were obtained through the researcher’s Email discussion groups, Face book inputs, Twitter inputs and many Internet resources.

Reliability and Validity

Reliability and Validity address issues concerning the quality of the data and appropriateness of the methods used in carrying out a research project.

Following Guba and Lincoln (2004) cited in Trochim (2006), however, modified interpretations for the Framework of reliability and validity were preferred due to the qualitative nature of the study. Internal validity involved establishing that the results of research are credible or believable from the perspective of the participant in the research (Trochim, 2006). This is because the purpose of the

interviews conducted was to understand issues concerning ICT integration in Visual Art from the participants' points of view, and are therefore the only ones who can legitimately judge the credibility of the results. The major concern of the researcher at this stage was how confident he could be in his observations, interpretations and conclusions (Ary et al., 2002).

More so, the degree to which the results of the study rendered itself to generalization or transferability to other contexts or settings interpreted the external validity of the study. To enhance transferability therefore, a lot of efforts were put into thorough description of the research context and the assumptions that were central to the research (Trochim, 2006). For instance the issues on the acceptability of computer hardware and software in the Visual Art classroom were interpreted purely in relative terms and according to uniqueness of variables. This way, the responsibility of determining the transferability of the results shifts to the person who wishes to transfer the results.

Steps were taken to ensure that instruments used and the subsequent data accrued were valid and reliable. Following Cohen et al. (2000), the researcher was of the view that the most practical way of achieving greater validity in interviews is to minimize the amount of bias as much as possible. According to Cohen et al. (2000, p. 121) "the sources of bias are the characteristics of the interviewer, the characteristics of the respondent, and the substantive content of the questions". In view of this, the following biases were put in check.

- The attitudes, opinions, and expectations of the researcher;
- Tendency for the researcher to see the respondent in his own image;
- Tendency for the researcher to seek answers that support his preconceived notions;

- Misperceptions of what the respondent is saying.

As much as possible, interviews were conducted in the most natural and conducive settings to enhance data collection.

Data Analysis Plan

Data analysis plan for this study was determined by the two main types of data gathered. They are interview transcripts/conversational analysis, and visual data. The main methodology used in analyzing the data collected for the study was Content Analysis. This is the intellectual process of categorizing qualitative textual data into clusters of similar entities, or conceptual categories, to identify consistent patterns and relationships between variables or themes (Given, 2008). It basically involves the process of reducing data and making sense of them or deriving meaning out of them. For this reason it is sometimes referred to as latent content analysis. Content analysis is a commonly used method for analyzing a wide range of textual data such as interview transcripts, recorded observations, narratives, responses to open-ended questionnaire items, speeches, and media such as drawings, photographs, and video (Julien, 2008).

Data analysis therefore involved close reading of texts obtained through data collection, against the background that text is open to subjective interpretation, reflects multiple meanings, and is context dependent. This postulated the use of inductive analysis of data whereby the data collection and analysis took place simultaneously (Ary et al, 2002).

Data analysis in this study has mostly been interpretive and has therefore been more reflexive and reactive interaction between the researcher and the decontextualized data that are already interpretations of a social encounter. In analysing data such as interview transcripts, analyses was made across the whole set

of data to come up with clusters that translated into “themes” from the beginning of the first interview. For example, the interview study that explored the views of teachers about the *importance of ICT in Visual Art* produced interview transcripts that were analyzed for content relating to themes ranging from *unavoidably important to uncertainty to total disagreement*. Because those themes had been identified earlier, the researcher sought evidence for participants’ expressions relating to those themes and also identified new themes that emerged from the analysis of the transcripts.

The guiding principles for data analysis were the principles of grounded theory. This was informed by the researcher’s decision to build his theories for the Framework from the data gathered (Hickman, 2008). Transcripts were generated from the semi-structured interviews and conversations. These were then coded and categorized for emerging themes. Maxwell suggests that the main categorizing strategy in qualitative research is coding (Maxwell, 1998). The Nvivo software was used to classify, sort and arrange information. This provided more time to analyze materials, identify themes, glean insight and develop meaningful conclusions. Where necessary verbatim expressions of the respondents were also used in order to report accurately what the participants had said.

Interpretation of the interview data.

Interpretation of the interview data evolved around Miles and Huberman’s (1994) suggested tactics for generating meaning from transcribed and interview data: These are

- Counting frequencies of occurrence of ideas, themes, pieces of data and words
- Noting patterns and themes, which stem from repeated themes and causes or explanations or constructs;

- Seeing plausibility—trying to make good sense of data, using informed intuition to reach a conclusion;
- Making metaphors—using figurative and connotative language rather than literal and denotative language, bringing data to life, thereby reducing data, making patterns, decentring the data, and connecting data with theory;
- building a logical chain of evidence—noting causality and making inferences; making conceptual/theoretical coherence—moving from metaphors to constructs to theories to explain the phenomena.

The analysis of data so accrued provided clear perceptions of the issues under investigation and accorded conditional propositions, critical examination of which formed the basis for the proposed Framework of an ICT-based Visual Art curriculum for Ghanaian Senior High Schools.



CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

Overview

Data collected for this study was obtained mainly from interviews conducted at various levels and instances. The interviews basically sought to solicit ideas from ICT experts, contributors to curriculum developments, Visual Art teachers and students with regards to how ICTs can feature as tools for the teaching and learning of Visual Art. Interviewees were therefore expected to express their views on the deployment of ICT tools (hardware, software and peripherals) accessible to schools and individuals, in Visual Art activities in Ghanaian Senior High Schools. Visual Art areas explored included all the eight main Visual Art disciplines outlined for study in the current Senior High School Visual Art curriculum for Ghanaian Senior High Schools – Basketry, Ceramics Graphic Design, Jewellery, Leatherwork, Picture Making (Painting), Sculpture and Textiles .

Analyses and interpretation of data accrued from the interviews enabled the researcher to determine the depth and breadth of technology that can be considered in planning the Senior High School Visual Art curriculum. Views, opinions and sentiments expressed brought to light what was known and what was not known about ICTs and Visual Art and this gave reasons and justifications for this research to assume the advocacy stance that it took.

Following qualitative analysis procedures therefore, this chapter entails the non-numerical presentation, analysis and interpretations of the data obtained through the interviews and documentary studies.

Reporting of Findings

Findings from the study are discussed in the light of the main themes that emerged from the study. These are as follows:

- Knowledge base of Visual Art Teachers regarding ICT and ICT tools in supporting teaching skills and educational goals of ICT and consideration for teaching and learning.
- Knowledge base of Visual Art Students regarding ICT and ICT tools in supporting learning skills and educational goals of ICT and consideration for teaching and learning.
- The extent to which ICT tools can be used to support teaching of concepts and skills in Art in Ghanaian schools.
- Considerations for the teaching and learning of Visual Art in the educational goals for ICT in Ghanaian Senior High Schools.
- Teachers' opinions on the importance of ICT in the teaching and learning of Visual Art.
- The role of ICT in the Visual Art classroom as perceived by Visual Art teachers, curriculum reviewers, ICT instructors and students.
- ICT Integration Challenges among Ghanaian Senior High School Visual Art Teachers
- Specific areas of consideration for ICT integration in the Visual Art curriculum

Knowledge Base and Awareness of visual Art Teachers in the use of ICT in Art.

Most of the Visual Art teachers and students interviewed agreed that ICTs indeed provide a set of tools that can serve the teaching and learning of Visual Art

positively. They also believed that the availability of ICT can provide a positive force that would not only promote teaching and learning of Visual Art, but can build up motivation and sense of worth among teachers and students.

Issues about interest and knowledge in ICT usage however attracted split responses between the young and the old. Unlike their young colleagues who were so enthused about computers and their roles in Visual Art, elderly teachers approached ICT issues with some level of trepidation. Though not completely ignorant about computers, they only perceived ICT as some kind of “in-thing” for the youth, as one teacher put it.

Art teachers who have some flair in the use of ICT expressed a lot of concern about the way they are treated when it comes to ICT issues. Until the coming into use of the 2007 syllabus, most school heads did not see where art teachers come in as far as ICT is concerned. For most of the heads interviewed, art teachers are supposed to be satisfied with the conventional art tools and materials available in their studios. A headmaster in one of the schools commented as follows: *“Computers are good but I think we should take our time because parents cannot even afford the traditional art tools and materials, let alone computers”* (Verbatim Comments of a headmaster).

From such comments it seems to be the case that the headmaster was unwilling to support the use of ICT by art teachers. Interestingly there was a lack of enthusiasm and support for the use of ICT in art by some teachers, whose view point was that ICT could not facilitate original works of art. One teacher for instance commented as follows:

You can call it whatever you want, but I would be the last person to call a work generated on the computer as work of art. A painting

without a brush and paint is to me, unthinkable. (Verbatim expression of an art teacher)

Besides, some art teachers themselves were divided on the issue of acceptability of computer generated art works as ‘authentic’ works of art. Some, even though are fascinated about the numerous possibilities provided by the computer in art creation, were reluctant to adopt new teaching techniques. Thus cross sections of teachers were unwilling to embrace ICT in their classroom, owing to what was considered as too new a thing to learn. *“ICT is for children. I see students doing so many things on computers and admire them so much. For me however I am too old a dog to start learning new tricks”*. (Verbatim expression of art teacher)

Some of these teachers are content to stick to the old thing they learnt and would gladly describe themselves as *BBC*, a Ghanaian acronym meaning born before the time of computer, and therefore unwillingness to learn about them, or rather a perceived inability in adjusting to the intricacies of ICT in art.

Interestingly, the use of ICT in the classrooms was quite popular among a section of art teachers, who showed eagerness in using it in their lessons. One teacher remarked as follows: *“I have been very reluctant to do anything manually by way of design or even writing since I learnt to use the computer. Where possible, I even use it to teach some concepts in art.”* (Verbatim expression of an art teacher)

Other factors influencing teachers’ interests in ICT integration are cost of computers and relevant peripherals coupled with the infrastructural base of most of the deprived schools. Considering the problems they encounter even in the acquisition of conventional art material, tools and equipment, they simply think ICT in some of the schools are impossible and therefore had no reason to spend time learning it. *‘ICT has come to serve as a modern tool for visual communication design...My only*

problem is accessibility as far as our economy is concerned. This was a teacher's observation, and indeed many teachers interviewed shared it.

Knowledge Base and Awareness of Visual Art Students in the Use of ICT in Art.

The level of students' skilfulness in the command of fundamentals with common software applications such as Microsoft Word as well as some specialized software like Adobe Photoshop were diverse in all the schools visited. In all the schools visited, there were some students who had more sound knowledge and expertise in the use of certain ICT tools for various forms of artistic expressions than some of the ICT teachers. Ironically as it may sound, these skills had been acquired mostly through students' own outside-the-school activities with friends, families and self-tuition. Some students have access to computers in their homes; some even have laptop computers of their own. The ICT instructor in one of the schools, for example, confessed learning Dream Weaver (for web design) and Adobe Illustrator from a student. In one school, there was a student who had advanced into the design and production of simple computer games.

It therefore became clear in all the schools that students are by far keener to learn with ICT than teachers. Majority (about 80%) of the students have active email addresses and use the Internet and other web-based communication and networking channels such as the Face book and Twitter more often than most of the teachers interviewed.

Unfortunately, some art teachers tend to discourage students from using the computer when they are assigned projects. "Because I always express the wish to use the computer for some of my Visual Art projects, some of my teachers think I am lazy". This was how a Visual Art student bemoaned his frustrations in his desire to

use computers for classroom activities. While some students believe that the computer would be a relevant tool in the performance of certain tasks, some teachers insisted that they should be rendered manually or face the risk of having their works cancelled.

The Extent of ICT Usage to Support Teaching of Concepts and Skills in Visual Art.

Issues concerning ICT usage in Ghanaian Senior High School Visual Art classrooms are like the story about the elephant. Many people admire them but few people really want to own them. Though there was a significant unanimity among teachers on the benefits of ICT in information accessibility, processing and presentation for teaching and learning purposes, few teachers (about 20% of interviewees, mostly young teachers) are actually using ICTs to support Visual Art activities in the classroom. It became obvious that these were teachers whose training back in their universities and colleges entailed the deployment of ICTs, and their specialties were mainly in graphic/communication design and textiles. The use of ICTs for practical visual art works was mainly private and fall outside the formal Visual Art curriculum of the schools. Teachers only use ICTs to support extra-curricular activities in schools such as making posters to announce school outdoor projects, designing T shirts and ceremonial clothes for students and or staff, labeling school properties, cutting stencils for banners and other such activities. Teachers and students in most of the schools made reference to how the computer was used to generate and manipulate images in graphic design, as well as actually producing graphic design products such as posters, labels, illustrations, brochures, books, banners and many others both in class and in income generation activities. In picture making and leatherwork, images were resized and manipulated to the required

dimensions and tones for marquetry by the use of the computer. Two teachers in one of the schools explained how the computer was used to generate images for the construction of a proposed frieze in the school's premises and also cut out stencils from computer generated texts to label all the important places and properties, including the school bus. In two of the schools, the ICT instructors were trained Visual Art teachers.

Majority of the teachers and students are aware of a wide range of information about artists, art history, art movements, aesthetics and criticism, available on the Internet, which makes literature in art education more accessible than ever before. Some teachers disclosed how viewing and downloading images from the Internet has exposed them to a much wider range of contemporary artists, artistic expressions and creativity than they ever imagined. Though many teachers are aware of the use of electronic presentation aids such as LCD projectors, slide projectors and Visualizers, as well as presentations software such as Power Point, they are hardly used in formal Visual Art lessons mainly due to accessibility issues and ignorance.

Though most of the students and teachers were conversant with the emailing systems, Face booking and other forms of Internet surfing, teachers made no efforts at capitalizing on it for student networking and interpersonal exchanges such as students communicating with other students or artists from other schools.

The extent of ICT usage to support teaching of concepts and skills in Visual Art was also weighed against the background ICT infrastructural provision in Senior High Schools. Issues explored are discussed below:

ICT Centres.

In all the schools cited, the most tangible evidence of responses to ICT involved the creation of ICT centres, or dedication of buildings to house computers

and peripherals. These building are boldly labeled as *ICT Centres, Computer Rooms* or *Computer Laboratories* and students were in most cases allowed access to these facilities when it was their turn for ICT Lessons.

ICT Resources Available to schools.

The basal determinants of the quality of ICT usage in Ghanaian Senior High Schools are the availability of computer hardware and software resources. Descriptions of resources in the purposively selected schools indicate certain consistent pattern of hardware and software acquisition/possession as explained below:

Hardware.

The number of personal computers available in the school ICT laboratories was the prime indicants of hardware availability in schools. Most of the ICT resources in the Senior High Schools are kept in the computer rooms. This was a consistent pattern in all the schools.

Hardware Peripherals.

There is limited access to peripherals in most of the schools. At best, schools were equipped with colour inkjet printers and scanners. Four of the schools had digital cameras and LCD projectors that were used for teaching. Interestingly, most Visual Art teachers were not aware that the digital cameras and audio/visual recording components embedded in their mobile phones could serve as useful peripherals for digital imaging activities.

Because schools had few peripherals, students access to these devices were restricted. In all cases, printers were not made available for students' use at all times, because the instructors felt students would misuse them. Students were only allowed

to print their works or use digital cameras and scanners with the permission and supervision of the instructors.

Computers and Software.

The computers used for ICT programmes in all the schools involved in the study were Personal Computers or IBM compatible computers. The six Apple Macintosh laptops observed were private properties of a student and teachers from three separate schools. Each of the schools had between 20 and 50 working computers. Their capacities differ and so are their general performances. No school had a computer classroom furnished with the same brand and quality of computers. Computers available to schools were predominantly Pentium-based, ranging between Pentium 2 and Pentium 4. Two types of software were identified with the school ICT centres investigated. These were Operating Systems and Application programs.

Operating System.

Because all the schools run IBM compatible computers, the operating system they learn is Windows. Versions range from XP to Vista depending on when a particular computer was obtained. Windows 7 was spotted on some computers in five of the schools but they all belonged to teachers. The hardware and operating systems platform available in schools implies that school facilities are capable of supporting art programs such as Corel Draw, Illustrator, Photoshop and the like.

Application Software.

The Microsoft Office suit was available to all the schools studied. Because this software was installed on all the computers found in the schools (and in most cases was bundled with the Windows operating systems), all the schools have access to the Office suit and therefore teach word processing, and some spreadsheet and presentations. The students and instructors interviewed confirmed that word

processing receives the greatest attention in ICT classes. Interviews with ICT instructors revealed that some of the instructors had considerable working knowledge of other programs, yet they did not teach it as part of the normal ICT programme. Interestingly some students had some knowledge and skills that enabled them to use the program for designing. It was realized that some art students had taught themselves the use of software such as Corel draw, Illustrator and Photoshop in various Visual Art praxis. In some of the schools, teachers were, apart from the general ICT periods, allowed to use the computers when and where they felt necessary in their specific areas of teaching. According to a graphic design teacher in one of the schools, art students learn concepts of colour and typography with MS Word.

Internet.

All the schools visited have some levels of ICT connectivity. Though some of them are operating on rather execrable bandwidths, there was a promise of their betterments in the not so distant future. It became obvious that connectivity was always better in urban and the so called grade 'A' schools. This is because some of these schools got hooked long before the government initiative which took off after the 2007 education reform. Some of these schools benefited from the efforts by some nongovernmental organizations to promote project-based, international tele-collaboration activities among secondary school teachers and students from developing countries. Some of their objectives included assisting developing countries to realize locally owned sustainable development by harnessing the potential of information and communication technologies (ICTs). Most prominent among these organizations were the *World Links* and *International Institute for Communication and Development* (IICD). IICD for instance donated a lot of computers and connected

many schools to the Internet through the Global Teenage Project (GTP) between 2000 and 2005, and many urban schools benefited from these projects. Their major Internet service providers (IPS) were Network Communication Systems, African Online and Afrinet.

Around that same period, other business oriented NGOs and some governmental institutions like the Institute of Computer Technology (ICT), World Technology System (WTS), Technonet Computers, Valco Trust, Towers Computers, National Institute of Information Technology (NIIT), Intercom Products and Manufacturing Company (IPMC), Expert Computer Technology (EC TECH), Network Computer Service (NCS), Tower Computers, Atlantic Computers and other ICT companies joined in the ‘technologisation’ of schools. Apart from supplying computers to the schools, they actually saw to the establishment of ICT centres and provided personnel to man and train students.

This trend gave another dimension to ICT in schools where ICT availed itself as a business avenue for ‘ICT companies’. The resultant implications were that ICT companies developed greater interest in Grade ‘A’ schools and therefore sought to direct their operations towards the ‘big’ schools where it was possible for them to reimburse their investments. This was a dangerous trend which had the tendency of further marginalizing the rural and deprived schools which are already disadvantaged.

Considerations for the Teaching and Learning of Visual Art in the Educational Goals for ICT in Ghanaian Senior High Schools.

Until 2008 there was no standard syllabus or clear educational goals for teaching ICT in senior secondary schools in Ghana. The syllabi for ICT programmes in the schools that run some ICT programmes were designed by the instructors

themselves. In the case of ICT centres that were run by private organisations, course contents were determined by such organizations.

As one would have expected, there were no differences in terms of content between the ICT centres run by the schools themselves and those run by private organisations. There was however, a great deal of difference in how the centres function from school to school, and this, to a very great extent, was dependent on the adequacy of computers and quality of staff. It was therefore obvious at the time that school ICT centres with enough equipment (computers and accessories) functioned more efficiently than those with limited equipment. Before the development of the 2008 ICT syllabi, therefore, some schools were far ahead of others because their centres were better equipped and programs were well structured.

As part of the 2007 New Educational reform which was a review of the school system which had run since 1987, the Ministry of Education (Ghana) called for the review of the SHS syllabi to reflect the recommendations made in the Anamuah-Mensah committee report. Based on the emphasis put on ICT by the report, the ministry deemed it expedient to incorporate ICT programmes into the educational system. Again, from a much broader perspective, the fact that the ICT revolution is having tremendous impact on the rapid development of world economies and making national economies more interdependent than they were some years ago was worth considering (Amega-Selorm, 2008). It therefore became a commitment of the Ministry to make Ghana a key player in today's digital age.

After some brainstorming and deliberations, two separate ICT syllabi emerged from the expert ideas of ICT experts and curriculum reviewers for Ghanaian Senior High Schools. The following are the structures for the SHS ICT core and elective syllabi:

Core (Senior High School 1 – 2)

Structure and Organization of the Senior High School ICT Core Syllabus.

The syllabus covers the first and second year of SHS. Each year's work has been divided into three terms. Each term has sections and a number of units. The structure is presented in the table below.

Table 1: Core ICT Syllabus for SHS Year One

TERM ONE	TERM TWO	TERM THREE
Section 1 – Basic ICT Concepts 1. Information and Communications 2. Technology (ICT) Introduction to Computers	Section 1 – Word Processing Application I 1. Word Processing 2. Editing Text in Word Processing Document 3. Formatting Word Processing Document 4. Inserting Tables and Symbols in Word Processing Document 5. Printing	Section 1 – The Internet 1. Internet 2. Using the Internet to communicate 3. Accessing Information from the Internet
Section 2 – Hardware and Software 1. Hardware 2. Software		Section 2 – Project Work Research Report
Section 3 – Typing Speed Development Keyboarding and Mouse Skills Development		

Source: Curriculum Research and Development Division (CRDD), Ghana.

Table 2: Core ICT Syllabus for SHS Year Two

TERM ONE	TERM TWO	TERM THREE
Section 1 – Spreadsheet Application 1. Introduction to Spreadsheet Application 2. Application of Selected Formula and Functions 3. Formatting Worksheet 4. Editing and Printing Worksheet	Section 1 – Presentation Application I 1. Introduction to Presentation Application 2. Power Point Window 3. Creating a Presentation 4. Editing and Formatting Presentation 5. Working with Objects, Images and Pictures in a Presentation 6. Running a Slide Show	Section 1: Presentation Application II 1. The Master Slide 2. Customising Presentation 3. Delivering a Presentation 4. Printing Presentation 5. Developing Organisation Chart
Section 2 – Project Work	Section 2 – Project Work	Section 2 – Project Work

Application of functions to Spreadsheet application.	Developing a Presentation	Creating and Delivering a Presentation of a Given Topic.
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Source: Curriculum Research and Development Division (CRDD), Ghana.

Elective (Senior High School 2 – 4)

Structure and Organisation

Table 4: Elective ICT Syllabus for SHS Year Two

TERM ONE	TERM TWO	TERM THREE
Section 1 – Advanced Information And Communications Technology (Advanced ICT) 1. Introduction to Information System 2. Introduction to Digital Technology and Culture 3. Information Technology in Our Lives 4. Data Representation and Transmission Including Number Bases.	Section 1 – Advanced Word Processing 1. Creating and Editing Word Processing Application Using Variety of Options 2. Business Documentation. 3. Merging Data. 4. Special Tools – (Macros) 5. Printing of Documents	Section 1 – Advance Spread sheet 1. Editing Worksheet 2. Formatting Worksheet 3. Data Handling 4. Data Security 5. Using Function 6. Basic Analysis 7. Special Tools
Section 2 – Project Work Research Work: How ICT has impacted on: - Businesses - Education - Government - Health	Section 2 – Desktop Publishing Software and its Functionality <i>(Adobe PageMaker, Microsoft Publisher or Corel Draw is recommended)</i> 1. Desktop Publishing Application Window 2. Principles of Designing Publication 3. Designing Publication 4. Editing Publication 5. Formatting Publication 6. Printing Publication	Section 2 – Project Work Project Work on Spreadsheet Application.
	Section 3 – Project Work Designing: Greeting cards ,Invitation Cards, Posters Business Cards, Letterheads, Certificates Banners, Brochures, etc	

Source: Curriculum Research and Development Division (CRDD), Ghana.

Table 4: Elective ICT Syllabus for SHS Year Three

TERM ONE	TERM TWO	TERM THREE
Section 1 – Advanced Hardware 1. Hardware Components. 2. The Central Processing Unit (CPU) 3. Main and Backup Storage Media and their Devices 4. Input and Output (I/O) Devices 5. Computer Configuration	Section 1 – Data Communications 1. Application of Data Communication 2. Components of Data Communication	Section 1 – Introduction to Data Processing Systems 1. Concept, Principles and Terminologies of Database Application 2. Creating a Database 3. Managing Data in a Database 4. Working with Queries, 5. Working with Forms 6. Working with Reports,
Section 2 – Introduction to Software Development 1. Operating Systems 2. Utility Programmes 3. Application Programmes 4. Introduction to Software Development	Section 2 – Basic Networking 1. Network Types 2. Network Architecture 3. Network Topology 4. Network Configuration 5. Data Security and Control	Section 2 – Project Work Designing a Class Database
Section 3 – PC Hardware Maintenance and Software Installation 1. Personal Computer (PC) Diagnostic and Maintenance 2. Software Installations and Upgrading	Section 4 – Introduction to Programming (1) 1. History and Development of Programming languages 2. Terminologies 3. Structure of Program 4. Fundamentals of Good Programming Practice 5. Programming Languages, their Characteristics	Section 3 – Introduction to Programming (2) 1. Programme Development Life Cycle) 2. Algorithms 3. Flow Charts

Source: Curriculum Research and Development Division (CRDD), Ghana.

Discussing the SHS ICT Syllabuses.

The Core ICT Syllabus.

Of the two syllabi shown above, only the Core ICT syllabus is currently running. With its main rationale being the introduction of the Core ICT in the SHS system is to provide basic skills in ICT for SHS students, it is expected that the knowledge and skills gained in this course will help students to use ICT in almost all their courses at school. The syllabus covers selected basic topics in ICT which offer

hands-on activities to help students acquire the required ICT skills with the general aims of helping the student to:

1. acquire basic ICT literacy
2. develop interest and use in ICT for learning in other subjects
3. acquire the knowledge for application of ICT in education and business
4. use the Internet to communicate effectively
5. access and share information through the Internet
6. follow basic ethics in the use of ICT
7. maintain high level speed in typing (CRDD, 2008).

Scope of Content. The core ICT programme is a two-year course designed to offer basic knowledge and skills to students. It is also intended to provide students the opportunity to acquire a firm foundation for elective ICT in Year 2 (CRDD, 2008). As indicated in the syllabus the course is based on selected themes which presumably form the basis for ICT literacy. The themes are as follows:

- Introduction to ICT
- Word Processing
- Internet
- Typing
- Spreadsheet
- Presentation (CRDD, 2008).

Pre-Requisite Skills. To begin this course, students should have acquired good reading, writing, numeracy and keyboarding skills and should have gone through the JHS ICT Syllabus. Behaviours required include a sense of responsibility and the ability to follow rules and regulations and perform tasks according to procedure (CRDD, 2008).

Opinions on Core ICT Syllabus (by teachers and ICT experts). ICT instructors agree on the appropriateness of the themes selected for the core ICT course.

Introducing students to ICT as a concept would help equip students with basic knowledge of the key ICTs that are being deployed in the current and emerging information industry. Students are introduced to rudimentary issues in software, hardware and peripheral. Students are, in this course, also exposed to the fundamentals of the arcane terminologies that ICT has spawned over the years.

Adequate knowledge in word processing is also necessary in the pursuit of ICT literacy. Since the computer has literally replaced the typewriter, students need to be familiar with the various skills involved in typing, editing, formatting laying-out and presenting a document the ICT way. This, the syllabus takes care of through the consideration of basic topics in word processing and presentation.

Students' exposure to Internet usage is also considered appropriate. As it stands now, students' knowledge in the use of the Internet is minimal, focusing largely on the components of the cyber world which has to do with entertainment. Students themselves expressed the desire to know more about how the Internet can help them in their academic work. Apart from enlightening students on the right ways of assessing information, teachers also believe that lessons on *Internet usage* would also train students on how to evaluate the kind of information they obtain from the Internet to ascertain its usefulness. It would also train them on the appropriate use of online resources, ethical considerations as well as activities on the Internet which are actually considered as *crime*. Teachers believe that lessons on Internet usage, if taken seriously, would help eliminate *Sakawa* and related criminal activities on the Internet.

Some ICT experts were however dissatisfied with the pace of ICT integration in education in Ghana. Opinions were high on the belief that public statements by

government officials and all the missives on the benefits of ICT to the development of the society have just succeeded in ballyhooing the concept without adequate policy.

I think we are being too frivolous with ICT integration. Schools seem to be satisfied with and proud of owning computers and or getting connected to the Internet. That's it! As to their real impact on curriculum delivery, we seem to care very little about it (an expert's view).

Experts are therefore of the view that ensuring equipping Senior High Schools with ICT tools must go hand in hand with the provision of curricular directives that ensure profitable use of technology. Some teachers even placed the blame on the *Sakawa* menace right at the doorstep of the Ghana Education Service for not being very precise and assumptive about ICT integration as is happening in most parts of the world. One teacher likened the popularity of ICT facilities in our society without prudent national orientation on its usage, especially in schools, to a father who comes home one day with sharp cutlasses and knives, share them among his children without educating them on their *appropriate usage*. With time, children begin to identify its sharp edges, experiment with them and identify appropriate uses to them. *Before you realize, they have started cutting all sorts of things, and if you refuse to intervene in the right time, your head could be on the line* (verbatim expression).

One implicit feature of the Core ICT syllabus was the spots of creative skills knowingly or unknowingly outlined in the topics. Topics such as *Word Processing, Editing Text in Word, Inserting Tables and Symbols in Word, Introduction to Presentation Application, Creating a Presentation, Editing and Formatting Presentation, Working with Objects, Images and Pictures in a Presentation*, which

constitutes about 40% of the syllabus, fall directly within the domains of Visual Art. Interestingly however, it has never been stated anywhere that creative and aesthetic awareness is central to ICT learning. Ironically, Visual Art students are the last to be considered when it comes to issues concerning ICT in schools.

Rationale for Teaching and Learning ICT (Elective). The Elective ICT syllabus is designed with the intention of providing advanced skills in ICT for SHS students. In addition with its intended objective of preparing students towards the pursuance of higher degree courses in ICT, the elective ICT programme also aims at providing students with the basic skills needed for the ICT job market. The syllabus therefore generally aims at helping students in

- the acquisition of advanced knowledge in ICT literacy
- development of enough interest to pursue ICT as a course at the tertiary level
- acquisition of proficiency in the use of ICT tools
- deployment of ICT as a tool for learning other subjects
- acquisition of the basic skills needed for the ICT job market

Scope of Content. The content has been designed to give students the opportunity to acquire knowledge and skills to operate effectively at more than a basic level of competence which will enable them pursue further ICT course or enter the job market. The course is based on themes which form the requirements for an advanced ICT literacy. The themes are as follows:

- Advanced Information and Communications Technology (Advanced ICT)
- Advanced Word Processing
- Desktop Publishing Software and its functionality
- Advanced Spreadsheet
- Advanced Hardware

- Introduction to software development
- PC Hardware Maintenance and Software Installation
- Data Communications
- Basic Networking
- Introduction to Data Processing Systems
- Introduction to Programming
- Introduction to Educational Technology (CRDD, 2008).

Expert Opinions on Elective ICT Syllabus.

ICT instructors were not aware of when the Elective ICT programme is going to take off. Experts are of the opinion that the syllabus is inherent with thematic inconsistencies and structural imbalances. Unlike the core ICT programme which aims at equipping all SHS students with basic knowledge in ICT, interviews with instructors as to which category of students or to which course area has the Elective ICT syllabus been designed yielded diverse responses which were only good enough to get the researcher confused. Majority of the respondents expressed the view that the core ICT should rather be extended to the third and the fourth years in SHS to cover the themes outlined in the elective syllabus, since most of the themes are not exactly esoteric and therefore can benefit every SHS student. One expert was of the view that “*if ICT is really intended to an elective programme at the Senior High School Level, then the current curriculum must be completely rethought*”. The view that ICT should be integrated into specific course areas to form part of the teaching and learning process was embraced by all teachers, students and ICT experts.

It was observed that the content of the current Elective ICT syllabus does not exactly satisfy whatever ICT as an elective subject should entail, and the decision to suspend its commencement was considered thoughtful.

Again, just like the Core ICT syllabus, Visual Art topics are more pronounced within the Elective ICT syllabus than any other topic. All topics listed under “Advance Word Processing” and “Desktop Publishing” are esoteric Visual Art disciplines. They include *Creating and Editing in Word Processing Application, Desktop Publishing Application Window, Principles of Designing Publication, Designing Publication, Editing Publication, Formatting Publication, and Printing Publication*. Technically speaking therefore, going by the content of the Elective ICT syllabus as it stands now, it qualifies to be an elective course for Visual Art more than any other subject.

Reference Tools.

Some common reference software such as the Encarta Encyclopedia was available in all the schools; Comptons Encyclopedia, Comptons Interactive Holy Bible, Webster’s Interactive Dictionary Encyclopedia and WordWeb dictionary were also available in some of the schools. These software applications are used to support traditional teaching practices. Teachers asked their students to search for information using reference software. As was evidenced there were no coherent educational goals regarding the use of ICT for teaching Visual Art and consequently strategies were based on teachers’ own initiative and theory. This was often problematic because some of the teachers’ own knowledge was often at foundation stage.

Opinions of Teachers and Students on ICT Integration in Visual Art.

Disagreement between ICT and Visual Art. Teachers’ agreement to issues concerning ICT integration into Visual Art practices was shrouded in uncertainties and dubieties. Even though no teacher or student denotatively expressed any view to the effect that ICTs conflicted with any known belief in conventional Visual Art practices, majority of elderly Visual Art teachers perceived ICT integration as

infiltration. Whilst accepting them as works of Art, many were teachers who maintained that though they had “*not seen so much of digital art works*”, works produced “*by the computer*” can never be equaled to those produced through the traditional media. Even when it was pointed out to them that the computer does not produce works of art but an artist does so with the computer as a tool, they insisted that, “*Whichever way one looks at it, digital art works still lack those human elements that qualify them to be creative works of art*”. Even among those whose convictions about ICT integration seemed somehow unintimidated, opinions were high on the belief that “ICT would only be good enough for graphic design, textiles and photography and not the other Visual Arts like painting, sculpture and ceramics” (a verbatim expression of a respondent). One teacher defined digital painting for example as *hollow* because the processes involved are unimpassioned. To him and others who expressed similar sentiments, though technology-based art could be practiced, creating art via the computer can never replace the personal and engaging processes that characterise the art of painting when rendered directly by the artistic figures on a canvas.

The opinion that ICTs would cheapen artistic practices and render Visual Art professions porous was also shared by two elderly teachers. One of them, a graphic design teacher pointed out how he abhorred the situation where students approached the computer with no ‘plan of work’ in mind, but rely on the numerous effects within the computer to generate an image. He also pointed out that heavy indulgence in the use of ICT in art would blur the distinction between professionally trained artists with creative sensibilities and untrained practitioners, and hence cheapen the profession. Concerns were also raised the proliferation of “wayside designers” who consider

themselves as artist as soon as they lay hands on some computers and peripherals were cited.

For most of the young Visual Art teachers on the other hand, ICT in Visual Art was perceived as an avenue for all-encompassing creative expressions. They believe that ICTs are extending the boundaries of Visual Art and opening up more opportunities for students to acquire cutting-edge skills that would fit them into the modern Visual Art industries. These teachers expressed a lot of worry about the slow pace at which ICT integration in the normal classroom activities was going for Visual Art. One teacher decried what he described as unfortunate an incident he experienced at one of the WAEC marking centres where some graphic design works were brutally marked down because examiners identified traces of computer usage.

Among Visual Art students, ICTs were perceived as the best things that have ever happened to the learning and practice of Visual Art. Among the recounted advantages are precision and finesse in computer assisted designs, fastness in performance, opportunity to explore widely and wildly, accessibility to much wider range of tools, colours and effects, prestigious feeling at work, availability of extensive sources of ideas, information and inspiration, and many others.

Perceived importance of ICT integration in the teaching and learning of Visual Art.

All the interviewees agreed on the importance of ICT in the art classroom. However, most of them perceived the importance more from the perspective of emerging technological trends than their own belief. In other words, they think once ICT has become so ubiquitous, art students need not be denied the opportunity to have a feel of it. To a very large extent, the perception that ICT is a latest vogue was considered by many teachers as enough reason to endorse ICT integration.

Importance of ICT integration was considered by all the teachers along the lines of job avenues and career opportunities for students. It was a common view that students need to be equipped with adequate knowledge in ICT to enable them function effectively in the job market where ICT is pervasive. All teachers (including those with misgivings on ICT integration) were therefore of the opinion that ICT integration in Visual Arts education is necessary and need to be considered as ineluctable part of art teaching in our times.

Comments from most of the teachers suggested that integrating ICT would also positively impact on perceptions of Visual Art as a subject. One teacher's observation was that *"as people observe artists use the ICT in diverse ways, the erroneous notions some people hold that Visual Art is an inferior subject would become baseless since artists would be competing with those in the sciences in the use of technology"*.

The view that integration of ICT into the study of Visual Art would make art more attractive and prestigious both as a subject and a profession was shared by both teachers and students.

Five teachers identified ICT as playing an important role in absorbing students into the Visual Art programme in schools and propelling them to hold on. Two teachers pointed out how ICT is luring a lot of students into Graphic design because the computer is now featuring as a major tool.

ICT Integration Challenges among Ghanaian Senior High School Visual Art Teachers.

All the teachers interviewed identified lack of knowledge or understanding of best curricular uses of technology owing to insufficient training, support and models of best practice as primary barriers to ICT use in the Visual Art classroom. Issues

evolved around what software to use, how to integrate it into the curriculum, and how to organise classroom activities. It was a general view that the country's effort at integrating ICT on the wholesale is not in congruence with the level of ICT literacy of teachers on the field. ICT enthusiastic teachers lamented the GES' failure to identify the peculiar nature of ICT in Visual Art in terms of hardware and software demands, as well as training. In their view, general ICT training workshops have not been very beneficial to Visual Art teachers, since they involve the use of basic software such as Microsoft Word and Excel rather than applications designed to support creativity.

Few teachers cited the cost of computers and peripherals as barriers to ICT integration. Though some teachers claim that computers and peripherals are too expensive for parents to acquire for their wards, it was generally agreed that ICT is one technology that has experienced a downwards trend with regards to the cost of its resources and artifacts. Today, the cost of a brand new computer is about half of what it used to be some few years ago when its working capacity and general performance was far lower than what it is now. The consensus opinion was that the cost of accessing ICTs is becoming cheaper with each passing day since many people are investing into it. As some teachers observed, costs of computers are considerably low (thanks to the availability of used but fairly good computers in the market), Internet accessibility and availability is considerably good (especially now that it has become possible to browse on mobile phones), "*and so any teacher who is not onboard the ICT train is simply not interested*" (a verbatim expression of a teacher).

As recorded earlier in the *Knowledge base and awareness of art teachers in the use of ICT in art* (see page 80), some teachers, especially the elderly, consider themselves too old to bother themselves with new learning. Instead they preferred falling on the 'young men' whenever they needed 'ICT related assistance', as one of

the respondents hinted. To elderly teachers, experimenting with technologies and planning lessons using new methods that incorporate ICTs was too time consuming and beyond their age.

Areas of Consideration for ICT Integration in the SHS Visual Art Curriculum.

Teachers, students and ICT experts projected a lot of ideas concerning ICT integration in Visual Art. Though some teachers feared that ICT in Visual Art would be beneficial only in the study and practice of graphic design, it was generally believed that ICTs can feature in all the eight areas of Visual Art pursued in the Senior High Schools, namely, graphic design, picture making, textiles, jewellery, basketry, leatherwork, ceramics and sculpture. This was corroborated by inferences made through expert views, literature search and other field works that suggested an unflinching support of numerous computer hardware and software application to the teaching and learning of the eight visual art disciplines in Ghanaian Senior High Schools.

In the first place, the fact that ICT places imaging and image productions into two and three dimensional scenarios was identified as enough grounds for its integration since the Visual Art forms studied in schools conform to the same premise. Even though most of the ICT experts interviewed were not visual artists in the right sense of the word, they had no difficulty in identifying ICT tools (hardware and software components) that could efficiently feature in the two and three dimensional modules of visual art studies.

It was generally observed, for instance, that existing hardware available in schools with ICT laboratories (computers and peripherals) are supportive of basic art and design software. It was also observed that quite a number of software applications

for art and design, some of which are industry standard applications, are either already accessible to teachers and students or are known to them. Most prominent among them are some essential packages in the Adobe Creative Suite such as Adobe Photoshop, Adobe Illustrator, Adobe Flash, Adobe Fireworks and Adobe Dreamweaver; essential packages in the Corel Suite such as Corel Draw and Corel Photo paint. For the benefit of studies in the three dimensional areas, experts suggested popular 3D applications such as Rhino, 3D Max, Cinema 4D and Maya. Other 2 and 3D packages identified are listed in the appendix.

Another area of importance that was mentioned was General Knowledge in Art (GKA), a programme which, according to teachers and students, has never been taken seriously since the inception of the 1987 educational reform which brought it into being. The only one text book which was published in 1987 (which is indeed, the only text book for the entire Visual Art programme) has never seen even a single review, whereas most of the text books in other disciplines such as mathematics and science have since the Reforms, been reviewed every now and then. Yet, teachers were confident of the relevance of the GKA rationales which, according to one respondent, *'suggests a lot of creative, innovative and adaptive practices on the parts of both teachers and learners'*. The programme is pregnant with a lot of well-intended themes and objectives which make it a very crucial area of study for students, a critical look at which would even qualify it for a compulsory programme alongside Mathematics and English for every student in the Senior High School. The outlined objectives for GKA are as follows:

To help students to

- appreciate art as an integral part of living

- develop pride, confidence and patriotism through appreciation of their own art creations
- develop the capacity for creativity through exposure to variety of art activities using traditional and contemporary tools and materials
- be visually literate in skills, competencies and in modes of art appreciation and criticism
- be exposed to the philosophical, anthropological and religious values of art
- acquire perceptual and analytical skills through art experience and the processes of self-expression and communication
- develop the ability to harmonize opposing ideas, contradictions and inconsistencies to design and make art works
- be aware of the variety of vocations available in the field of art and opt to choose a career in the field of art
- acquire basic entrepreneurial skills for self-employment
- develop skills in the use of the computer to design and make artworks (CRDD, 2008).

The decision to make it compulsory for all Visual Art students and an additional elective for some Home Economic students therefore is considered very thoughtful and beneficial.

Fortunately, ICT experts, teachers and students agree that an ICT-based Visual Art curriculum would not only suggest effective ways of carrying the objectives of the programme through, but also salvage the image of GKA and provide a lot of tools for pedagogical innovations and transformations that would establish it in its right position in the Visual Art programme. It was observed for instance, that the Internet provides a valuable source of information for the teaching and learning of GKA.

Summary of Findings

This study has shown that most of the teachers in the Senior High Schools have a fair knowledge about the advantages and potential for ICT integration, particularly in relation to students' engagement, motivation and career opportunities.

Despite the seeming differences in opinion about ICT integration in Visual Art among some teachers, Visual Art teachers and students believe that there are more legitimate educational reasons for the integration. Even those who are vehemently opposed to full integration of ICT for the fear that it would subvert and supersede, rather than supplement, have a lot of positive ideas to share about ICT. However, few of them are either willing, feel obliged or can actually do so. Two reasons identified for this are (1) a significant diversity in ICT proficiency and understanding among teachers due to lack of training and support and (2) lack of coherent curriculum direction that commit teachers to consider integration as a serious issue.

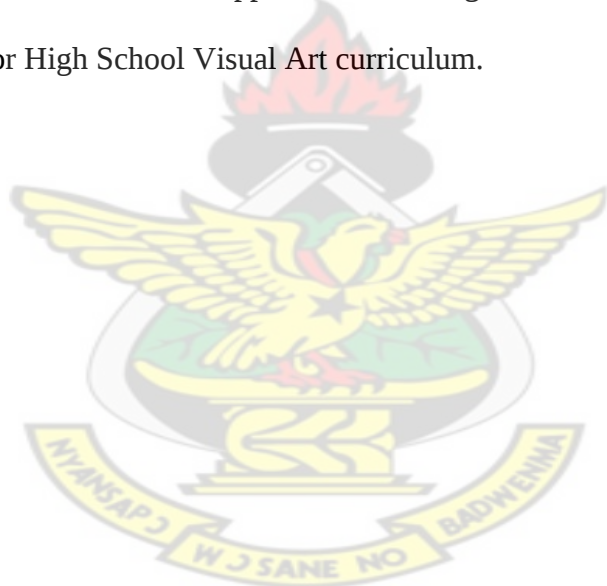
It is obvious that the government's efforts at ICT integration in schools have been too superficial and devoid of substantive objectives, and therefore do not target at any empirical outcomes. A clear case is the Elective ICT syllabus which had to be suspended after so much had been put into its design and publication.

This study therefore argues that transformative use of ICT in schools must travels beyond the provision of syllabi, computers and Internet facilities. It also needs to target at a more composite and proactive professional development which requires a clear emphasis on addressing both the 'hows' and the 'whys' of ICT integration (Phelps & Maddison, 2008).

The trend of responses from Visual Art teachers about ICT integration are also suggestive of the view that integration cannot be complete without the consideration of the professional opinions of Visual Art teachers. Many Visual Art teachers,

especially those with specialties in painting and sculpture, continue to think that introduction of technology into Visual Art would dilute the purity of art forms. Any form of integration therefore needs to ensure that ICT does not, and indeed, cannot belie traditional art practices, but rather builds from past traditions and projects traditional Visual Art education as the heart of the new digital art programmes. Assurance to this effect, coupled with a coherent body of knowledge amongst art educators as to how this could be done is necessary for a smooth take off into effective ICT integration into the Senior High School Visual Art curriculum.

In the chapter that follows, an effort has been made at putting together a structure intended to serve as a support as well as a guide for integrating ICTs into the Ghanaian Senior High School Visual Art curriculum.



CHAPTER FIVE

PROPOSED FRAMEWORK FOR INTEGRATING INFORMATION AND COMMUNICATION TECHNOLOGIES INTO THE GHANAIAN SENIOR HIGH SCHOOL VISUAL ART CURRICULUM

Overview

As indicated by the literature, integrating ICT into the school curriculum goes beyond typing and printing out handouts for students or creating a spreadsheet that calculates student grades, or teaching with Power point presentation aid, or browsing the Internet for information or teaching students the various types and components of a computer, or even teaching students how to do all or any of the above.

Based on the responses from teachers, students and experts in various fields of ICT, a better view about the form ICT integration is supposed to take in the Visual Art curriculum for Ghanaian Senior High Schools has been deduced. These views have been formulated into ideas, concepts and competencies to compose the Framework for Integrating ICTs into the Visual Art curriculum. This is in line with the proposition by Tyler and Taba that “efforts at Framework of curriculum design, should be guided by information gained from industry, the students, educators, and society as a whole” (Eryaman, 2010, p. 320).

The ideas comprise declarative statements that describe concepts and provide focus on specific content for all students. The concepts describe the key knowledge students are supposed to know, whilst the competencies describe what students should be able to do.

These guidelines have been designed based on the current ICT hardware and software profiles of Ghanaian Senior High Schools. This is against the background that though many schools are highly under resourced (and in most cases hardly

resourced at all), it is also true that as inadequate as ICT resources may be in most schools, adequacy in usage is barely enough, and especially in the case of Visual Art studies.

This Framework therefore seeks to answer the question of how any Visual Art Teacher who considers him/herself averagely knowledgeable about computers gets started when he/she finds him/herself in a school that has computers for teaching and learning purposes. The proposed Framework, simply put, prescribes broad areas of consideration for an average ICT-literate art teacher. It therefore does not include details such as how the various physical components of a computer works, which is not very necessary for a classroom teacher. That would be analogous to learning how a car's engine works before driving one. The major concern would rather be how to use and apply the computer in the Visual Art classroom. With this focus, this Framework does not consider ICT as some sort of stand-alone programme of study which is supposed to be learnt on its own merit, but a means for teaching to achieve the instructional objectives in the Visual Art classroom. The difference between this approach and existing practices is that, the Visual Art teacher would be concerned about *integration* of ICT into the normal Visual Art classroom, and not the *teaching* of ICT. What has been presented in this chapter, therefore is a conceptual guide towards ICT integration in the Visual Art programme in Ghanaian Senior High Schools.

Conceptual Framework

In spite of disparate levels of competencies and awareness recorded among Visual Art teachers and students, it is generally agreed that ICT provides wonderful tools that can be used to assist teachers and students in the classroom. Today, encouraging teachers to master and use ICT to assist them in their various roles as

torchbearers of the nation's educational goals is the order of the day. However, all such calls are virtually mute on the form that ICT integration in education is supposed to take.

The Ghanaian ICT policy statement outlines very interesting and mouthwatering objectives for ICT integration in the educational system, yet the nation is yet to witness any serious stride towards its comprehensive implementation by the seven key implementation agencies cited – The Ministry of education, Youth and Sports, Ministry of Employment and Social Welfare, the Universities, Polytechnics, Colleges and Research Institutions, the Private sector, Local and Foreign Educational Training organizations, Local and Foreign non-governmental organizations and Trade and Labour Unions and Associations (ICT4D Policy, 2003). Though some efforts are being made by some agencies within the Local and Foreign Educational Training organizations such as IPMC, NIIT, Kofi Centre for Excellence, this can hardly be considered adequate since it has very little to do with the Basic, Junior High and Senior High Schools that form the core of the nation's educational aspirations. This is not to mention the uncertain manner in which ICT is featured in the teacher training institutions.

As per the expectations of CRDD, Visual Art curriculum in the 21st century should aim at helping students develop creative skills, critical appreciation and knowledge of artistic techniques and technologies. It should also aim at developing students' sense of personal and cultural identity and equip them for lifelong involvement in the practicing and the appreciation of art. Besides, a Visual Art curriculum must also take cognisance of the following goals and philosophy for Visual Art:

- Provision and enrichment opportunities and skills for self-expression and social, intellectual, emotional, and creative growth
- Stimulation of students' creative needs and enhancement of skills in expressing personal interest and aptitudes
- Helping to develop a positive self-image within students as well as respect for their own creative work and that of others.
- Promoting the development of problem-solving and decision-making skills (CRDD, 2008).

Anyone who is awake to our modern technologically saturated environment would agree that most, if not all, of the above goals would hardly be achievable without some degree of ICT intrusion and infusion.

The Scope of the Framework

This study has not suggested specific courses and appropriate durations or specific programme requirements. The Framework therefore does not make any attempt at prescribing to curriculum developers what areas of knowledge should be important to them. It only proposes a set of modules which would provide a list of general areas relevant for Integrating ICTs into the Visual Art curriculum. Developers are expected to infuse the topics derivable from the proposed modules according to the demands of the various Visual Art programmes outlined in the curriculum. As a practical document, the Framework is designed to assist educators and students on a variety of levels – from the creation of individual courses to the development of complete teaching syllabi.

Areas of Consideration

The Senior High School Visual Art curriculum embraces eight broad areas in Visual Art, three of which are two-dimensional (2D) and five three dimensional (3D)

disciplines. The 2D disciplines are Graphic Design, Picture Making and Textiles. The 3D disciplines consist of Basketry, Ceramics, Jewellery, Leatherworks and Sculpture. From these eight areas, each school (that offers Visual Art) is expected to run at least two disciplines, that is, one 2D programme and one 3D programme in addition to General Knowledge in Art. Broadly speaking, it implies that every school is running two categories of Visual Art – 2D and 3D.

The suggested Framework therefore pays a lot of attention to these two broad categorizations since they have so much in common in the consideration of ICT applications for Visual Art. For example, the same software that can be used in ceramics modelling can also be applied in sculpture, basketry and jewellery. In many instances, applications for certain 2D projects apply to some 3D projects as well. For example, the same software used to manipulate and edit images in picture making (or painting) may be used to edit and manipulate images in sculpture, basketry, jewellery and ceramics. Most of the tools used for illustration and creation of various forms and motifs are common to graphic design, textiles, jewellery, leatherwork and many more. Issues concerning software and hardware would therefore overlap in certain instances but would be adequately discussed under appropriate headings.

Another important area of consideration involves the role of ICT for general studies in Visual Art or General Knowledge in Art. To a very large extent, this has been a major consideration in this study since it constitutes the central point for the performance of all forms of creative activities. This area embraces studies in the elements and principles of art, history, criticism and appreciation of art.

Information and Communication Technology Considerations for Visual Art (ICTC4VA)

Various views expressed by Visual Art teachers and ICT experts suggests that any proposed Framework for ICT integration into Visual Art should be liberal enough to make teachers key players in its adoption and implementation. To reflect this important concern, the term *Information and Communication Technology Consideration* (ICTC) was considered as an appropriate reference to the ICT modules described in this Framework. The modules shall therefore, in appropriate contexts, be referred to as *Information and Communication Technology Considerations for Visual Art (ICTC4VA)*. This is to remove any form of compulsion this document may seem to suggest and also to eradicate the thinking that ICT is replacing traditional art teaching and learning. It would also make it possible for Visual Art teachers to interpret and adopt ICT based on their personal views, beliefs and biases. For instance where teachers are of the notion that traditional art making must go hand in hand with digital media, it should be possible to use digital tools only as means of getting students to gain further insight into traditional art making. At the same time, in order that student may not miss out in current trends in Visual Art praxis, it is ensured that the modules suggested in this Framework is in conformity with some of the key learning domains for ICT literacy such as

- Communicating, expressing creativity, enquiring and problem solving
- Using ICT productivity and communication tools
- Developing operational knowledge and concepts
- Developing critical awareness of the personal and societal impact of ICT

(NCCA, 2004)

ICTC4VA therefore suggests infusion of technology, whereby technology would contribute to the teaching and learning process. ICTC4VA also serves as means of ensuring that technology is appropriately and purposefully applied to develop ideas and think creatively in Art. This would ensure that ICT is appropriately selected, so that art students would not be exposed to areas in ICT that have no direct bearing on their area of study. This way students would not only acquire some vague skills and think that they are ICT literates but would really know *what* ICT is available, *when* to use it and *why* it is to be applied for a specific task.

In this pursuit, ICTC4VA, being in congruous with the literature and expert views, would ensure that a coordinated developmental approach to the students' developing ICT literacy will incorporate both *learning about*, *learning with*, and *learning through*, ICT:

- *Learning about ICT*: Programmes at this stage would conform with the *emerging approaches* to ICT integration. ICT would be presented as a subject under study whereby its technological tools are the subject matter in themselves. Students will learn the history and parts of the computer, how to programme, how to navigate around a graphical user interface and so on. The goal of this approach is for students to develop mastery over technology, whilst developing skills in, and knowledge of, the potential uses of ICT.
- *Learning with ICT*: This stage would be structured to align with the *applying approaches* to ICT integration. ICT will be used as a tool for productiveness or enrichment resource. Teachers and students will use ICT resources to support classroom practices based on their understanding of contributions of ICT to learning through experiences at the emerging stages. Opportunity will be created for students to browse the Internet for information to prepare notes,

and also use ICT tools to complete lessons. Computers will at this stage be seen as better typewriters, calculators, and grade books.

- *Learning through ICT*: This stage will take care of the *infusion approach* to ICT integration. Teachers and students will at this stage use ICT to learn in new ways that were previously not available. Teachers will explore effective ways of combining technology with personal productivity and professional practice as they identify software and other ICT resources that enhance practice (UNESCO, 2002).

It is obvious that the first two concerns of ICT integration (*learning about and learning with ICT*) are supposed to be taken care of by the core ICT programmes in schools. The themes outlined in the SHS core ICT syllabus are adequate to introduce students to ICT as a concept, technology and a productivity tool.

ICTC4VA would therefore put teachers on the alert to identify and plan for which and when ICT usage is appropriate in their lessons because being able to identify and clearly stating your *teaching intent* is a valuable first step in teaming up with computers to teach (Geiset & Futrell, 1995). Teachers would then have the option to consider whether ICT when applied in a particular lesson would add value to the lesson. In other words, they will find out whether the lesson outcomes can be achieved without the use of ICT or can be better achieved with the use of ICT before deciding whether or not to consider ICT in the lesson. ICTC would in this way support Visual Art teachers in the improvement of lesson design and delivery as well as transformation of teaching and learning strategies. It would also help them to engage and motivate students more effectively.

To students, ICTC4VA is intended to get them exposed to alternative and challenging ways of learning as they experiment with a wide range of resources and

techniques to support creative and critical thinking. ICTC4VA in art lessons would also make it possible for students to access a much wider range of past and contemporary art works as they visit online museums and galleries on the Internet. All these are besides that major opportunity it would afford students in development, creation and manipulation of two and three dimensional forms, provided within the Framework of independent creative thinking devoid of any fear to experiment and taking creative risks.

To curriculum planners, ICTC4VA intends prompting an adaptation of a pace of curriculum development which would be challenging and yet realistic in the sense that it takes cognizance of the emerging technological trends in the teaching, learning and Visual Art praxis.

Theoretical Underpinning for ICTC4VA

The literature suggests that earlier theories and principles of learning support ICT integration into the study of Visual Art. ICTC4VA therefore draws significantly from views expressed in the confluence of several theories that have informed popular understanding of the nature and context of learning. ICTC particularly hinges on the constructivist theory of Jean Piaget which posits that learners' understanding of the world grows in richness and depth when they assimilate new information into their existing mental structures. As indicated by the literature, these ideas are core concepts of the constructivism view of the learning process which, among other things, also ensures that an environment has been created to provide opportunities for learners to experience multiple perspectives.

Some other influential theories that relate to new views of the learning process, and upon which the foundation of ICTC has been laid are

- *Vygotsky's socio-cultural theory of human learning* which advocates for the provision of socially rich environments in which students would explore knowledge domains with their fellow students, teachers and outside experts
- *Anchored instruction*, an approach to designing instruction that is 'anchored' in a real world context, problem or situation. Through this theory, technology has been used to help create 'real world' contexts and situations through the use of video.
- *Distributed cognition* emphasises on interaction with others, involvement in dialogue and discourse, making of private knowledge public and development of shared understanding as means of fostering cognitive growth. The interest in this construct lies within its premise that learning is not a sole pursuit but is shared with mediating resources found within the learning environment. As explained by Steketee (2006), learning from the viewpoint of distributed cognition, is distributed across minds that are connected by way of the activity within which they are collectively participating (Steketee, 2006). The assumption is that no one particular entity embodies knowledge, rather it is a property of the student's engagement with the specific situation at hand; it is spread over the entire context which includes people, resources, rituals and culture (Hutchins, 2000; Rogers, 2004 cited in Steketee, 2006).

The set of topics proposed for this study would reflect these theories.

Expected ICT Competencies and Learning Outcomes

The expected competencies and learning outcomes for the ICT-Based Visual Art curriculum would not be too different from the competency and learning outcome expectations of the current Visual Curriculum. This is because there has been no

change in the scope of the Visual Art programme itself. In other words, ICTC4VA has a sole objective ensuring that Visual Art learning outcomes are achieved through modern technology. Expected competencies would therefore boarder around ICT skill acquisition in Visual Art practices. In a document provided by CRDD, competency expectations for ICT-based Visual Art education, described as ‘the 21st century skills’ are discussed under three main skills – Information Literacy, Media Literacy and ICT Literacy:

- *Information Literacy*
 - Accessing information efficiently and effectively, evaluating information critically and competently and using information accurately and creatively for the issue or problem at hand
 - Possessing a fundamental understanding of the ethical/legal issues surrounding the access and use of information
- *Media Literacy*
 - Understanding how media messages are constructed, for what purposes and using which tools, characteristics and conventions
 - Examining how individuals interpret messages differently, how values and points of view are included or excluded and how media can influence beliefs and behaviors
 - Possessing a fundamental understanding of the ethical/legal issues surrounding the access and use of information
- *ICT (Information, Communications and Technology) Literacy*
 - Using digital technology, communication tools and/or networks appropriately to access, manage, integrate, evaluate and create information in order to function in a knowledge economy

- Using technology as a tool to research, organize, evaluate and communicate information, and the possession of a fundamental understanding of the ethical/legal issues surrounding the access and use of information (CRDD, 2010)

Expected learning outcomes would include students' ability to

- aesthetically express their ideas, feelings and opinions concerning their place in the school, family, community and the world at large to bring about personal development through ICT
- understand the risk and challenges facing them in today's technology driven world by being able to use technology to analyse, explain, interpret and organise their findings through the elements of art
- use ICT skills to transform Visual Art media into an individual and critical response to bring about awareness and change in their world (CRDD, 2010).

Proposed Modules for an ICT-Based Visual Art Contents for Senior High Schools

The proposed Framework for ICT-based Visual Art curriculum begins with a description of ICT-Based Visual Art Modules. The modules describe areas of knowledge for the eight areas of Visual Art, as well as General Knowledge in Art (GKA), as pursued in the Ghanaian Senior High Schools. These areas of knowledge are intended to categorise recommended skill sets that students would learn through ICT integration in their Visual Art studies. All propositions aim at bringing to bear the required knowledge for effective participation in the current Visual Art industry, as well as production of the next generation of Visual Artists in Ghana.

The following table (Table 6) shows seven main Modules that constitutes ICTC4VA. The Modules have been itemized as Modules 1 to 8 (M1 – M8). The three

columns in the table provide information on each of the Modules, their Descriptions and Strands. The *Modules* are self-contained units of learning constituting the curriculum Framework. The *Descriptions* expound the expected learning contingencies and set the scope for the Modules whilst the *Strands* translate the modules into study areas from which specific topics could be derived.

Table 5: Modules for ICT integration into the Senior High School Visual Art

Module	Description	Strands
M1 General Studies: The study of basic artistic skill sets such as the Elements and Principles of art, Colour theory, layout and composition through ICT.	a. Courses to be derived from this model should include the use of appropriate software and hardware to generate simple to complex two and three dimensional drawings both in vectors and in pixels. b. Courses should also aim at introducing students to the concepts of design elements and principles, colour theory, layout, composition, etc., and deepening understanding in their application.	<i>Topics to be considered should be derived from the following strands:</i> • Introduction to computer hardware and software for Visual Art. • Digital drawing (Vectors) with draw programs. • Digital drawing (Pixels/Bitmaps) with paint programs. • Digital Imaging (digitally generating with the computer and peripherals such as scanners, digital cameras, graphic tablets and other digitizers). • Creating the elements of design. • Organising the

		elements according to the principles of design (moving, sizing, transforming and sampling of digital images, etc). • Layout • Typography • Colour theory (How the Computer perceives colour) – Understanding the colour space and colour models and gamut.
M2 Digital Art History	Courses should cover topics that distinguish Digital Art from other art forms as it has developed and gained signification in the history of Art.	<i>Topics to be considered should be derived from the following strands</i> • What is Digital Art? • Why Digital Art? • Digital Art Defence • Origin of Digital Art • The Scope of Digital Art • Exploring Digital Art Systems – Advance studies in Art hardware and applications. • Digital Art terminologies. • Digital versus Traditional Art forms – advantages and

		disadvantages	• The future of Digital Art
M3	Computer Assisted Art I: 2-Dimensional	Courses should equip students with further skills and deepen understanding in the use of technology for the production of real time 2D artworks such as drawings, illustrations, communication designs, paintings, pictures and photographs.	<i>Topics to be considered should be derived from the following strands:</i> • Digital drawing • Digital Illustration • Designing for Communication – Organisation of text and images for communicative purposes. • Designing for Textiles • Digital Painting • Digital Picture making (collage, mosaic, montage, letter cole, marquetry, etc) • Digital Photography
M4	Computer Assisted Art II: 3-Dimensional	Courses should equip students with further skills and deepen understanding in the use of technology for the production of real time 3D artworks in the areas of sculpture, ceramics, jewellery, basketry, leatherwork and other forms of product designs.	<i>Topics to be considered should be derived from the following strands:</i> • Introduction to 3D software • Introduction to 3D drawings • 3D Computer Modelling • Rendering

M5 Digital Input	Courses in Digital Input should expose students to the practical application of uploading images and data into the computer for processing.	<i>Topics to be considered should be derived from the following strands:</i> • Advanced scanning and digitization techniques • Digital Photography
M6 Digital Output	Courses should expose students to the practical application of exporting a processed work back from the computer into the real-world as a tangible work of art (hardcopy).	<i>Topics to be considered should be derived from the following strands:</i> • Exploring various printing tools, materials, equipment and technologies such as Computer Aided Manufacturing, Image Making and others. • Understanding digital printing techniques • Experimenting with printing or projecting onto a variety of materials, such as film, canvas, cloth and metal. • Rapid prototyping
M7 Multimedia	Courses to be derived from this module should introduce student to the rudiments of computer-based materials designed to be used on a	<i>Topics to be considered should be derived from the following strands:</i> • Introduction to multimedia systems

	computer that can display and print text and high-quality graphics, play pre-recorded audio and video material, and create new audio and video recordings	• Multimedia applications • Introduction to presentational applications • Introduction to animations • Video editing basics • Audio editing basics • Web design/authoring
M8 The Internet	Courses should direct students in the appropriate and effective use of the Internet and Internet resources, with the aim of enhancing the study of Visual Art. 	<i>Topics to be considered should be derived from the following strands:</i> • History of the Internet • How the Internet works • Browsing the Internet • Using search engines • Bookmarking • Downloading • Uploading • Chatting • Emailing • Internet ethics

The modules presented above are proposed to form the basis for an ICT based visual art curriculum for Ghanaian Senior High Schools. From these modules, content standards could be set to define specific ICT skill sets that students are supposed to learn within the various Visual Art areas. It must be noted, however, that the modules are not exhaustive guidelines for ICT integration into Visual Art studies. It only provides a panoramic view of the huge landscape of ICT related Visual Art

programmes and activities. Being an outcome of a research work therefore, this curriculum Framework is expected to serve as a talking point for any interest that it might generate among curriculum developers, teachers and the general readership.

Model Content Standards for ICT-Based Visual Art Curriculum for Ghanaian Senior High School

The content standards provide descriptions of what students should know and be able to do in the various areas of the SHS Visual Art programme. The ICTC4VA Model Content Standards shown in tables 7 - 15 comprises Modules Strands (derived from the Modules in table 6) and Benchmarks. Module Strands describes specific topics that constitute the content standards whilst the Benchmarks set standards of curriculum contents by which learning outcomes will be measured. The model content standards for ICT-based visual art curriculum and accompanying benchmarks are intended to assist in the development of ICT-based Visual Art Curriculum for Senior High Schools.

Titles for the derived content standards are prefixed *computer assisted* and not *computer generated* to re-echo the *assistant* role ICT is supposed to play in the activities. In other words, Graphic Design (as an example of an area in Visual Art) remains so in all respects with the computer functioning just as a tool. The title again suggests that the introduction of the various electronic tools provided by data processing systems for Visual Art projects which are already ongoing in schools, are meant to improve the speed, accuracy and efficiency of the operations which are usually made by hand. Again, *computer assisted* and not *ICT assisted* has been used as the prefix, because of the centrality of *the computer* in ICT which has, in so many instances, made ICT synonymous to computing and vice-versa. Indeed in this study, ICT, as already defined (see page 8), would refer to data processing systems such as

computers, computer networking (the Internet and intranet), peripheral devices and multimedia, and the range of assistive technologies available for teaching, learning and general ICT usage. The eight *Computer Assisted Visual Art* areas that constitute the model Content Standards and their descriptions are as follows:

- Computer Assisted Graphic Design (CAGD)
- Computer Assisted Picture Making (CAPM)
- Computer Assisted Textiles (CAT)
- Computer Assisted Jewellery (CAJ)
- Computer Assisted Basketry (CAB)
- Computer Assisted Leatherwork (CAL)
- Computer Assisted Ceramics (CAC)
- Computer Assisted Sculpture (CAS)
- Computer Assisted General Knowledge in Art (CAGKA)

Computer Assisted Graphic Design (CAGD)

The content standards set for CAGD aims at helping students develop an understanding in the use of computer as a tool for interpreting, informing, educating and persuading in the creation and dissemination of information and data. Students will develop skills in areas including theory and principles of Graphic Design, creative applications in digital Graphic Design and implementation of digital Graphic Design projects.

Table 6 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAGD and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 6: Content Standards for CAGD

Module Strands	Benchmarks
1 Lettering	
▪ <i>Roman Lettering – Students will develop understanding of the origin and features of the Trajan Roman letters as a highly developed state of perfection in Roman lettering.</i>	▪ Structure of the Roman letters – Exploring the structure of the original Trajan Roman Letters from the Internet. ▪ Constructing the Roman letter with great finesse using computers.
▪ <i>Sans-serif letters (Gothic) – To be able construct San-serif letters effectively, students will analyse the various forms of San-serif letters among the computer fonts to identify major differences and characteristic and how they influence letter and word spacing.</i>	▪ Construction of san-serif letters – Analysing the features of san-serif letters from the computer's extensive font options. ▪ Understanding the principles of letter anatomy and construction such as baselines, height lines and counters. ▪ Letter/Word spacing – Exemplifying Kerning and Leading in word processing for better understanding of Letter and Word spacing.
▪ <i>Calligraphy – Students will explore the use of the computer for calligraphic renderings of strokes for texts and images.</i> ▪ <i>Students will understand layout and</i>	▪ Tools and materials ○ Introduction of the computers as a calligraphy tool ○ Exploring calligraphy tools in <i>draw</i> programs. ▪ Layout and border design ○ Laying out a design page in a draw program.

<i>layout procedures and exhibit stronger sense document setup, design and presentation.</i>	○ Creating or customising a boarder design for a layout. ▪ Decorative letters – Rasterizing or converting computer generated letters into curves to enable manipulation and customisation to form appropriate decorative letters.
▪ <i>Freestyle lettering – Students will use digital tools to express original ideas in free style letter formation and construction.</i>	▪ Using Bezier curves to create free style letters. ▪ Customising existing letters into free style letter forms.
2 Basic Drawing ▪ <i>Object Drawing – Students will use draw software to present two and three dimensional drawings that simulate manual drawing and shading techniques in various media.</i>	▪ Basic shapes and forms – Using digital tools to generate basic geometric and free-form shapes and forms. ▪ Shading – Using lines, textures, shapes, etc, to depict darkness or lightness of portions of drawn images. (At advanced drawing stages, students would be introduce to the process of altering colours in drawings based on their angle to lights and their distance from light to create photorealistic 3D effects). ▪ Proportion – Perceiving and creating proportions on the computer screen. ▪ Perspective – Creating perspective grid with digital tools that helps in matching the perspective of imported graphics and drawn images to that of the background image. Or using guidelines and smart guides in an appropriate draw application to create perspective drawings.
3 Colour–<i>Students will establish essential foundation for the</i>	▪ Understanding how the computer perceives colour. ▪ Introducing students to Colour Modes and

<i>effective uses of colour in the creation of Visual Artworks and designs on the computer.</i>	Models (CMYK, RGB, YIQ, HSI, etc.) ▪ Colour compositions – Visualizing and composing colours according to their componential values.
▪ <i>Colour Relationships – Students will examine colour relationships through critical studies of colours and their schemes in selected colour models and modes and also grasp the knowledge of colours, rules of colour matching, modes of combination and composing.</i>	▪ Colour wheel – Drawing the colour wheel with the computer using appropriate draw programs. ▪ Tints and shades – ‘Mixing’ tints and shades using modal compositions of digital colours.
4 Paper craft Items – <i>Students will explore new ways of transforming papers into decorative items for various purposes.</i>	▪ Making decorative papers – Generating decorative motifs and ideas for paper decorations using the computer.
5 Reproduction Processes in Graphic Design ▪ <i>Serigraphy (Screen Printing) – Student would generate camera ready images for screen printing projects.</i>	▪ Screen preparation methods – Using a draw program to generate camera-ready designs for screen preparation. ▪ Separating colours for colour screen printing projects using digital tools

6 Drawing– <i>Students will critically study a wide variety of images (animate and inanimate) downloaded from the Internet to equip themselves with better understanding of types, forms, shapes, postures and anatomy.</i>	▪ Proportions in the Human figure – Analysing the anatomy of the human figure through images from the Internet to understand the proportions of the human figure. ▪ Human figure in various actions – Studying images of the human figure in various actions to enhance effective rendering both on paper and on the computer. ▪ Flora and fauna drawing – Objectively studying a wide variety of (both local and foreign) realistic flora and fauna images from the Internet to enhance proper understanding of objects.
7 Book design– <i>Students will produce professional looking print documents.</i>	▪ Page layout – Using word processors and page editors to produce professional looking layouts for books and other print documents such brochures, posters and fliers.
8 Illustration– <i>Students will use digital drawing tools and transformation options of industry-standard vector drawing programs to create from simple to complex illustrations and drawings.</i>	▪ Understanding the computer as a tools for illustration ▪ Analysing various digital illustration techniques ▪ Freehand drawing – drawing of lines, shapes, textures and dots. ▪ Stylize – Find Edges Illustration Technique ▪ Faux HDR Illustration ▪ Pen-and-Ink with Aquatint Illustration ▪ Dreamy Soft Focus Effect ▪ Cut-Out Illustration
9 Cartooning– <i>Students will achieve proficient technical and aesthetic skills using digital tools to generate a broad range of</i>	▪ Creating simple 2 and 3Dcartoons (still and animated) digitally, using computers either to support during traditional cartoon tasks such as pen and ink or going entirely digital, exhibiting knowledge in the following areas:

<i>two and three dimensional images, demonstrating understanding of both the technical, artistic and aesthetic implication of the software utilized.</i>	○ Modeling Basics ○ Modeling with splines ○ Lofting Modeling for Motion Graphics ○ Polygon Modeling ○ Subdivision Surface Modeling ○ Polygon Modeling with Graphite ○ Materials Basics ○ Camera Basics ○ Lighting Basics ○ Keyframe Animation ○ Hierarchies ○ Controllers and Constraints ○ Special Effects
10 Communication Design– <i>Students will develop skills in developing ideas for creation and production of communication design products from postage stamps to billboards.</i>	▪ Organizing appropriate elements by the use of appropriate software to produce effective communication design products such as posters, calendars, postage stamps, pennants, buntings, flags, signs and symbols. ▪ Manipulating and integrating images and texts to produce graphic design works with specific genre. ▪ Designing for the Web
11 Package Designing– <i>Students will identify and define roles of packaging in product identification, presentation, and production. Using appropriate digital tools students will explore the unique challenges of adapting typography,</i>	▪ Design and construction of packages ○ Designing of volume and shape of a container with an appropriate draw program. For example using Adobe Illustrator’s precision tools to create isometric, axonometric, diametric and trimetric views for 2D artwork. ○ Creation of surface information – Illustration, typography and layout. ○ Mapping of the two-dimensional

<i>illustration, design and materials to three-dimensional forms.</i>	illustration, typography and layout onto 3-D shape. ○ Simulating final product for design testing and market research.
12 Reproduction Processes in Graphic Design– <i>Students will develop skills in the management of portable electronic devices and formats as means reproducing digitally generated designs.</i>	▪ Electronic printing Devices – Installing, setting up and using inkjet and laser printing device to produce hard copies of digitally produced graphic design works. ▪ Publishing to PDF, the web and other digital formats such as JPEG, TIF, PNG, BMP, etc. ▪ Exposing students to basic industrial printing practices like colour separation and dummyming using digital tools.
13 Entrepreneurial Skills– <i>Students will explore the essence and processes involved in the organisation of products and services for entrepreneurial purposes</i>	▪ Building a digital artist portfolio ▪ The online exhibition experience ○ Visiting online Exhibitions ○ Planning/Organising and Mounting exhibition online
<i>And also identify and employ appropriate software in the management of Graphic design finances</i>	▪ Costing , Pricing and Marketing of Graphic Design works ▪ Business Plan Meaning and Purpose Key in business plan and preparation. ▪ Managing Graphic Design finances with spread sheet and electronic database systems such as Microsoft Excel and Lotus 123.
14 Internet Search– <i>Students will define and investigate important graphic design issues and problems using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Graphic design topics such as: • The Concept of Graphic Design • The role of Graphic Designer in the society • Development of the Roman alphabet • Notions of colour in the Ghanaian and other societies • The design process

	• Development of Paper ○ What is paper? ○ Papyrus stage ○ Modern paper manufacturing ○ Types of paper and their uses • Printing ○ Principles of printing ○ Development of various printing methods and procedures ○ Modern application of printing • Book Illustration ○ Concept and types of illustration ○ Importance of illustration
15 Hardware Considerations – <i>Students will exhibit understanding in the functions and uses of relevant hardware for Graphic Design.</i>	• Computers • Scanners • Digital cameras • Graphic tablets • Printers • LCD Projector • Visualizer
16 Software Considerations– <i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Graphic Design related tasks.</i>	• Draw or vector-based application – Adobe Illustrator or Corel Draw • Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks • Basic 2D and 3D Animation Programs – Adobe Flash, Adobe Premier, Toon Boom • Web Authoring – Adobe Dreamweaver, WYSIWYG web builder, Adobe Flash • Basic Multimedia Applications – Microsoft PowerPoint, Windows Moviemaker, Adobe Premier.

- Page design – Adobe InDesign
- Microsoft Office Suite
- Web Browser/Internet Connectivity
- Interactive CD ROMs on Graphic Design
- Microsoft Encarta Encyclopedia

Computer Assisted Picture Making (CAPM)

Content standards set for CAPM entails a set of studio based activities aiming at introducing students to the general principles of digital image processing and electronic painting with emphasis on bitmapped or raster-based image making. It also exposes students to the creative aspects of illustration for commercial and fine art applications, covering the blending of vector and raster-based images.

Table 7 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAPM and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 7: Content Standards for CAPM

Module Strands		Benchmarks
1 Forms of Basic Picture Making and Associated Tools, Materials and Equipment	<i>Students will identify and employ appropriate draw and paint programs for generation of vector and pixel based drawings.</i>	▪ Drawing – Draw/vector based applications as drawing tools. ▪ Painting – Paint/pixel based applications as painting tools.

2 Basic Design <i>Students will explore fundamental ideas, methodologies, principles, and skills that comprise a common knowledge base important to all design disciplines. These will foster a multidisciplinary design experience among students and prepares them to move into picture making practices.</i>	○ Visual Elements – Using vector based and or pixel based applications to produce and appreciate the elements of design. ○ Principles of design – Organising visual elements according to the principles of design to produce appropriate pictures ○ Understanding colour – (see colour under graphic design, page)
3 Picture Making Methods and Techniques – <i>Students will acquires skills in digital picture making techniques and concepts, with emphasis on the understanding of its formal language and the fundamentals of artistic expression.</i>	▪ Drawing – Producing drawings using the digital drawing tools in draw programs in ways not too different from traditional drawing procedures. ▪ Digital Painting – Using digital paint brushes, colours and appropriate filters to produce paintings on digital canvases or turning photographs into beautiful, textural digital paintings. ▪ Digital Collage/Montage – <i>Cutting and pasting</i> shapes and images from various sources (saved images, scanned images, images from digital cameras, clip art images, etc.) to produce interesting <i>digital collages</i> and <i>Montages</i>. For example, using rasterized image to create tiles that can be overlapped for a tissue paper collage look. ▪ Mosaic/Marquetry – Generating, transforming and manipulating digital images to produce mosaic and marquetry. ▪ Digital Photography – Digitally manipulating photographs (scanned or captured with a digital) to render pleasant photographs.

4 Composing A Picture– <i>Students will approach picture making projects with deepened understanding of visual composition.</i>	▪ Composition – Experiencing the ease of generating, scaling, moving and transforming elements on a digital support/canvas to produce gratifying compositions.
5 Introduction to the Concept of Digital Painting– <i>Students will gain adequate exposure into the world of digital drawing and painting. Students will use appropriate digital tools such as pressure sensitive digital tablets in combination with raster and vector based software to provide powerful ways to synthesize traditional and digital skills.</i>	▪ <i>The Basic Tools for Painting in Photoshop</i> ○ Using digital brushes ○ Customizing brushes for variations in sizes, styles, orientation, etc. ○ Using the digital texture libraries ○ Creating patterns ○ Applying pattern textures ▪ <i>Digital Charcoal and Pastel Drawings</i> ○ Digital Charcoal Techniques ○ Rendering with tiny charcoal marks or smudgy charcoal look ○ Rendering in conte, charcoal and pastel ▪ <i>Digital Painting with Watercolours and Oils</i> ○ Digital Watercolour Techniques ○ Using digital watercolour brushes ○ Using Pattern Stamp Watercolour Technique ○ Using Art History Brush watercolour Technique ○ Making Simple Two-Layer watercolour Painting ○ Applying Digital Impasto Technique ○ Using Bevel and Emboss Layer Style Oil Painting ○ Using Bevel and Emboss for Portrait Painting

6 Photo Editing and manipulation– <i>Students will demonstrate understanding in the use of digital imaging tools for image acquisition, manipulation and rendering.</i>	▪ Electronically scanning and manipulating images – global colour collection, cloning a subject, distorting or enhancing an image and preserving an image without disintegration of dyes using any appropriate software.
7 Mixed Media– <i>Students will demonstrate proficiency in handling digital and traditional artworks on a digital platform for manipulation, adjustment, refinement and infusion of effects.</i>	▪ Combining traditional media with computer output devices (printers in particular) to create a finished work of art in activities such as: ○ adding colour to black-and-white laser print by using colour pencils and markers ○ transferring computer images to traditional printmaking media like silk-screens or etchings. ○ using the computer as a sketch tool to develop an ideas, which is then executed in a traditional media such as oil paint on canvas ○ digitizing a manually rendered painting for additional digital effect.
8 Internet Search – <i>Students will define and investigate important Picture Making issues and problems using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Picture Making topics such as: ▪ <i>History of Painting</i> ○ Cave art ○ Ancient painting ○ Renaissance painting ○ Modern/Postmodern painting ▪ <i>Introduction to Picture Making</i> ○ Importance of Picture Making

	○ Career Opportunities in Picture Making ○ Picture Making in Ghana ▪ <i>Body Art</i> ○ Importance of Body Art ○ Types of Body Art ○ Tools/Materials ▪ <i>Illustration</i> ○ Meaning and Scope of illustration ○ Purposes of illustration ○ Illustration Techniques
10 Hardware Consideration – <i>Students will exhibit understanding in the functions and uses of relevant hardware for Picture Making.</i>	▪ Computers ▪ Scanners ▪ Digital cameras ▪ Graphic tablets ▪ Printers ▪ LCD Projector ▪ Visualizer
11 Software Considerations – <i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Picture Making related tasks.</i>	▪ Draw or vector-based application – Adobe Illustrator or Corel Draw ▪ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or Fireworks. ▪ Typical <i>Painting</i> applications – Art Rage, Corel Painter ▪ Web Browser/Internet Connectivity ▪ Interactive CD ROMs on Painting/Picture Making ▪ Microsoft Encarta Encyclopedia

Computer Assisted Textiles (CAT)

Content standards set for CAT involve the use of design software to create and modify designs digitally. It covers the principles of developing pattern designs for textiles and decorative arts. Students, with the computer as a tool, will also learn to create colour renderings of repeated patterns used in the textile industry. The standards are also intended to expose students to digital reproduction procedures in the contemporary textiles industry.

Table 8 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAT and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 8: Content Standards for CAT

Module Strands		Benchmarks
1	Looms and Accessories — <i>Students will study about other types of man-power looms which are not common locally to aid in further researches into looms for the local weaving industries.</i>	▪ Types of Man-power loom and Functions – Observing and learning about other types of looms such as Warp weighted looms, Back strap looms, Hautelisse and basselisse looms as well as their weaving accessories from the Internet and other digital sources.
2	Fabric Construction Processes – <i>Students will explore some of the digital procedures involved in fabric design and construction.</i>	▪ Designing (Plain Weaves) – Generating ideas for plain weave designs using draw and paint programs.
3	Fabric Decoration Techniques — <i>Students</i>	▪ Basic Drawing – Generation of motifs and other decorative images for fabric decorations.

<i>will resort to various digital procedures for the generation motifs, textures and other forms of designs for fabric decoration.</i>	▪ Generating digital designs for Fabric Decoration ▪ Adopting digital prints from scanned and simulated surface for fabric decoration.
4 Pattern Generation– <i>Students will generate various patterns for fabric design projects with draw and paint programs.</i>	▪ Generating patterns by the use of an appropriate application software to simulate industry standard designs.
5 Drawing– <i>Students will explore the use of drawing tools in vector and pixel drawing applications to generate general or textile related drawings for classroom textile projects.</i>	▪ Generating general textile (or fashion related) drawings with an appropriated basic draw and paint programs.
6 Design– <i>Students will inquire into as many digital procedures as possible to generate appropriate designs for textile projects.</i>	There are many ways student can use technology in design depending on the package available. This includes ▪ Adopting manual designs with added annotation ▪ Applying scanned images/designs with added colour- ways ▪ Using modified clip art images
7 Entrepreneurship– <i>Students will engage in various enhanced entrepreneurial practices in textiles using digital tools.</i>	▪ Annotating using MS word and other word processors ▪ Using digital cameras ▪ Providing visual presentations with Pie charts, etc. ▪ Creating textiles costing sheets using word & Excel ▪ PowerPoint presentations
8 Printing onto fabrics	▪ Identifying unusual printing surfaces for textile

and hard substrates– <i>Students will sample various printing surfaces other than the traditional printing surfaces for production of fabrics designs.</i>	production. ▪ Using various digital printing technologies and techniques available to students ▪ Printing onto unusual materials
9 Contemporary Textile Exploration– <i>Students will have the opportunity to develop their own personal skills through designing and making, using creative textile techniques and technologies, including ICTs, for fabric designing, painting, dyeing and embroidery</i>	▪ Exploration of contemporary tools and materials for textiles – computer assisted textile projects like <i>Computer Aided Design (CAD)</i> and <i>Computer Aided Manufacturing (CAM)</i>. ▪ Technological production cycle control systems such as <i>drawing-inn machines, card punchers, dobbies</i> and <i>electronic Jacquard</i> ▪ Exploration of indigenous fabric construction and decoration processes. ▪ Building a Digital Portfolio and Textile Exhibition.
10 Internet Search – <i>Students will define and investigate important Textiles issues and problems using a variety of resources, including the Internet and interactive CD ROMs.</i>	Internet- access to a wide range of information on textiles such as ▪ <i>Introduction to Textiles</i> ○ Rationale for studying textiles ○ Textile developments and careers ▪ <i>Renowned local and foreign textile Artists</i> ▪ <i>Fibres (Cellulosic)</i> ○ General properties of fibres ○ Cellulosic fibers (cotton, linen) ▪ <i>Yarn Preparation (Cellulosic)</i> ○ Traditional Yarn preparation (Cellulosic) ○ Contemporary yarn preparation ▪ <i>Fabric Construction</i> ○ Designing and Weaving Twill structures

	○ Satin/ Sateen Weaves ○ Crocheting and Knitting ○ Tapestry ○ Types of power loom (shuttle/shuttleless)
11 Hardware considerations – Students <i>will exhibit understanding in the functions and uses of relevant hardware for Textiles.</i>	▪ Computers ▪ Scanners ▪ Digital cameras ▪ Graphic tablets ▪ Printers ▪ LCD Projector ▪ Visualizer
12 Software Considerations– Students <i>will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Textiles related tasks.</i>	▪ Draw or vector-based application – Adobe Illustrator or Corel Draw ▪ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ▪ Microsoft Office Suite ▪ Web Browser/Internet Connectivity ▪ Interactive CD ROMs on Textiles ▪ Microsoft Encarta Encyclopedia

Computer Assisted Jewellery (CAJ)

The set content standards for CAJ involves the use of simple draw programs to develop ideas for the creation of different diamonds and precious stones, as well as modification and editing of elements with special effects to simulate real products of jewellery.

Table 9 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAJ and

Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 9: Content Standards for CAJ

Module Strands	Benchmarks
1 Equipment, Tools and Materials – <i>Students will identify appropriate hardware and software for jewellery design and production.</i>	Types of tools and equipment – Identifying ICT related tools, materials and equipment for jewellery design and production.
2 Design and Production of Jewellery Items – <i>Students will adopt digital procedures to brainstorm for ideas that bring together images for idea development and designs for exploration into different approaches of presenting professional and coherent projects in jewellery.</i>	- Preliminary designs and idea development – Developing and brainstorming for ideas using digital tools - Translating preliminary designs into final products using a basic renderer.
3 Jewellery Finishing Processes – <i>Students will give professional finishes to jewellery designs employing digital procedures.</i>	Processes and techniques for finishing – Exploring various processes involved in the use of appropriate photorealistic renderer to simulate artistically finished jewellery products.
4 Basic Design – <i>Students will explore fundamental ideas, methodologies, principles, and skills that</i>	Drawing – Exploring the use of digital tools in the generation of Jewellery related objects.

comprise a common knowledge base important to all design disciplines. These will foster a multidisciplinary design experience among students and prepares them to move into jewellery practices.

5 Advance Jewellery Production Techniques – <i>Students will exhibit deeper understanding of 3D renderers and their roles in the design and production high standard jewellery products.</i>	▪ Jewellery production and finishing using combination of different techniques and materials including 3D renderers ▪ Application of jewellery finishing skills ▪ Project report writing in jewellery using Microsoft Word or any appropriate word processor.
6 Exhibition and Entrepreneurship – <i>Students will study, analyse and adopt techniques of presentation relating to design marketing and promotion including internet and digital technologies. This will expose them to the production of exciting, professional presentations and portfolios which may be used to communicate and promote individual practices in jewellery.</i>	▪ Building a digital portfolio of works ▪ Exhibitions – Visits to online museums and exhibitions ▪ Entrepreneurial skills in practice ▪ Design and construction of attractive packages for jewellery products.

7 Internet Search – <i>Students will define and investigate important Jewellery issues and problems using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Jewellery topics such as: ▪ <i>Jewellery as a Vocation</i> ○ Meaning of jewellery ○ Types and uses of jewellery ○ Importance of Jewellery as a field of study ○ The Jewellery student ▪ <i>Historical Background of Jewellery</i> ○ Origin of Jewellery ○ Uses of Jewellery ▪ <i>Jewellery for Sustainable Development</i> ○ The significance of sustainable development to society and the jewellery industry ○ Challenges of the jewellery industry. ○ Symbolism in Jewellery
8 Hardware Considerations – <i>Students will exhibit understanding in the functions and uses of relevant hardware for Jewellery.</i>	▪ Computers ▪ Scanners ▪ Digital cameras ▪ Graphic tablets ▪ Printers ▪ LCD Projector ▪ Visualizer
9 Software Considerations– <i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Jewellery related tasks.</i>	▪ Draw or vector-based application – Adobe Illustrator or Corel Draw ▪ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ▪ 3D renderer – Maya, Cinema4D, Rhino, 3ds Max. ▪ Microsoft Office Suite ▪ Web Browser/Internet Connectivity ▪ Interactive CD ROMs on Jewellery ▪ Microsoft Encarta Encyclopedia

Computer Assisted Basketry (CAB)

Content standards set for CAB will involve the use of basic CAD programs in creating volumes and shapes of different containers and other basketry products. CAD programs would also make it possible to generate two-dimensional twills and weaves that can be mapped onto the 3-D shape. Computers can stimulate the final product for *hard* production.

Table 10 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAB and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 10: Content Standards for CAB

Module Strands		Benchmarks
1 Tools and Equipment– <i>Students will demonstrate understanding of the roles of technology in the study of basketry, and also identify specific technological tools that can assist in the execution of basketry products.</i>	▪ Identifying the role of technology in the study of basketry. ▪ Identifying basic 2D and 3D packages for Basketry.	
2 Basic Design and Technology– <i>Students will explore the essential elements and principles of design and their significance in the generation of ideas for various three dimensional</i>	▪ Exploring, creating and understanding in the Elements of Design and their application in basketry projects ▪ Brainstorming and generating ideas for basketry product using technology as both as a tool and aid.	

<i>forms and constructions, identifying specific implications for basketry design and production. Students will also exhibit awareness in the technological considerations in modern basketry.</i>	
3 Design and Making of Basketry Items– <i>Students will get actively involved in practical basketry design and production, blending ICT with traditional basketry making procedures.</i>	▪ Drawing objects in outline using draw programs ▪ Creating ideas and designs by drawing/ sketching. ▪ Building up an image from a wireframe model using a CAD program ▪ Applying solid shading and ray tracing to generate realistic images.
4 Internet Search–<i>Students will define and investigate important Basketry issues and problems using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Basketry topics such as: ▪ <i>Social, Cultural and Economic Importance of Basketry</i> ○ Meaning And Scope of Basketry ○ Rationale for Studying Basketry ○ Historical, Social, Cultural and Economic Importance ○ Types and Contribution of Basketry by Some Places and People ○ Competencies, Attitude and Behaviour of Students for Education and Employment
5 Hardware Considerations – <i>Students will exhibit</i>	○ Computers ○ Scanners ○ Digital cameras

<i>understanding in the functions and uses of relevant hardware for Basketry.</i>	○ Graphic tablets ○ Printers ○ LCD Projector ○ Visualizer
6 Software Considerations – <i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Basketry related tasks.</i>	○ Draw or vector-based application – Adobe Illustrator or Corel Draw ○ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ○ 3D renderer – Maya, Cinema4D, Rhino, 3ds Max. ○ Microsoft Office Suite ○ Web Browser/Internet Connectivity ○ Interactive CD ROMs on basketry, bamboo and rattan ○ Microsoft Encarta Encyclopedia

Computer Assisted Ceramics (CAC)

The set content standards for CAC lead students to the exploration into the relationship between digital tools and ceramics practices. Normal classroom teaching and hands on activities would be supplemented by 2-D vector and pixel based programs, and 3-D modeling programs. Students will learn how to use the computer as a design tool for ceramics and to prepare files for various outputs.

Table 11 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAC and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 11: Content Standards for CAC

Module Strands	Benchmarks
1 Introduction to Ceramic Tools and Equipment– <i>Students will explore, identify and discuss software and hardware considerations for ceramics projects.</i>	▪ Identifying the computer and appropriate software for ceramics ▪ Discussing the roles of digital media in the design and production of ceramic products.
2 Drawing and Designing– <i>Students will explore various procedures involved in the brainstorming and development of ideas for contemporary ceramics practices.</i>	▪ Exploring, creating and understanding the Elements of Design and their application in ceramic projects. ▪ Brainstorming and developing ideas and preliminary designs for ceramics using digital tools. ▪ Developing and refining ideas for ceramics product.
3 Designing/modeling with CAD program– <i>Students will explore the vast area of 3D modeling in relation to activities and practices in Ceramics.</i>	▪ Identifying the types of 3D Art ▪ Creating 3D models by manipulating polygon meshes and molding them into objects. ▪ Exploring lighting in 3D ▪ Experimenting with <i>texturing</i> concepts and techniques in 3D modeling. ▪ Engaging in digital modeling in ceramic

4 Decoration and Finishing– <i>Capitalizing on the dynamism and versatility of digital tools, students will identify ways of applying professional finishes to ceramics designs to facilitate high production standards.</i>	▪ Decorative Techniques ▪ Applying finishing techniques to ceramics product using digital rendering technique such as texture-mapping.
5 Internet Search – <i>Students will define and investigate important issues and problems in Ceramics using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Ceramics topics such as: ▪ <i>Ceramics as Avocation</i> ○ Rationale and History for Ceramic Education ○ The Ceramic Industry Opportunities in Ceramics ▪ <i>Introduction to Ceramic Raw Materials</i> ○ Clay: Meaning and Formation ○ Clay: Types and Properties ○ Clay Prospecting and Processing ▪ <i>Drying and Firing</i> ○ The drying process ○ The firing process/open firing/cooling ▪ <i>Other Ceramic Raw Materials</i> ○ Fluxing Minerals, Refractory Oxides and Silica ○ Clay bodies ○ Ceramic Production And Environmental Issues ▪ <i>Introduction to Glazes</i> ○ Types of Glazes ○ Glaze Components

▪ <i>Introduction to Kilns and Kiln Construction</i> ○ Types of Kilns ○ Materials for Kiln Construction	
6 Hardware Considerations – <i>Students will exhibit understanding in the functions and uses of relevant hardware for Ceramics.</i>	○ Computers ○ Scanners ○ Digital cameras ○ Graphic tablets ○ Printers ○ LCD Projector ○ Visualizer
7 Software Considerations– <i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Ceramics related tasks.</i>	○ Draw or vector-based application – Adobe Illustrator or Corel Draw ○ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ○ 3D renderer – Maya, Cinema4D, Rhino, 3ds Max. ○ Microsoft Office Suite ○ Web Browser/Internet Connectivity ○ Interactive CD ROMs on Ceramics ○ Microsoft Encarta Encyclopedia

Computer Assisted Leatherwork (CAL)

The content standards set for CAL aims at introducing students to the use of basic digital drawing and computer skills to assist in the communication of design concepts and ideas for the development of leather products.

Table 12 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAL and

Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 12: Content Standards for CAL

Module Strands	Benchmarks
1 Basic Tools and Materials in Leatherwork – <i>Students will identify and explore relevant digital tools for leatherwork projects.</i>	▪ Identifying appropriate digital tools for leatherwork.
2 Production of Leather Articles – <i>Students will get actively involved in the design of a variety of leather articles, demonstrating evidence of originality and creativity as well as understanding of digital media.</i>	▪ Preliminary Design – Using draw programs to produce preliminary designs for leather articles. ▪ Design Process – Carrying out an entire design process, from brainstorming to working drawings for production of leather articles. ▪ Making Leather Items – Using basic CAD programs to generate digital simulations of leather products. ▪ Manipulating images (scanned images, photos, etc.), through digital processes such as ‘vectorization’ using Corel Trace for example, for patchworks and tonal projects in leatherwork.
3 Leather Decoration and Finishing – <i>Students will take advantage of the flexibility, dynamism and versatility of digital tools</i>	▪ Decoration ▪ Finishing ▪ Terms Used in Leatherwork

to identify ways of applying professional finishes to leather article designs to facilitate high production standards.	
4 Internet Search – <i>Students will define and investigate important issues and problems in Leatherwork using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Leatherwork topics such as: ▪ <i>Introduction to Leatherwork</i> ○ Rationale and History of Studying Leatherwork ○ Sources of Leather ○ Careers in Leatherwork ○ Classification of Leatherwork ▪ <i>Exhibition of Leather Products</i> ○ Meaning, Types and Importance ○ Planning and Preparing the Exhibition ○ Mounting the exhibition
5 Hardware Considerations– <i>Students will exhibit understanding in the functions and uses of relevant hardware for Leatherwork.</i>	○ Computers ○ Scanners ○ Digital cameras ○ Graphic tablets ○ Printers ○ LCD Projector ○ Visualizer
6 Software Considerations– <i>Students will develop a basic working knowledge of relevant computer software and the ability to</i>	○ Draw or vector-based application – Adobe Illustrator or Corel Draw ○ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ○ 3D renderer – Maya, Cinema4D, Rhino,

<i>select and apply appropriate software for Leatherwork related tasks.</i>	3ds Max. ○ Microsoft Office Suite ○ Web Browser/Internet Connectivity ○ Interactive CD ROMs on Leatherwork ○ Microsoft Encarta Encyclopedia
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Computer Assisted Sculpture (CAS)

CAS content standards will lead students to explore the relationship between digital tools and sculptural practice. Normal classroom teaching and hands on activities would be supplemented by 2-D vector based programs, digital photography software and 3-D modeling programs. Students will learn how to use the computer as a design tool for sculpture and to prepare files for various outputs.

Table 13 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the CAS and Benchmarks that set standards of curriculum contents by which learning outcomes will be measured.

Table 13: Content Standards for CAS

Module Strands	Benchmarks
1 Materials, Tools and Equipment – <i>Students will identify the tools necessary for the design and creation of objects through the use of computers. Student will get exposed to digital sculptural tools for scanning physical objects,</i>	▪ Introducing basic digital tools, equipment and materials for sculpture. ▪ Considering 3D modeling as a process of sculpting

<i>modeling and manipulating 3-D objects in the computer, creating tool paths from 3-D computer models and computer-controlled machines to cut forms out of various materials.</i>	
2 Designing and Making Sculpture– <i>Students will explore various ways of generating 2D and 3D designs and ideas for sculptural products.</i>	▪ Basic Drawing - Exploring, creating and understanding the Elements of Design and their application in sculpture projects. ▪ Idea Development and Preliminary Design – Brainstorming and developing ideas and preliminary designs for sculpture using digital tools. ▪ Modeling – Drawing of models in two-dimensional (2-D) form with a basic CAD program as schematics or as a three-dimensional (3-D) <i>wire-frame</i> necessary to design or conceptualize ideas for sculpture. ▪ Volume modeling – growing, extruding and manipulating edges, faces and vertices of a polygonal primitive such as cubes to form objects. ▪ Adding surface attributes and photo realistically rendering an object
3 Designing/modeling with CAD program– <i>Students will exhibit knowledge and in-depth understanding in the use computer modeling tools for designing of realistic</i>	▪ Getting familiar with 3D Art – software interface, etc ▪ Creating shapes and splines – Creating 3D models by manipulating polygon meshes and molding them into objects. ▪ Modeling with polygons and subdivisions ▪ Modeling Loft objects

<i>sculpture works.</i>	▪ Modeling with NURBS ▪ Shading objects with materials and maps ▪ Texturing concepts and techniques ▪ Setting up camera and scene layout ▪ Lighting basic scenes
4 Internet Search–<i>Students will define and investigate important issues and problems in Sculpture using a variety of resources, including the Internet and interactive CD ROMs.</i>	Using the Internet to search for more information on Sculpture topics such as: ▪ <i>Sculpture as a Vocation</i> ○ History and rationale for studying sculpture ○ The sculpture industry in Ghana. ○ Career opportunities in sculpture.
5 Hardware Considerations–<i>Students will exhibit understanding in the functions and uses of relevant hardware for Sculpture.</i>	○ Computers ○ Scanners ○ Digital cameras ○ Graphic tablets ○ Printers ○ LCD Projector ○ Visualizer
6 Software Considerations–<i>Students will develop a basic working knowledge of relevant computer software and the ability to select and apply appropriate software for Sculpture related tasks.</i>	○ Draw or vector-based application – Adobe Illustrator or Corel Draw ○ Paint or pixel-based application – Adobe Photoshop, Corel Photo paint or fireworks ○ 3D renderer – Maya, Cinema4D, Rhino, 3ds Max. ○ Microsoft Office Suite ○ Web Browser/Internet Connectivity ○ Interactive CD ROMs on Sculpture ○ Microsoft Encarta Encyclopedia

Computer Assisted General Knowledge in Art (CAGKA)

Content standards for CAGKA draws from all the above indicated standards since the domains that compose the subject are mocked up from the Visual Arts subjects studied at the Senior High School (SHS) level. It must be noted therefore that the practical component of the set standards deserve the same attention given to distinctive areas like sculpture, ceramics, leatherworks and all the others, as outlined in Tables 7 to 14 and would therefore not be repeated. Module strands composing the practical component of CAGKA include Basic Drawing, Basic Design, Design and Technology, Composition, Product Design, Lettering, Colour work and Printing.

Tables 14 shows the various Strands from the *Modules for ICT integration into the Senior High School Visual Art* that outline specific topics within the theory component of CAGKA, and examples of relevant Internet sites that provide information to support classroom delivery.

Table 14: Content Standards for CAGKA (Theory)

Module Strands	Internet Sites
1 Visual Arts Education – <i>Students will explore the Rationale for Visual Arts Education; examine the Arts as Concepts and their relevance to national development.</i>	Using appropriate search engines and other Internet resources to gather information on contemporary Visual Arts Education and its relevance to national development. Relevant sites include: ▪ www.noteaccess.com/.../ArtEd/.../ContempBeliefs.htm
2 Pre-Historic and Ancient Art – <i>Students will investigate the origin and earlier developments in the history of Art as recorded at various stages in human</i>	Using appropriate search engines and other Internet resources to gather information on Prehistoric and Ancient Art. Relevant sites include: ▪ witcombe.sbc.edu/ARTHprehistoric.html ▪ www.arthistoryarchive.com/arhistory/prehistoricart

civilization. Periods to be explored are the Palaeolithic, Mesolithic and Neolithic as well as early Egyptian civilization.	▪ www.bigeye.com/artancie.htm ▪ www.enchantedlearning.com/artists/time/early.shtml ▪ www.visual-arts-cork.com/ancient-art.htm
3 African Art – Students will trace the Philosophy of African Art and demonstrate understanding of various issues in indigenous and contemporary African Arts.	Using appropriate search engines and other Internet resources to gather information on indigenous and contemporary African Arts. Relevant sites include: ▪ www.africanart.com ▪ www.africanart.org ▪ en.wikipedia.org/wiki/Africanart ▪ www2.lib.virginia.edu/artsandmedia/artmuseum/african ▪ www.artnetafrica.com ▪ www.artchive.com/artchive/A/african.html ▪ www.nmafa.si.edu
4 Ghanaian Art and Artists – Students will demonstrate learning and understanding of various issues in indigenous and contemporary Ghanaian art forms and artists.	Using appropriate search engines and other Internet resources to gather information on indigenous and contemporary Ghanaian Arts. Relevant sites include: ▪ www.vmcaa.nl/vm/magazine/002/artikel001/index.html ▪ www.fcaghana.org ▪ condor.depaul.edu/~mdelance/AfricanArtBibNation/Ghana.html ▪ http://www.artistsallianz.com/
5 Greek, Renaissance, Oriental and Oceanic Art – Students will analyse the characteristics of the Arts of the earlier civilizations and their significance to contemporary Art Education.	Using appropriate search engines and other Internet resources to gather information on Greek, Renaissance and Oceanic Arts. Relevant sites include: http://witcombe.sbc.edu/ARTHLinks.html www.norwichfreeacademy.com/museum/collections www.ctmuseumquest.com/?page_id=3428

6 Other Useful Sites

Identifying appropriate sites for general information in Visual Art. Below are examples of the numerous Internet resources available for Visual Art students and teachers:

Dictionaries and Encyclopedias of Art

- <http://artlex.com/artlex/intro.html>
- <http://www.artsconnected.org/toolkit/encyclopedia.htm>

Online Museums and Exhibitions

<http://www.cogapp.com/uk>

Leonardo da Vinci

<http://www.mos.org/sln/Leonardo>

Vincent van Gogh

<http://www.vangoghgallery.com>

Auguste Rodin

www.rodin-web.org

Creativity

<http://www.ncaction.org.uk/creativityindex.htm>

Elements and Principles of Art

- www.msdsieben.k12.in.us/.../elements_and_principles_of_art.htm
- www.slideshare.net/.../elements-and-principles-of-art-presentation
- www.jphnlovett.com/test.htm
- www.princetonol.com/groups/iad/Files/elements2.htm
- www.artsconnected.org/toolkit/explore.cfm
- www.goshen.edu/art/ed/Compose.htm
- www.jiskha.com/visual_arts/ped.html

Free Software for educational purposes

<http://sourceforge.net>

Method of Teaching ICT-Based Visual Arts

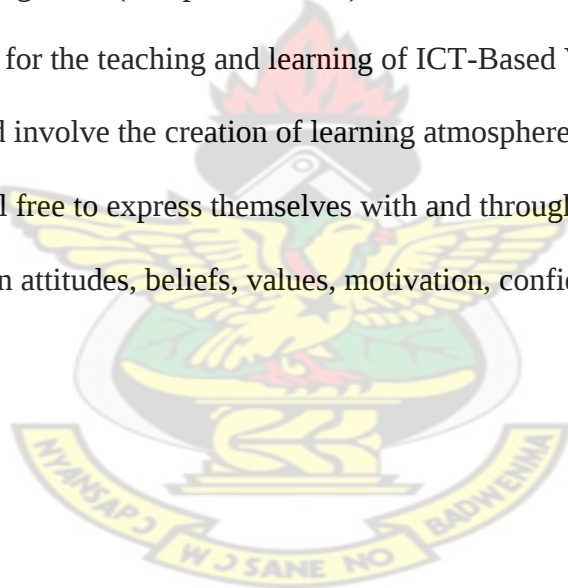
Method of teaching for the proposed ICT-Based Visual Art programmes in the Senior High Schools would evolve around the Metacognition approaches to ICT learning proposed by Phelps, Graham and Thornton (2006). Metacognition, being described by Livingston (1997) as one of the latest buzz words in educational psychology simply means “thinking about thinking”. By extension Metacognitive knowledge involves knowledge about cognition in general, as well as awareness of and knowledge about one's own cognition (Pintrich, 2002). As a method of teaching and learning, therefore, Metacognition is founded on the assumption that adoption and integration of ICT by teachers is influenced by their attitudes, beliefs, values, motivation, confidence and learning strategies (Phelps et al., 2006). Considering the disparities in ICT skills and competencies among Ghanaian Visual Art teachers, it is easy to identify Metacognition as just the appropriate methodology for the teaching of ICT based competencies in Visual Art since that approach encourages teachers to think about themselves as computer learners. By this approach, teachers are in better position to develop their own confidence with computers and their willingness to try new integration ideas, a process which also impacts quite significantly on their understanding of how their students learn (Phelps et al., 2006).

Another reason for the endorsement of Metacognition as the most viable methodology for the teaching of ICT in Visual Art lies within the belief that its major emphasis as an educational theory has been on helping students become more knowledgeable of and responsible for their own cognition and thinking. The anticipated impact of this method of teaching is getting students become more aware of their own thinking as well as more knowledgeable about cognition in general. These attributes, according to Pintrich, cut across all the different theoretical

approaches to learning and development – from neo-Piagetian models, to cognitive science and information processing models, to Vygotskian and cultural or situated learning models (Pntrich, 2002).

These constructs of Metacognition are in perfect congruence with the demands of ICT integration that have become bare through earlier investigations in this study, suggesting a rather free-minded approach to ICT learning. As Phelp et al. prescribed, ICT teaching and learning should involve encouragement, but not pressure, support but not over-assistance, stimulation with ideas to enhance perceived usefulness and adequately resourced without forming an impression that resources alone will lead to effective ICT integration (Phelp et al., 2006).

Methods for the teaching and learning of ICT-Based Visual Art programmes therefore, should involve the creation of learning atmosphere where both teachers and students will feel free to express themselves with and through ICT in a manner that reflects their own attitudes, beliefs, values, motivation, confidence and learning strategies.



CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview

This chapter provides a summary of the thesis, explains the main results of the research, and provides the major conclusions of the thesis. It also outlines suggestions for further research and decision-making towards effective integration of ICT in the teaching and learning of Visual Art in schools.

Summary

This study sought to identify ways of integrating information and communication technology into the teaching and learning of the Visual Arts in Ghanaian Senior High Schools. In this pursuit, the study opposed the current trend of ICT introduction in schools which lacks precise and clearly communicated structure for integration into content areas of the curriculum. This provided the justification for a study into the development of ICT-based Visual Art curriculum which aims at infusing ICTs into the Senior High School Visual Art Curriculum.

To investigate this problem, the study questioned the potentialities of current approaches to ICT in pedagogical transformation; the extent of recognition of the centrality of artistic, creative and aesthetic sensibility in the core ICT programmes in schools; the level of ICT integration readiness among Visual Art teachers and students in the Ghanaian Senior High Schools; and ways of unleashing the full potentialities of ICT for artistic and instructional purposes.

Teachers, students and experts in curriculum issues and various ICT related fields constituted the chosen population for the study and a sample was purposefully drawn out of the population.

Data was analysed through Content Analysis. Data collected, which was mainly qualitative textual data, was categorized into clusters of similar entities and conceptual categories, to identify consistent patterns and relationships between variables or themes. The major findings provided insights and conditional propositions, critical examination of which formed the basis of the proposed Framework of an ICT-based Visual Art curriculum for Ghanaian Senior High Schools.

Prominent among the findings are that:

- There is a high level of enthusiasm about computer usage in the Senior High Schools among Visual Art teachers and students. Though the knowledge base and awareness of Visual Art teachers in ICT applications are characterized by marked disparities, there is a general consensus on its relevance as a formidable tool in the SHS Visual Art classroom.
- As it currently stands, ICTs feature only informally in the Visual Art classroom. There is no structured system or blueprint that would formally motivate Visual Art teachers to consider ICT integration in any compelling manner.
- Available ICT resources in the Ghanaian Senior High School, though not adequate, are supportive of Visual Art related peripherals and software.
- The core ICT programmes currently running in Ghanaian Senior High Schools, is not supportive of the teaching and learning of Visual Arts.
- Visual Art teachers are consensus on the view that ICT, apart from being a relevant tool in Visual Art can raise the status of the subject as a subject of study and render it more prestigious.

- Efforts towards ICT integration in Senior High Schools is not focused, aggressive and preserving enough to equip our future leaders with the required competence in their various fields of study.
- Integration of ICT into Visual Art disciplines are biased towards Graphic Design, Picture Making (Painting) and Textiles. ICT experts are however certain of the positive roles ICT can play in all the eight Visual Art disciplines studied in the Ghanaian Senior High Schools.
- Integration of ICTs into the SHS Visual curriculum should take into consideration the opinions of Visual Art teachers concerning the inevitability of conventional Visual Art practices in our art forms.
- Information and Communication Technology Considerations for Visual Art (ICTC4VA) provides useful approaches for smooth integration of ICTs into the Senior High School Visual Art curriculum.

The conclusions drawn helped in answering the Research Questions posed at the commencement of the research.

1. Current approaches to ICT in the Senior High Schools as potential catalyst for transformation in the teaching and learning process (Research Question 1)

The ICT programme as it currently exists in the Senior High Schools lacks transformative goals. It does not aim at initiating pedagogical transformation in the study of Visual Art or any known subject area. The seven general aims set for the programme merely takes care of the *emerging* and *applying approaches* to ICT integration formulated by UNESCO (2002), where instructors expose students to ICT as a concept, inculcate in teachers and students the need for ICT literacy, interest in the use of ICT, and the use of ICT for the performance of tasks already carried out in school such as typing and calculating.

2. *Recognition of artistic, creative and aesthetic sensibility in the core ICT*

(Research Question 2).

ICT programme in the Senior High Schools do not exactly support the teaching and learning of Visual Art. Inherently, however, there are a lot of topics in both the core and the elective ICT syllabi that point to the centrality of artistic, creative and aesthetic sensibilities in *ICT studies*. The question of whether artistic, creative and aesthetic awareness is central to the study of ICT in school or not, can therefore be dealt with, only as a covert phenomenon.

3. *The level of ICT integration readiness among Visual Art teachers and students in the Ghanaian Senior High School (Research Question 3)*

Visual Art teachers and students are prepared to embrace ICT integration provided it would be supported with explicit directives and implementation procedures. In spite of few instances of disagreement especially among some elderly teachers, there was a considerable consensus on the need for measures that would ensure a more structured way of infusing technology into Senior High School Visual Art programmes. Among many reason, ICT integration was considered imperative due to the fact that technology has already caught up with artistic practices in the job market and therefore called for its unconditional integration in classroom practices as well. Besides there are many known advantages in the use of ICTs in Visual Art classroom activities which enhance both subject delivery and learning. The implication is that, Visual Art teachers have the responsibility of ensuring that today's Visual Art student is being prepared adequately for tomorrow's ICT pervasive job market.

4. *Ways by which a comprehensive ICT-based Visual Art curriculum can unleash the full potentialities of ICT for artistic and instructional purposes.*

The Proposed Framework demonstrates the possibility of initiating a procedure for the infusion of technology to enhance teaching and learning of Visual Art in Ghanaian Senior High Schools. Modules presented in the Framework, code-named *Information and Communication Technology Considerations for Visual Art* (ICTC4VA) are intended to ensure appropriate and purposeful use of technology to develop ideas and creative thinking in the most flexible manner. By this Framework, it would be possible for curriculum developers, teachers and students to appropriately select ICTs that have direct bearing on their area of study. This will make it possible to both Visual Art teachers and learners to apply ICT in the right time, the right way and for the right purpose.

Conclusions

The most prominent of the several conclusions that may be explicitly or implicitly inferred from this study is the development of a suggested Framework for Integrating ICTs into the Ghanaian Senior High School Visual Art curriculum. The Framework identifies relevant ICT modules code named ICTC4VA. These modules are intended for consideration in the preparation of Visual Art curriculum, that can potentially ensure a more vibrant and rewarding ICT programmes in the study of Visual Art in Ghanaian Senior High Schools. Contrary to current practices, the suggested Framework demonstrates the potentialities of ICT as a means for reaching the instructional objectives in the classroom rather than ‘an add-on’ or ‘time filler’.

The study also identifies the centrality of the Visual Art teacher in any effort towards ICT integration. Apart from training and re-orienting Visual Art teachers into relevant skill acquisition and confidence in the use of ICT, curriculum planning should not be oblivious of the opinions of Visual Art teachers. Deficiencies identified about Visual Art teachers’ knowledge in the use of technology has got more to do

with *acceptability* than ignorance, and this to a very large extent, is understandable considering what goes into the making of a typical 'Visual Artist'. It was obvious from the study that not all Visual Art teachers are welcoming technology with open arms. To some extent, teachers have been polarized in their acceptance of ICT. Whilst some are very enthusiastic about the integration of computers and the Internet into the classroom, others have been cautious in their welcome, and some have simply rejected the technologies. To a very large extent, there is a level of justifiable cynicism based on some of the experiences with computer usages among the youth in the Ghanaian society. In so many instances, the youth who are supposed to be the immediate beneficiaries of ICT have both knowingly and unknowingly damaged its reputation through internet fraud (*sakawa*) and other cybercrimes. Serious efforts towards ICT integration should therefore be preceded by a conscious effort towards providing the Visual Art teachers with tangible reasons *why* they should fuse ICT into their teaching, before proceeding into the *how's* of ICT infusion.

The readiness of Visual Art students for ICT infusion in Visual Art praxis both inside and outside the classroom became so obvious in the study. This confirmed the statement by Asamoah-Duodu of Visual Arts and ICT Education Unit in CRDD, that students of today are "digital natives", and today's educators are "digital immigrants" (CRDD, 2010). The prowess and dexterity exhibited by most of the sampled students in the use of technology in art was admirable and indeed made the entire idea of ICT integration so prognosticating.

That Ghanaian Senior High Schools are ready to integrate ICT into the teaching and learning of Visual Art is axiomatic. Most of the schools visited had ICT laboratories, about 80% of which enjoy some Internet connectivity. Besides, there is enough evidence on efforts by GES and other stake holders, including old student and

Parent/Teacher Associations, to equip Senior High Schools with ICT tools, materials and infrastructure throughout the country. Presently, there are a lot of ongoing efforts by the government to modernize the educational system, and ICT has always been perceived as a key to such modernization. Curriculum and ICT experts consider ICT a vital component in upgrading the quality of education through changes in curricula, mastering of new training skills and wider scope of knowledge. This is what gave birth to the 2007 education reform which threw a lot of weights behind ICT integration.

Unfortunately, curriculum content, methods of teaching and school administrative procedures are rather inert to the continuous changes in reality and therefore pose unwarranted limitations to ICT integration. The study identified discrimination in the use of ICT facilities for teaching and learning against Visual Art. However, ICT enthusiastic Visual Art teachers and students continue to project justifications for the need for ICT in Visual Art praxis.

Recommendations

Many key issues concerning the effective integration of ICT in Visual Art education have become apparent through the findings of this research. Before premising any recommendations, however, it is deemed necessary to highlight some issues this study does not exactly recommend.

As indicated in the proposed Framework for an ICT-based Visual Art curriculum, no attempt has been made at dissolving the traditional boundaries associated with the teaching and learning of Visual Art in Ghanaian Senior High Schools. While the research assumes a strong advocacy stance in support of ICT integration, it is also mindful of the caveat put forward by a section of Visual Art teachers concerning the danger of ‘‘throwing out the baby with the bath water’’. This

study does not in any way discard traditional Visual Art practices. Indeed this study does not only consider traditional art practices worth keeping, but central to the new ICT-based curriculum. This is because the experiences gained through traditional art practices, whereby tools and materials are committed to total compliance with the artist's creative sensibilities, are very necessary in the control of technological tools which are much more overwhelming, imposing and powerful. On this basis, it is first and foremost recommended that teachers should be open-minded in their approach to ICT integration.

Whether we like it or not, information and communication technologies are already a vital factor in successful development of education, not only in Ghana, but the world over. Considering the pace at which ICTs are uncontrollably multiplying in our societies and dictating educational needs, teachers have no option than to vary or customize their roles to conform with current approaches to teaching. They should begin to see the need to evaluate the ways by which they go about their professional duties to reflect the demand of today's child. Visual Art teachers in the Senior High School should take advantage of the Senior High School level being the level where students are attempting to understand complex processes (Kinelev, et al., 2004) and adopt means of transforming pedagogy to meet the complex learning needs of their students.

Since teachers cannot operate in a vacuum, it is the responsibility of the government to ensure that the right environment has been provided for effective integration of ICT. In this direction, this study should be considered as a plea on behalf of Visual Art education for designing and implementation of educational policies that advance and maintain genuine courses for ICT integration in the Ghanaian Senior High School. Visual Art as a programme deserves a place in ICT

considerations, and where possible, Visual Art departments should have their own ICT studios or laboratories.

Whiles encouraging critical thinking skills, promoting information and media literacy and furthering cooperative working attitudes among students through ICT integration, there is also the need to ensure that students are directed appropriately towards positive and more beneficial usage of ICTs.

With regards to the use of the Internet and other online resources, students need to be educated on their educational resourcefulness and also be supported in making responsible choices within an educational Framework. Students should be made aware of the potential dangers of the Internet as well as the dangers and pitfalls that they may unwittingly encounter online. They should also be encouraged and assisted to grow less attractive to inappropriate, offensive and illegal materials on the Internet. This can be one positive way of ensuring the safety of students online.

The decision to integrate ICT into Visual Arts education in schools can be intriguing much as it is challenging, considering the financial and other resource constraints facing the Ghanaian educational system. If we consider certain challenges in our schools such as class size, low equipment levels, ICT infrastructure, school leadership, parental support and teacher-ICT competencies, to mention but a few, it would be more than justifiable for anyone to suggest that ICT integration should never be considered at all in any way. But then, one question remains outstanding: How do we address the question of students' preparedness for the 21st century world, without developing additional didactics that would motivate the new generation to become investors and participants of the current technology driven world?

Fortunately, ICT integration may have a 'one soul' but 'several bodies'. In other words ICT integration is so complex an enterprise that there is no "silver bullet"

approach. The soul of ICT integration is the knowledge that ICT can play a major role in helping learners acquire the 21st century skills of creativity, innovation, critical thinking, problem-solving, communication and collaboration (Bosco, 2009; Dede, 2008; Tapscott, 2008). Therefore, schools have the opportunity to provide the appropriate ‘body’ for the ‘soul’. In this direction, individual teachers, administrators and students are charged with the responsibility of adapting appropriate aspects of ICT to their particular educational needs and institutional contexts. Ghana can draw greatly from the Singapore example, where the Educational Ministry creates the ICT integration vision centrally but allows individual schools the freedom to implement it to suit their needs (Lim, 2004).

Already, Ghana as a country has invested in some ICT infrastructure both outside and inside the school. Teachers, parents and students are already heavily exposed to ICTs in the field of communication through the use of the Internet, mobile phones, computers and modern audio/visual systems. Therefore, whether or not everybody has fully embraced ICT integration in education is no more an issue. It is now the responsibility of government to formulate appropriate measures towards ICT integration in schools by identifying key stakeholders in bringing the required changes and outline their role in achieving ICT integration.

Again, ICT integration, like any other educational enterprise should be constantly monitored to ensure that ICT is not ending at infrastructural development like establishment of ICT laboratories in schools. It must be ensured that it is also leading toward academic development in subject area studies, contributing to better understanding of concepts and high academic achievements.

It is believed that this proposed ICT-based Visual Art curriculum Framework would map out conceptual outline of how our traditional teacher-oriented Visual Arts

education can be gradually transformed into student-oriented education. It is also believed that the Framework would help Visual Art teachers to evolve the kind of “constructivist activities” that would engage learners in a deeper and more liberated creative thinking through Information and Communication Technology (ICT).

Recommendation for Further Research.

It must be noted that this research and the derived Framework for Integrating ICTs into the Ghanaian Senior High School Visual Art Curriculum remains a theoretical concept intended to present parameters to assist in the development of a curriculum and identify ICT learning outcomes in the study of Visual Art. As typical of all frameworks, it is “not designed to be used as an instrument for the delivery of instruction” (Eryaman, 2010, p. 380). It is meant to provide direction to schools and curriculum developers in their effort to integrate ICT into the Visual Art Curriculum. This researcher therefore believes that a further research on the outcome of the study could be helpful. In this regard, a further study might be undertaken to test how the Framework could provide the required parameters to assist in the practical development and implementation of Senior High School Visual Art curriculum in an effort towards the variegation of instructional procedures. Further research could also include at least, a-one-academic-yearlong Performance Assessment Procedures (PAP) that will determine the effectiveness of ICT integration in the Visual Art Classroom. Among other measures, further research could also ascertain students’ competencies in Information literacy, Media literacy and ICT literacy through the implementation of the Information and Communication Technology Considerations for Visual Art (ICTC4VA) by the end of the try period.

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APPENDIXES

APPENDIX 'A'

FRAMEWORK DEVELOPMENT FOR AN ICT-BASED VISUAL ART CURRICULUM FOR GHANAIA SENIOR HIGH SCHOOLS

GUIDELINES FOR INTERVIEWS WITH PARTICIPANTS IN THE STUDY

The study used interviews to obtain data from selected contributors to the current senior secondary school visual art curriculum, school ICT coordinator/instructors, visual art teachers and ICT experts. These questions served as a guide to the researcher in the interviews which were mostly in the form of conversation. Apart from this guide, it became necessary to use neutral probes to elicit further responses in many instances.

QUESTIONS FOR VISUAL ART TEACHERS

1. What is your understanding of ICT?
2. How would you assess your own level of proficiency in the use of ICTs?
3. Do ICTs help in any aspect of your teaching?
4. What is your take on current exponential stances on ICT integration into the teaching and learning of Visual Art?
5. Do you perceive any form of disagreement between ICT and visual art?
6. Do you think it is important to integrate ICT in your teaching?
7. In your opinion, what role(s) can ICT play in your classroom?
8. In what ways would ICT affect the image of Visual Art as a subject?
9. From your experience as an art teacher, which aspect(s) of the visual art curriculum can ICT render more effective?
10. Do you have students who express the desire or the ability to engage in artistic activities with ICTs?
11. Would you tell me some of the challenges you are facing as an art teacher in your effort towards the use of ICT in your teaching?
12. Do you have any general comment to make or experiences to share about ICTs and Visual art?

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QUESTIONS FOR VISUAL ART STUDENTS

1. Which aspect(s) of visual art do you study?
2. Briefly tell me what you know about ICT.
3. Do any of the things you study in the general ICT classes affect the learning of your chosen area in visual art?
4. Apart from the ICT lessons, do you encounter any of the ICT tools in the visual art classroom?
5. Please mention and explain how they are used.
6. Do you personally undertake any learning activity in visual art using computers?
7. Do you do this at home or in school?
8. Where would you say ICTs are most accessible to you? Home or school?
9. How would you rate the consideration of visual art in ICT issues in your school on a scale of 0 to 5, where 0 is *never comes into the picture at all* and 5 is *major consideration*?
10. Would you agree or disagree with the proposal that *computer* use should form part of your studies in visual art?
11. Which of the areas in visual art do you think ICT can effectively be used as a tool?
12. Do you know of any software that can be used in any of the areas mentioned?

FRAMEWORK DEVELOPMENT FOR AN ICT-BASED VISUAL ART CURRICULUM FOR GHANAIAN SENIOR HIGH SCHOOLS

GUIDELINES FOR INTERVIEWS WITH PARTICIPANTS IN THE STUDY

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QUESTIONS FOR ICT EXPERTS

1. Would you please tell me your area of specialization in ICT?
2. What role or roles do you expect ICT to play in our educational system?
3. How do you assess the current effort towards ICT integration in education in Ghana?
4. How frequently do you hear about ICT in relation to the teaching, learning or practicing of visual art?
5. From your stand point as an ICT expert, do you consider ICTs as viable tools in artistic practices?
6. Are you aware of any software that can be used in Visual Art practices?
7. Do you think this/these software can be used in the teaching and learning of visual art in the senior high school?
8. Can you suggest any other way by which ICT can feature in the visual art curriculum for SHS?

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The study used interviews to obtain data from selected contributors to the current senior secondary school visual art curriculum, school ICT coordinator/instructors, visual art teachers and ICT experts. These questions served as a guide to the researcher in the interviews which were mostly in the form of conversation. Apart from this guide, it became necessary to use neutral probes to elicit further responses in many instances.

QUESTIONS FOR CURRICULUM EXPERTS

1. You took part in the recent curriculum review which brought to existence the current senior high school syllabi. Were you in any way exposed to any policy framework guiding the integration of information and communication technology (ICT) by students and teachers in curriculum considerations?
2. Can you comment as to whether any specific area of study (subject) has been associated with ICT as far as teaching and learning is concerned?
3. How would you comment on the level of ICT consideration in the senior high school visual art curriculum? Are you satisfied with your observation(s)?
4. Can you think of any reason for your observation(s)?
5. Do you consider ICT integration into the senior high school syllabus as worthy of consideration in our current educational system?
6. Can you please mention any specific aspect(s) of visual art which ICT can positively affect as far as the current contents of the senior high school visual art syllabus is concerned?
7. Are there particular schools, documents or other resources you can recommend I refer to for further information on what you have told me?

FRAMEWORK DEVELOPMENT FOR AN ICT-BASED VISUAL ART CURRICULUM FOR GHANAIA SENIOR HIGH SCHOOLS

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The study used interviews to obtain data from selected contributors to the current senior secondary school visual art curriculum, school ICT coordinator/instructors, visual art teachers and ICT experts. These questions served as a guide to the researcher in the interviews which were mostly in the form of conversation. Apart from this guide, it became necessary to use neutral probes to elicit further responses in many instances.

QUESTIONS FOR SCHOOL ICT COORDINATORS/INSTRUCTORS

1. Does this school have a policy for the use of information and communication technologies across all subject areas?
2. If so, who formed it and how was it formed?
3. As an ICT instructor, can you briefly tell me what ICT in schools mean to you personally?
4. Do you think ICT has affected teaching and learning in any special way?
5. Are you aware of any benefit(s) ICT provides to the teaching and learning of visual art?
6. How would you comment on the level of ICT consideration in the senior high school visual art curriculum? Are you satisfied with your observation?
7. Can you think of any reason for your observation?
8. Do you consider ICT integration into the senior high school syllabus as worthy of consideration in our current educational system?
9. Has there ever been any opportunity for you to expose visual art students to the potentialities of ICT in artistic practices in any of your instructional periods?
10. Can you please mention specific aspects of visual art ICT can positively affect as far as the current contents of the senior high school visual art syllabus is concerned?
11. Can you share with me some of your general experiences as an ICT instructor?

APPENDIX 'F'

Summarised transcript of some of the responses from Visual Art Teachers

(Teachers are simply referred to as T1, T2, etc., in no particular order. The responses recorded have been captured from two different teachers from two different schools. They have been juxtaposed in this presentation because the issues raised are different in some special ways)

1. What is your understanding of ICT?

[Potential probes: What does the abbreviation stands for? What does ICT as a concept means to you? What does ICT entail?]

- T1: ICT stands for Information and communication technology. It has got to do with computers basically. Well, as a concept I think ICT represent modern technologies that help us to do things fast and also access and send information. As I said earlier, I think ICT entails the use of computers, internet and maybe mobile phones.
- T2: ICT stands for information and communication technologies. ICT as a concept stands for the use of computers to enhance performance. ICT entails computer technologies, hardware and software.

2. How would you assess your own level of proficiency in the use of ICTs?

[Potential probes: How much of ICT do you know? What accounts for your ICT proficiency level? Are you interested in knowing more than you know now?]

- T1: Personally, I don't count myself among ICT literates because I cannot use the computer so much. All what I am able to do is a little typing here and there with one finger, the " 'A' wohen, 'B' wohen" [where is 'A' where is 'B'] sort of thing. Well the fact is, I haven't really been exposed to ICT in any serious way. The ICT I learnt at the university was just anything. We hardly used the computer in any serious way. Well I wish I could learn more. In fact I have been improving since I bought my own laptop. What I really need to be serious at is how to use Corel draw and such programs for designing and other things. The only problem is, I feel so reluctant to do so because learning in such a completely new environment is not too easy for someone of my age. But I will try all the same.

T2: Actually I cannot say I know too much, and I cannot also say that I don't know anything at all. My experience with ICT tells me that it is so broad that no one can actually profess all knowing. I have been fortunate to interact with people who use computers and other ICT gadgets for all sorts of things, and that has helped me to use computers and quite a number of software for so many things. I can actually draw with Adobe illustrator, work photos with Photoshop and do some basic animations with Flash. I can also edit videos with Adobe Premier. Of course I wish to know more. I learn something new with the computer each passing day, and I really want to know as much as possible.

3. Do ICTs help in any aspect of your teaching?

[Potential Probes: Given the opportunity, would the ICT laboratory in your school help your teaching in any way]

T1: Not really. I think the only thing ICT does in my teaching is the notes I compile on my laptop, and probably the examination questions that are typed and printed with the computer. But some of the students have learnt to use the computers themselves. It has come in their time, and so it is their thing, you know. Back at home, my children use my laptop more than I do, and they can do far more than me. Some of us are called BBC Born Before Computers And well, it is very difficult to teach an old dog new ways. Well, yes I think the ICT lab would help the Visual Art students when they are allowed to use the place for learning, but well, not for all of us. Maybe the younger ones would make good use of such opportunities, because for somebody like me, I have a lot of learning to do myself.

T2: Somehow. In fact, formally I would say no because we have not been assigned computers for Visual Art teaching. The computer laboratory is purposely for ICT lessons and nobody is allowed to use the place outside that purpose. What I do sometimes is to use my laptop to illustrate certain concepts to my students. When I was teaching colour for instance, I used the computer to explain the primaries of light and other such concepts. So yes, indeed, if we are given the opportunity to use the ICT laboratory, it would be very beneficial.

4. *What is your take on current exponential stances on ICT integration into the teaching and learning of Visual Art?*

T1: I can say it is in the right direction, considering the fact that ICT has come to stay. Now wherever you go it is ICT, and it has even become a requirement for job acquisition. So why not? Visual Art students need it to brighten up their chances of gaining employment after school.

T2: From the little that I know, I don't think there has been any better tool for art than the computers and associated peripherals. To say it simply, ICT in Visual Art is a necessity. I think we should encourage the position.

5. *Do you perceive any form of disagreement between ICT and visual art?*

T1: I don't exactly see it as a disagreement. I see it as a misconception. In fact, in my opinion, we should classify computer art works and judge them on their own merits rather than clustering them with traditional art making and grading them on the same scale. The reason being that, the two have no basis for comparison. Painting with a brush in hand is always a painting, and I can't see why moving of the mouse on the computer screen to make "marks" can equal the elevated process of standing in front of the canvas. Then coming to think about sculpture, ceramics and the rest, I don't really see where the computer comes in. But again, this is my personal opinion, and as I said, I cannot close my eyes to the realities of the day and say that ICTs don't have any role to play in Visual Art. Probably you are the experts and you may know better.

T2: I don't see Visual Art practices disagreeing with ICT in any way. I think they are bedfellows. All the tools available for traditional art making are available in ICT tools, and they performances better in so many ways.

6. *Do you think it is important to integrate ICT in your teaching?*

T1: Yes I think so. Because, as I indicated earlier, it is clear from ongoing developments, that, very soon, skills in traditional art making alone wouldn't be enough for penetration into the job market. So for the sake of our future artists, let the integration come.

T2: Integration is very important. In fact some of us think a more serious effort than what is prevailing needs to be put in place. From the way it is going, I don't see when ICT would really feature as a tool in the Visual Art classroom.

7. *In your opinion, what role(s) can ICT play in your classroom?*

T1: It can feature more prominently in graphic design activities, and may be textiles.
That's my thinking.

T2: ICT can help to explain concepts such as colour very well. It would also give students the opportunity to practice and explore more extensively than they are currently doing with traditional tools. The reason is that, with computers for instance, you can try out so many ideas without exhausting your paper, and erase, undo and redo for so many times without destroying the work area. This advantage alone would give students so much freedom to engage in self-expressional activities. When it comes to the Internet, ICT would help children to get a lot of information to supplement what is imparted in class.

8. *In what ways would ICT affect the image of Visual Art as a subject?*

T1: It would make our students feel proud and confident in their subject of study. In this school, some people behave as if the computer laboratory was built for them. So when it gets to the point where our students would use computers in their lessons, or better still have their own ICT lab, that is Visual Art computer lab or something, I think it would raise the image of the subject so high.

T2: Very positively. It would bring a lot of prestige to the subject.

9. *From your experience as an art teacher, which aspect(s) of the visual art curriculum can ICT render more effective? [Potential Probes: Which areas in Visual Art would ICT effectively support and in which areas would ICT be less supportive]*

T1: Well, as I said earlier, my knowledge in ICT is not enough to provide a satisfying answer. But from where I am standing, I think ICT would benefit graphic design, textiles, and to some extent, picture making. Because I know Corel draw for example can be used to create graphic design products such as posters, labels and so on, and also used to develop motifs for textiles.

T2: I think ICT would be beneficial to all the eight aspects of Visual Art. Already, ICT tools art tools support the creation of 2 and 3 dimensional art forms, the same way the curriculum stipulates. So I see ICTs supporting the teaching and learning of all Visual Art disciplines. The only set back I perceive is the inability to actually produce tangible 3 dimensional art forms from the computer

the same way graphic design and picture making products are produced in hardcopy. All the same, the computer can help students develop interesting ideas for 3 dimensional products to be built manually into tangible art forms.

10. Do you have students who express the desire or the ability to engage in artistic activities with ICTs?

T1: All the students are desirous to learning with ICT, but I think few of them can actually do so. I believe some of the students have access to computers in their homes, so they seem to be very knowledgeable. Yes, they talk about computers all the time and so I presume there would be some who are very apt at it.

T2: My students are crazy about computers. They are on me all the time to even take them through what I know on extra-classes basis, but I simply don't have the time and resources. I once made an attempt to hold them in the computer lab for extra classes in 'computer art' (inverted commas indicated with fingers), but I was stopped before I even started. But there are students among them who are fairly good. I know of about two or so students who have laptops, and they are very good.

11. What do the students think of the way in which they are asked to use computers in general ICT classes in your school?

T1: Maybe they are not satisfied, but they don't have any other option, do they? Fact is, that is what every student in the school is learning, so who are visual art students to suggest otherwise.

T2: They are not satisfied one bit, especially those who are in my graphic design class. You see, it takes a Visual Art student only the first encounter to identify what he can do with the computer. So the situation where they go for ICT classes only to learn about computers and how they are used to type could be very frustrating. All the same, they are coping.

12. Would you tell me some of the challenges you are facing as an art teacher in your effort towards the use of ICT in your teaching?

T1: In terms of real integration challenges, I don't think I have much to say, because as far as I know nothing of that sort has really started. Right now, my major challenge is that I would have a lot of catching up to do if tomorrow your curriculum is developed and implemented. But I can probably predict some of

the anticipated challenges. In the first place, teachers need to understand what the integration is really about, and be educated on what they need to know and do. This should be done even before schools are equipped with the needed infrastructure. As I have been telling you all along, I have my own reservations about computers in Art and there are probably other people like. This is why I am saying that we need to be enlightened and precisely directed as to how the whole thing should be like. I don't know if I'm making sense, but well, that's what I think.

T2: The first challenge I'm facing right now has got to do with the directives to give me the go ahead to, maybe use the computer lab for some of my Visual Art lessons. Then like what you are planning to do, the syllabus must indicate specific ICT topics for the various aspects of Visual Art. Because right now, I am even allowed to use the ICT lab, I would have to figure out for myself aspects of my lesson that would require ICT tools. But if there is a general guideline on ICT integration, integration would be more consistent and systematic.

