

**A CASE FOR THE INTRODUCTION OF COMPUTER
GRAPHICS INTO THE SENIOR SECONDARY SCHOOL
VISUAL ARTS GRAPHIC DESIGN PROGRAMME IN
GHANA**

A thesis presented to the School of Graduate Studies
Kwame Nkrumah University of Science and Technology,
Kumasi in partial fulfillment of the requirement for the
Award of a Master in Art (M.A) Art Education

By

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FEBRUARY, 2004

CERTIFICATION

This is to certify that this thesis is the candidate's own account of his research.



Supervisor

Nana Amponsaa Opoku Asare (Mrs)

ACKNOWLEDGEMENTS

My effort at bringing this thesis to fruition may not have been complete without the contributions made by certain individuals, which need to be appreciated.

First and foremost, my sincerest thanks goes to Nana Amponsaa Opoku-Asare, my project supervisor, a lecturer at the Art Education Department, K.N.U.S.T. who took time to read through the script and made very useful suggestions.

I am also indebted to the headmasters, I. T. teachers and Armed Forces Secondary, Prempeh College, Kumasi High, Technology Secondary, Kumasi Secondary Technical and T. I. Ahmadiyya, whom I depended for the pre-test part of the study, without whose assistance the project would not have seen the light of the day.

Special mention has to be made of Mr. Kingsley Adjei and Miss Janet Anokye of Armed Forces Secondary Technical and Mr. AKwasi Gyebi (Computer Graphic designer Aseda House Kumasi) for their dedication toward the attainment of success in the pre-testing of the identified computer graphics programmes.

Last but not the least, I wish to thank Mr. James Gyimah (a close friend) and Miss Victoria Pomaah (my wife) for their moral support they offered for the accomplishment of this thesis.

To each and every one who contributed in anyway towards the production of this thesis, I say, thank you.

ABSTRACT

Author	:	Bartholomew Johnson Sebbeh (Dip In Art Ed., B. Ed (Hons)
Title	:	A Case for the Introduction of Computer Graphics into the Senior Secondary School Graphic Design Programme in Ghana
Supervisor	:	Nana Amponsaa Opoku-Asare (Mrs.)(M.A Art Ed, M.Phil)
No. of Pages	:	178

The computer has become an indispensable tool in our day to day activities. It makes human beings work with comfort and lessens the time used to calculate, gather, arrange and store data, and retrieve information. In Education, learning with the computer at every level provides teachers and students the opportunity to explore the world and learn at their own pace. For the teacher in particular, the computer serves as a powerful and reliable instructional resource whereas students can use it both as writing and a drawing tool.

It is for this reason outlined above that it is very imperative for the proposition of Computer Graphics to be included in the training of visual artists in the Senior Secondary Schools in Ghana.

The Demonstration method of research was deemed suitable and the purposive sampling method was used to narrow the selection of students for the pre-testing exercise involved in the study.

The computer hardware and software can be considered as a subject for study and as a tool to be used in education as well as in the design process to increase students' interest in the design process.

The study has shown that computer graphics as a modern technology will make the learning of concepts and skills very easy and let performance become easier for students. This will make the study of graphic design in particular and art education in general enviable since it will equip its students with the necessary techniques that will help students face the challenges posed by modern day advertising and communication.

CorelDRAW, Microsoft Word, Office, Microsoft Works, and PowerPoint are easy to learn and their introduction into the Senior Secondary School Visual Arts Programme would enhance the capabilities of students in designing and that would make them efficient to fit into the job market.

BJS

February, 2004

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CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Computers have become valuable and dependable tools in almost all the sectors of human development. The computer is now used in scientific explorations, in the technology, construction, manufacturing industry, business and also in art and architecture.

To save time, the engineers seek solutions to high profile problems concerning automatic control, design, and complex mathematical situations, among others by using the computer.

In business and government, computers assist in data processing, preparation of payrolls, warehousing and distribution operations, customer accounting and billing by banks, insurance companies, and public utilities and have become an essential tool for decision making at the highest administrative level.

In education, computers are used as a tool for imparting knowledge to the individual by means of Computer Aided Learning (CAL). With such programmes the individual can learn at his or her own pace thereby facilitating programmed learning. In the arts, computers are used in literature, music and art and design including film production and animation.

To the artist or the designer, the computer serves as a powerful tool for creating a wide range of images in two and three-dimensions. The computer allows the artist to design or paint on an electronic canvas otherwise called the screen with electronic devices such as brushes, pencils, airbrushes, spraying cans and erasers. Computers enable artists to manipulate images and designs for easy alterations and corrections by the touch of a button, a process which reduces the burden of spending hours and days to create and produce.

Using the computer to create pictorial representations to effect communication is what is termed "computer graphics". Computer graphics offers unlimited assistance to the artist to facilitate easy designing and production in all spheres of human endeavors from initial thumbnail sketches to the final stage and above all, allows the designer to store his or her work, retrieve and use it at a later time.

In order for Visual Arts students in Ghanaian Senior Secondary who are pursuing the Visual Arts course to acquire computer skills in designing and to meet public demands as far as graphic communications are concerned, it will be most appropriate to introduce them to computer graphics.

1.2 Statement of the problem

According to the Senior Secondary School Visual Arts Syllabus (1991), the Visual Arts courses have been selected to help students acquire competence and skills in art for individual and national development. This means that the Senior Secondary School

Visual Arts programme is mainly intended to offer students basic employable skills that will enable them become useful members of the society, when they leave school.

The scope of the Graphic Design component of the Visual Arts programme to be expanded to include education in information technology. The advent of computers and their application in education makes it imperative for Visual Arts students in general and Graphic Design students in particular, to acquire knowledge in computers to make them competitive on the job market where knowledge in computer graphics is a pre requisite.

Unfortunately, the Senior Secondary School Visual Arts curriculum does not include the use of computers in the design and production of pictorial illustrations and other communication materials. The fact that advertisements in the local newspapers emphasize knowledge in computers and hands-on experience in the use of CorelDraw, Adobe PageMaker, Microsoft Works, Microsoft PowerPoint and other graphic design software as a requirement for employment in the advertising and publishing firms implies the need to expand the scope of the Graphic Design curriculum to enhance career opportunities for its students in Senior Secondary Schools.

The thesis therefore focuses on introducing computer-aided designing in the Senior Secondary School to provide additional skills for graphic design graduates.

1.3 Objectives

1. To assess the content of the existing Graphic Design syllabus in the Senior Secondary School Visual Arts programme.
2. To identify computer programmers needed to enhance the teaching and learning of

graphic communication in the Senior Secondary School.

3. To identify selected schools in which to pretest the new Computer designing programmes.
4. Suggest effective ways of teaching computer graphics.

1.4 Hypothesis

1. Introduction of computer-aided designing will broaden the scope of the Graphic Design component of the Senior Secondary School Visual Arts programme.
2. Computer literacy and its application in designing will enhance the marketability of the Senior Secondary School Visual Arts programme.

1.5 Delimitation

This study focuses on the use of CorelDRAW, Microsoft PowerPoint, Microsoft Works, WordArt and Microsoft Paint among others, as tools for teaching, learning and designing within the Senior Secondary School graphic design programme in Ghana.

1.6 Limitation

Difficulties encountered centered on inaccessibility to use of institutional computer laboratories because identified software did not form part of the schools' I. T. programmes. The researcher therefore had to rely on other resource personnel to test the feasibility of the selected programmes.

Moreover, some of the schools did not have printers to print students' output on the computer to enable the students engaged in the exercise to appreciate the difference

manual and computer-aided designing. In working on stored data, opening of the floppy disk on other computers for printing was also at times difficult thereby losing some of the works the students had produced.

There were also no image scanners in the schools where pre-testing were done so there could not be any opportunity for scanning pictures and images for use as graphic design.

1.7 Research Methodology

This is the procedure that is used to carry out the research activities. It is based on the procedure that data is gathered in order to test the hypothesis. Research instruments include observation, historical, experimental, and descriptive. For the purpose of this report, the experimental method was used and the results written in a descriptive form.

The essential feature of the experimental research is that investigator deliberately control and manipulate the conditions which determines the events in which they are interested. At its simplest, an experiment involves making changes in a variable called the independent Variable and observing the effect of that change on another variable called the dependent variable. In learning, the independent variable in experiments in the classroom settings is a stimulus of some kind and the dependent variable is a response.

The descriptive research method on the other hand is concerned with conditions or relationships that exist; practices that prevail; beliefs, point of views or attitudes that are

held; processes that are developing. At times, descriptive research is concerned with how what is or what exists is related to some preceding event that has influenced or affected the present condition or event.

In descriptive research, the researcher arrange for events to happen. Looks at individuals, groups, institutions, methods and materials in order to describe, compare, contrast, classify analyses and interpret the entities and the events that constitute their various fields of enquiry. This permits the researcher to examine individual variations in characteristics or traits testing to identify progress over a period of time.

1.8 Population for the study

To facilitate easy data collection and effective analysis of the researcher employed the purposive sampling technique was adopted to select the population for study. This is based on the fact that only schools currently offering Graphic Design as an option of the Visual Arts programme and have access to computers could be included in the project. Schools that have computers but do not use them were not included in the sample. Only six schools were therefore selected to form the sample population for pre-testing the identified software.

1.9 Libraries Visited

Libraries the researcher visited to source information include the University of Education Library , Kumasi campus; Dunkwa on Offin Public Library; College of Art library, KNUST; Ashanti Library, Wesley College, Kumasi and Kwame Nkrumah University Main Library, Kumasi.



1.10 Definition of Term

The meanings of certain technical terms as used in this study are explained as follows to facilitate easy understanding of the report:

- Software : Encoded instructions that when executed by a computer, perform useful functions. (Software and programme are used interchangeably as their meaning are virtually the same).
- Computer Graphics : The use of the computer to produce communication designs
- Computer-Aided Design: The assistance of the computer in the design of Products and structures. (Computer graphics and computer aided-design are used interchangeably in this report because they are synonymous to each other)
- Monitor : The part of the computer that looks like the television set and displays the result of the input.
- Input : The part of the programme or the computer hardware that moves data into the Central Processing Unit for processing
- Output : The part of the programme or the computer that comes out as the result of the data that was moved into the computer
- Memory : The storage capacity of a computer.
- Menu : A list of choices displayed by a computer

- programme that offers the user a number of options to select from at a given stage.
- Mouse** : A hand-held pointing device that creates electronic signals on the monitor when moved along a flat surface.
- Keyboard** : A typewriter-like input device for entering information into a computer and also for controlling programmes through the command and function keys.
- Pixels** : Individual dots that form images on the monitor or screen.
- Bitmap** : A picture in which the image is made up of thousands of dots (pixels). Bitmap images are also called Raster image
- Application software** : This is software that performs tasks to benefit or help the user directly. e.g. CorelDraw, Ms Word.
- Handles** : Small boxes that surround selected objects which are used to change the size of the object on the screen
- Vector image** : A drawing or picture created with lines.
- Font** : A particular typeface and size.
- Default** : The standard settings automatically used by the Computer when the user does not specify an alternative

- Custom : Settings made by the user when using a particular programme.
- Cursor : A small graphical symbol such as a cross, box or an Arrow that shows the user's current location for inputting text or graphics.

1.11 Abbreviations

- CAD : Computer Aided Design
- CAI : Computer Aided Instruction
- CPU : Central Processing Unit
- CRT : Cathode Ray Tube
- I. T. : Information Technology
- JSS : Junior Secondary School
- PC : Personal Computer
- RAM : Random Access Memory
- ROM : Read Only Memory
- SSS : Senior Secondary School
- VDU : Visual Display Unit (also called the monitor)

1.12 Assumption

Planners of the senior Secondary school Curriculum did not recognize the importance of computer graphics in Visual Arts Education hence its absence from the Visual Arts syllabus. They are also not aware of the negative impact the absence of computer graphics has on the students as far as creativity is concerned. The planners do not know

the vulnerability, insecurity and the trauma the SSS graduates go when searching for jobs since they are not prepared for the job market.

1.13 Importance of the Study

The research will spell out the importance of computer graphics and outline computer programmes that need to be taught in schools to enable the future graduates of the Senior Secondary School Visual Arts programme have the requisite skills to face the world of digital art with confidence.

1.14 Organization of the rest of the Text

The research write up is organized into five chapters. Chapter one contains the background to the study, the statement of the problem, the hypotheses, objectives and the importance of the research. It also defines some unfamiliar terms used to enable readers get a fair understanding of the text.

In chapter Two, a review of related literature was carried out. The main points reviewed include the definition of Graphic Design, what computer graphics means, the difference between computer graphics and computer aided design. This chapter also looked at the structure and content of both the Visual Arts and Graphic Design syllabi and discusses the need for the introduction of computer graphics into the Senior Secondary School Visual Arts programme.

Chapter Three identifies and describes a number of computer graphics software that are

available for the designing and describes their various features. The methodology used for the study and analysis of the pre-testing procedure of the Computer Graphics programmes identified are found in chapter four.

The fifth chapter consists of the summary, conclusions and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2:1 Introduction

Many people find it difficult to understand what Graphic Design or "Graphics" is all about. Others are generally aware and knowledgeable about what Fine Art is but do not know that "graphics" is a branch of Fine Art. Graphic design does not, in the strictest sense of the term, stand for Fine Art. Therefore in an attempt to write about Computer Graphics and its introduction into the Senior Secondary School curriculum, it is prudent to start with a discussion of what "Graphics" is all about.

2:2 Definition of Graphic Design

Bertoline, Wiebe, Muller and Nasman (1995:9) claim that graphics is a

"Visual communication language incorporating text, image and numeric information. Graphics include everything from the more traditional types of engineering drawings to sophisticated computer models, such as the solid of mechanical part or the display in the goggles of a virtual reality system and all follow the rules or laws of visual science."

This definition shows that graphics deal with information that the eye conveys to the individual and that such information is made up of text, numbers and drawings.

According to the Oxford Dictionary of Art (1988), the term "Graphic Art"(graphic design) has several meanings but that in the context of the fine arts, it most usually refers to those arts that rely essentially on line or tone rather than colour.

From this definition, graphic art can be considered as involving drawing and engraving since the most essential elements needed are lines.

The Oxford Dictionary of Art further explains the term as being used to cover the entire field of commercial printing that include text and illustration.

On its part, the World Book Encyclopedia (1985:313) describes graphic art as

"a general term for drawing and other techniques used to reproduce words and pictures. This techniques include block printing, engraving, etching, lithography and silk screen printing."

It further describes "graphics " as being used commercially to advertise, prepare newspaper, magazine, illustrations as well as pamphlets, art production, bookbinding and fashion design and lithography.

The Longman Dictionary of Contemporary English (1987:456) sees graphic design as

"the art of combining pictures, words, and decorations in the making of books, magazines and advertisements."

This definition emphasizes the making of books, illustrations and decoration. This researcher however, believes that graphic design involves more than book making and advertisements.

Amenuke, Dogbe, Asare, Ayiku and Baffoe (1991) view graphic design works as those that involve drawing, painting, engraving and etching for the sole purpose of communication and advertisement. This assertion makes it clear that drawing, painting, etching and engraving must be directed at communication and advertisement in order to be called a graphic design work.

Segal (1975) indicates that graphic design is the most common type of art or design work carried out in industry and commerce. Segal describes the graphic designer as not being responsible for the poster, be it the mundane variety or more creative in concept. Graphic design, according to this author, is concerned with illustrations of all kinds for books, periodicals and dust jackets and covers. Graphics is also said to include cartooning, which is a branch of illustration.

From the discussion so far, it can be concluded that the graphic designer produces posters and illustrations of all kinds, periodicals, book cover and jacket designs.

Crampton and Finney (1988:65) refer to "graphics" as "Design Graphics" and asserts that it is

*"the conveying of information in a Graphic form.
It is concerned with the designing of instructions
and signs; instrument display, sales promotion
and package design."*

The authors explain that graphic design portrays a message in a clear and detailed description or in life-like pictures and that such activity involves the making of signs, logos and exhibition designs. Design graphics, to them, ranges from the straight forward

conveying of information to the selling of a product which in the simplest term is called "advertisement."

The authors say that the designer has to consider the relationship that should exist between functionality and aesthetic properties as vital aspects of designing in terms of package design. This means that the designer should take into account the selling aspects and the persuasive properties of the product because marketing it depends largely on the design and its visual appeal.

Fales, Kuetemeyer, and Brusic (1988) on their part, refer to graphic design as "Graphic Communication" and define it as the methods of sending messages using primarily visual means that include printing, photography and drafting. These authors define graphic communication media as consisting of photographs, pictures, product labels signs, newspapers, magazines, books, mail art and other resources.

Bertoline, Wiebe and Muller et al (1995:16-17) also claim that all types of graphics come under the general heading of Visual Science, which comprises the study of visual and technical application of graphics. They categorize visual science into two major areas namely, visualization and geometry. According to them, Visualization refers to the "process mentally understanding visual information" while geometry is described as a

"branch of mathematics that deals with the properties, relationships, and measurements of points, lines, angles, planes and solids."

They conclude that the ability to visualize and knowledge of geometry combine to create artistic and technical drawings. Applications that are considered as visual science include

visual designs, printing technologies, communications media, engineering and technical graphics, and artistic drawings.

This study, however, is interested in the aspects which are mainly concerned with the production and arrangement of colour, form and other elements that affect the sense of beauty and ability to express aesthetic, philosophical and abstract ideas.

Bertoline, Wiebe and Muller also add that graphics play a very important role in all areas of engineering, for documentation, communications, design, analysis and modeling and that each of the activities is so slanted towards graphic communications. They assert that engineering, for example, is 92% graphical based.

On her part, Gilbert (1992:269) points out that

*"All arts have to do with communication,
but this is uniquely true of graphic design."*

Gilbert underlines the view that the goal of graphic design is to communicate a specific message and the effectiveness of a design is measured by how well the message is conveyed. Gilbert's contention is that if it can be demonstrated that the public received the message because the product sold well or the company's stock went up or the traveler found the right service, then the designer has achieved the maximum goal. It is because of this that graphic design was for a long time known as "commercial art" even

though not all graphic design involves selling. For this reason, Gilbert says the term graphic design is more inclusive and describes more accurately what artists in the field really do.

Gilbert further tells us about some of the things that graphic designers do. Among others, they create visual images by combining words and pictures to communicate a message quickly and effectively: they design books and packages and advertisements: they devise the trademarks and symbols (logos) that construct special corporate identities for firms doing business around the world: They invent symbols that have the same meaning to people who speak different languages and provide the colourful images that introduce television programmes and movies.

Gilbert's explanations make graphic design a powerful tool in the communication of information through designing of books packages, logos as well as images for television and film productions. The symbols that the graphic designer makes are conventional and can be understood by people all over the world irrespective of the language spoken.

From the discussion, it can be concluded that graphic design is a process of working with lettering, lines, illustration or images to make representations for understandable visual communication. It can also be said to include the production of postage stamps, trademarks, billboards and television commercials (advertisements), the designing of brochures, packages, posters and printing of books and magazines. Etching, engraving, block printing as well as other forms of printing such as silkscreen printing are all works of graphics.

The advent of computers has made it possible for graphic designers to create their designs in less time than is usually used when manual designing is adopted.

2.3.1 Computer Application in Graphics

A computer, according to Bardsley (1987) is an electronic machine capable of processing data at a rapid speed.

Walter (1995) states that until 1940, a computer referred to a person who computes and after 1940, to 'gigantic calculators' that gradually replaced human computers. Walter however sums up a computer as any machine that can be seen to do useful thinking.

According to the McGraw-Hill Encyclopedia of Science and Technology (1977) a computer is a device that receives, processes, and presents information. Similarly, Paulson Junior (1995) also asserts that a computer is a complex electronic machine that accepts structured inputs, processes it according to precisely defined rules coded as programmes and outputs the result.

Paulson's definition points out that the computer acts on definitive information according to a particular programme and then produces results.

From the point of view of Media Computer Series (1997:1), a computer is

"an electronic device which accepts data and processes the data under a given set of logical instructions (programmers) to produce output (information)."

Mireku (1996) also defines a computer as a device, which receive information or data one gives and processes the information and gives back the results.

Segal (1975:636) informs us that,

"computers perform what is basically a series of very simple operations, of calculation and comparison, as well as storing and moving data. They are not, as has been popularly supposed, electronic 'Brains', and so are incapable of original, thought, imagination, initiative, reasoning or plain common sense; rather they have obedience which is so absolute that they have to be 'programmed' or instructed, with equally absolute logic and simplicity and in minute detail."

A computer, according to Mittler, Humphries and Howze (1989), is a machine that allows people to store, manipulate and re-organize information, which could be in the form of numbers, letters or images. This implies that artists can use the computer to create images and innovate the design process and enhance creativity in communication design. This position is reinforced by the statement by Dunn (1986: 98) that

"Computers are becoming increasingly important in our lives because of their increased versatility and reliability... computers can be used in other ways such as producing typed text for use in a report; as teaching aid using Craft Design Technology and as a graphic designer to help with your drawing and design work."

Dunn, however, cautions that it is essential to use a well written programme to ensure that the computer copes with the instructions given. It is evident then that the computer can be simply defined as a machine which carries out operations based on the data it is fed with (input), and gives back the result of the operation (output) in another form that can be understood and used.

2.3.2 Components of the Computer

According to Hutchinson and Sawyer (2000), computers come in the form of Supercomputers, Mainframe computers, Workstations, Microcomputers or Minicomputers (Laptop, Palmtop, Personal Computers, etc). For the purpose of this research, the Personal Computer is the focus of the discussion. The Personal Computer has five components, no matter the size. These are the

- Processor
- Memory
- Input/Output
- Disk Storage and
- Programmes (Software)
- Memory

Apart from the programmes (also called Software) the others constitute the hardware of the computer. The hardware then is the physical components of the computer whilst the software refer to the instructions that people have written to give the hardware command. Figure1 shows the various components of computer.

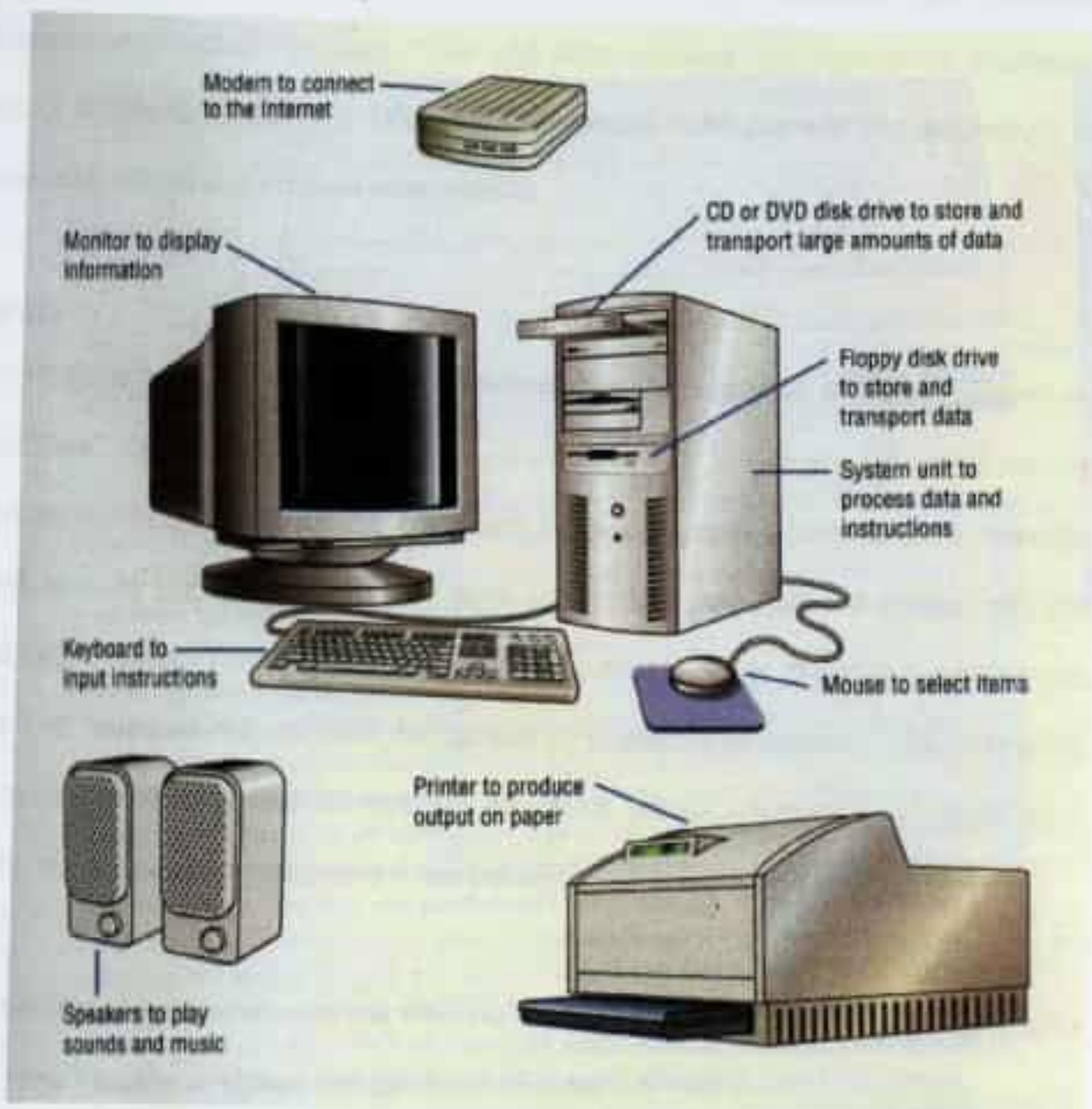


Fig. 1 The computer and its components

The Processor

This is the brain of the computer that carries out instructions. The processor is found in the Central Processing Unit (CPU). It is this part of the computer that performs arithmetic and logical functions. This unit also contains the high-speed electronic memory of the computer. The CPU thus contains the intelligence of the machine. It is where calculations and decision take place.

Memory

The computer's memory consists of semiconductor chips capable of storing millions or more "bits" (binary digits) organized in a manner that is logically accessible to the computer's processor. There are two main kinds of memory. They are the Random Access Memory (RAM) which can both store and retrieve data from the memory and the Read Only Memory (ROM) which encodes data permanently in the chip hardware and can be retrieved by the processor but cannot be written to or replaced. The RAM holds information only while the computer is on. Thus unless information is stored on a device, the information disappears when the computer is turned off or reset.

The memory used can take various forms such as a disk, a cartridge, a chip e.g. a ROM chip. However, the CPU uses the computer's memory to hold pieces of information while it works with them and as a pad for calculations.

Input / Output Devices

Input and Output (I/O) comprise all the ways a computer communicates with users or other machines. Whilst Input devices accept data and instructions from users, Output

devices return processed data (information) back to the user. According to Norton (1995), without input or output devices, a computer cannot communicate with the user even if it had instructions permanently built into it. In this manner, the computer would be isolated.

Input Devices

The most common computer input devices are the keyboard and the mouse but there are also joysticks, magnetic discs, tracker balls, graphic tablets, image scanners and video digitizers. All these can be used for graphic design work but this study will discuss the keyboard, the mouse, and the scanner since they are the most common input devices used by graphic designers.

The Keyboard

This is somewhat like the typewriter keyboard. This enables a person to select and press keys in order to feed the computer with data. The computer keyboard differs slightly from the typewriter keyboard because it has "function" keys that perform special tasks. An important similarity that exist between the computer keyboard and the typewriter keyboard is that they both have Shift keys that, when held down while typing, make the keyboard type uppercase letters and symbols that appear above the characters on the lower parts of the keys.

Another difference between the computer keyboard and the typewriter keyboard is that the computer keyboard has other keys that alter the normal function of various keys. These are labelled Ctrl (Control), Alt (Alternative), Shift and Tab.

Also, the computer keyboard has programmed function keys labelled F1, F2, F3, to F12, and Esc (escape) that are arranged along the upper row of the keyboard. Pressing a key on the computer keyboard produces an electrical contact between a set of wires, which encodes a unique electrical signal and sends it to a storage buffer in the Processor.

The Mouse

The computer mouse resembles the rodent mouse in appearance. It is a small device with a tail like wire connecting it to the computer. A ball underneath the mouse generates electronic signals when it is moved or rolled along a flat surface and these signals produce motions that the computer software interprets to as a small graphical image in the form of a vertical bar or cross which is known as the "cursor". The device normally has two or three buttons that are used to input data. The buttons on the mouse enables it to send signals that allow the software to control activities by attaching the cursor to an object so that it could be moved, make a choice from menu options and show where to insert text or object on the screen as though one were writing or sketching a picture on a paper. It is the most favoured input for graphical uses. Figure 1 shows the computer keyboard and mouse.



Fig. 2 The Keyboard and the Mouse

Scanner

Another Input device worth mentioning as far as graphics is concerned is the image scanner. This is a device that converts an existing image into a digital representation in a computer. For instance, a photograph can be scanned and included in a Desktop Publishing document. The Scanner can also be used to convert existing printed matter into editable image in the normal ways within the computer. This conversion process is referred to as Optical Character recognition (OCR).

Output Devices

A lot of devices enable computers to present information in the form that the user requires. These include the display screen, audio speakers, and all kinds of printers as well as graphic plotters but for this study, only the display screen (the Monitor) and the printer are discussed, for the reason that they are the two most common output devices that the graphic designer uses.

The Monitor (VDU)

This is also called the Visual Display Unit (VDU). It is connected to the computer's system unit and displays information that the computer has been fed with. In other words, it displays the result before it is printed. The commonest type looks like a television screen. There are other types, which have flat-panel displays. Monitors may be monochrome (black and white) or colour. They vary in resolution because the picture produced by the monitor is made up of a number of tiny dots called pixels and the more there are in a picture, the sharper the image will look, like on the screen.

storage device such as the floppy disk for future use. He can as well copy or store programmes that he might not have on the hard disk for use on another computer.

Figure 3 shows Floppy and Compact disks.



Fig. 3 The Floppy Disk



Fig. 4 The Compact Disk

Programmes (Software)

These are specific sets of instructions written in a language that when translated to a computer's instruction set and executed, performs one or more tasks to help achieve the programme's objectives.

Norton (1995:11) states that

"Because programmes tell the machine's physical component what to do, without them a computer could not do any thing."

In view of this, it can be said that programmes are the life wire of the computer.

The Printer

Printers accept information from the computer through a cable connected to it from the computer and prints out information as a hard copy, which can be taken out and read. Printers range from small dot-matrix impact and ink-jet printers to laser printers. Some printers produce only black and white prints. But others are able to print colour. Most printers use dots to characters and graphic patterns. The difference in printing is based on the technology used to move the paper and put the ink on the page.

Disk Storage

The process by which the computer keeps data that it is not currently processing is what is termed as *storage*. Storage can also be said to be an electronic file cabinet from which the computer retrieves data when such data is needed for a work. When data is no longer needed, it is put back in the cabinet.

Norton (1995) declares that the most common storage medium is the magnetic disk, which is a round, flat disk object that spins around the center. Storage can also be done on a floppy disk. However, a hard disk can store more data than a floppy disk or compact disc.. Therefore the hard disks used as the computer's primary filing cabinet. Norton further states that loading a new programme or data onto a hard disk, trading data with other users, and duplicating data, is done via any other permanent or removable storage device such as the floppy disk, and the compact disk, among others.

From this discussion, it is evident that the graphic design student is presented with a guaranteed means of keeping his work on either hard disk or any other permanent

Programmes can be divided into two main categories: System programme and Application programmes. System programmes tell the computer how to interact with the user and how to use devices such as the disk drives, keyboard and monitor. Application programmes on the other hand therefore tell the computer how to accomplish specific tasks for the user. An example of system programme is an Operating System such as Windows XP whilst Presentation Graphics programme like PowerPoint is an application programme.

It is however, important to say that the effectiveness of any computer work and for that matter computer graphics depends on the availability of the processor, memory, input and output devices, a storage device, and the programmes.

In addition to the components, Williams, Sawyer and Hutchinson (1995) identify certain basic features of Graphic Design application programmes that are common to most Graphic Design software. These features are the cursor, scrolling bars, menus dialogue boxes, special purpose and function keys, macros, tutorials and documents. These features enable the graphic designer or the user to carry out operations with the computer to achieve the optimum in a very fast and untiring way. These features would enable Graphic Design students to understand the computer well and use it to build confidence and capacity for efficient work.

2.3.3 Computer Graphics

The McGraw-Hill Encyclopedia of Science and Technology (1977) defines computer graphics as the process of pictorial communication between men and computers.

Sippl (1985:53) defines computer graphics as

"Statistical printout, translated into meaningful graphs, charts, diagrams, maps and renderings."

The author adds that computer graphics can provide overviews and visual aids that would take hours or even days to produce by hand.

Gilbert (1992) discloses that nothing has had a major influence on graphic design ever since the printing press was invented than the computer because when the computer's help is solicited, it can manipulate the tools (type, photograph and illustration) available to the graphic designer in special ways. According to Gilbert,

"Computer-designed typography is now commonplace. Unique typefaces can be created, stored, re-arranged and re-designed with a speed and flexibility unheard of just a few years ago. The computer influences the character of mechanically produced alphabets as surely as the quill and ink influenced the design of letters centuries ago."

For instance, Gilbert explains that letters designed by a computer can be set against graphically exciting backgrounds or even designed to move in a colourful landscape.

Bardsley (1987) claims that with the graphics facility, the computer can be made to use colours and draw pictures while bar charts and other interesting ways of displaying information can also be produced.

Computer graphics, according to Slotnick, Butterfield, Colantonio, Kopetzky and Slotnick (1986:133), can be defined as

"Modelling (describing an object in terms of lines, solids and colour), Storage (of the model in the memory of the computer), manipulation (changing the model by altering its shape or size or merging models together) and viewing (the computer model from a particular view point and depicting what is seen."

Slotnick et al (1986:142) emphasize that computer art is

"based on pixel or raster graphics using the screen as the canvas. The ability to draw or paint computer picture depends on three main components, first the power of the computer to cope with the manipulations required, second, the programme to enable the generation of art on the screen and third the imagination of the user."

In essence, computer graphics refers to the use of computers in planning and executing design work using the appropriate design programmers which allow the designer to conveniently review the progress made, make the necessary corrections on the screen, store and print out the desired work at a faster speed than could be done by hand.

2.4 Computer Aided Design (CAD)

According to the McMillan Dictionary of Micro computing (1985), computer aided design is the capability of the computer to be used for automated industrial statistical, biological and other types of design through the use of visual devices and graphical symbols.

The Encyclopedia Americana (1976) on its part describes computer-aided design, as a new role for the computer is being an aid to the designer in making drawings.

Crampton and Finney (1988:148) submit that computer aided design is linked with Computer Aided Manufacturing (CAM) and covers many different aspects of product design. According to the them,

"The computer can be used in many different areas from the technical research data (information) and market research data, to control a large milling or printing machine. This data can be inter-related and drawn upon easily by other departments."

Furthermore, the authors assert that computer aided design requires data in the form of drawings and components or cutting lists. The drawing, according to them, is entered into the computer as a series of measurements. In this case, the object being drawn is three-dimensional although it can be drawn on a two dimensional screen or paper.

Paulson (1995:580) asserts that Computer Aided Design is a

"computer hardware and software system that enables designers to prepare two dimensional drawings and three dimensional models directly on a computer screen."

He continues by saying that computer aided design can readily support the creation of unique projects of high technical and aesthetic quality.

Harms, Kroon and Weigel (1993) claim that computer aided design involves using a computer to assist in the creation or changing of a design. In furtherance of the claim, Harms et al explain that special software or "instruction" allows drafters and designers to draw anything that could have been drawn on paper on the computer which allows changes to be made quickly and easily so that design work that would have taken days to complete would require a few hours to do.

On their part, Fales et al (1968) declare that in computer-aided design, the designer draws directly on the computer and has opportunity to interact with the computer. The authors explain that with CAD, the designer is able to see the design evolve on screen and can manipulate it by rotating, enlarging, or reducing it. Besides this, the programme allows changes to be made instantly if there is the need for that and also print a hard copy of the design.

Sherwood (1996) cites the experience of Williams who also describes the computer as his partner in the sense that it helped to solve complex drawing problems. It is difficult to make quick but accurate drawings, sketches and plans by hand but with computer aided design, these can be done accurately and faster. Besides, CAD enables the designer to sketch on the computer screen, call up one of the basic designs stored on disks and change it to create an entirely new effect. He concludes that

"CAD provides the flexibility to update a design as new ideas and difficulties occur. It can even alert some one to any mistakes made."

Likening this experience to problems which graphic design students normally encounter with drawing and lettering as far as precision is concerned; learning to use CAD will help students resolve such problems in the Senior Secondary School art studio. This will enhance student's creativity and ability to draw accurately and quickly. The most interesting aspect is that the CAD system provides excellent drawings in a fraction of the time it takes to do them by hand. In this wise, Sherwood (1996: 402) point out that

"With computer aided design programmes, designers can prepare drawings more quickly than they can by hand. Because computers are very accurate, they make it easy to create straight lines, precise angles ,

and perfect circles of exact dimensions required."

McCornick (1993) confirms Sherwood's position by saying that the computer serves as an aid, extending the skill and work speed of the operator. Getting access to the computer and the needed software in Ghanaian Senior Secondary Schools will make the design process less-time consuming and resolve problems associated with accurate, freehand drawing of lines, circles and angles that make the teaching and learning of basic drawing for design difficult for many graphic design students.

Whitehead (1985:349) submits that with computer aided design,

"points and lines can be entered on television screens and into computer memories by typing in figures from a keyboard with digital tracer, with a light pen or with an electronic pen.

Whitehead elaborates that the computer has the ability to rotate lines and figures as wire framework, about various axis, enlarge or reduce, have partial views of the work and alter parts if that is necessary. The author adds that works that have been produced can be viewed from different directions and, when the best solution has been found, the result can be printed out.

Sullivan, Lewis and Cook (1986) discloses that the graphic editor tool is used to create drawings on the screen using the paintbrush, eraser, pencil and others that are available on the screen with the graphic editor, a sketch can be edited by moving, rotating or enlarging it. They maintain that the graphic editor allows the designer to print out the sketch as soon as the desired design has been obtained.

Sherwood (1996) again declares that the computer can enhance drawings with colour, texture, light and shadows. She concludes by saying that the result can look almost as real as a photograph.

Williams, Sawyer and Hutchinson (1995:105) categorize computer graphics into "analytical graphic" which appears in a graphical form that allows numeric data to be analyzed easily and "presentation graphics" which uses different texturing patterns, colours and three dimensionality while some presentation graphics programmers allow artwork especially Clip Art to be inserted into graphic works.

These authors observe that graphic programm

"allow you to use electronic painting and drawing tools for creating lines, rectangles, and just about any other shape. Depending on the systems capabilities, you can add text, animated sequences, and sound."

Mireku (1996) on his part, view computer aided design as a package for making precision drawings or plans and further discloses that each component of the drawings retains its identity so that editing becomes possible when moved and that particular component can be altered without affecting the rest of the drawing.

The Longman Encyclopedia (1989:243) also describes computer aided design as

"interactive computer assistance for the design of a wide range of artifacts such as cars, aeroplanes, buildings and electronic components in particular integrated circuit layout."

It further explains that a CAD system allows experts to input design criteria such as component sizes and tolerance and allows standard components to be inserted into a design from a software library. It goes on to say that a design can be changed interactively and tested by simulation software which shows the behaviour of a device over time for a given asset of input and may take the form of printed charts and artwork. That is the hard copy.

From the various definitions cited so far, it is realized that computer graphics and computer-aided design do virtually the same work. They both use interactive computer assistance in the creation of designs and allow the graphic designer to create straight lines, accurate angles and circles for designing logos, packaging, book jackets and other works. It is also evident that computer graphics and computer-aided design require the use of appropriate software and knowledge and skills in designing in order to effectively use them in the production of high quality design.

It can therefore be concluded that computer graphics and computer-aided design are synonymous and can be used interchangeably. However, in this report, the term used is computer graphics.

2.5.0 Review of the Senior Secondary School Visual Arts Syllabus

2.5.1 Introduction

The syllabus of the Senior Secondary School (S.S.S.) Visual Arts programme in Ghana provides information on what should be taught within each discipline. It also offers

specific guidelines as to what, why, how, and when a subject is to be taught in order to satisfy the general aims and objectives of the Senior Secondary Education in Ghana.

According to the syllabus the inclusion of Vocational Subjects in the SSS curriculum seeks to expose students to a variety of skills so that learners who complete this level of formal education would be able to produce marketable products to earn a living if they are unable to pursue further education. The programmes are also designed to equip the S. S. S. Visual Arts graduates with basic skills in Basketry, Ceramics, Graphic Design, Textiles, Leatherworks, Picture making, and Sculpture, to enable them set up small-scale ventures for employment.

The essence here is that depending on resources available in the communities in which a school is located, a student offering three elective subjects in Visual Arts will be exposed to a wide range of vocational opportunities that will help him or her to acquire visual thinking and manipulative skills in these disciplines. They are also to experience art thus eventually the Visual Arts student acquires cognitive, psychomotor and affective development.

2.5.2 Composition of the Visual Arts syllabus

In line with the objectives of the SSS Visual Arts programme, General Knowledge in Art (GKA) is a compulsory subject for all Visual Arts students. GKA must be offered in addition to two other elective subjects. The two elective subjects have to be chosen from Textiles, Graphics Design and Picture Making (i. e. two-dimensional art disciplines) and Ceramics, Basketry, Leatherwork, and Sculpture (three-dimensional disciplines).

Tables 1 - 8 indicate the breakdown of what Visual Art students are supposed to be taught over the three-year period.

Table1: The General Knowledge in Art Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Rational for Visual Arts Education 2. Ancient Art 3. African Art 4. Art Appreciation 5. Terms in Art 6. Design 7. Composition 8. Drawing 9. Colour Work 10. Lettering 11. Printmaking 	<ol style="list-style-type: none"> 1. Indigenous African Art 2. Contemporary African Art 3. Ghanaian Arts 4. Symbolism and functions of Art 5. Art Societies 6. Design 7. Composition 8. Drawing 9. Colour Work 10. Lettering 11. Printmaking 	<ol style="list-style-type: none"> 1. Indigenous African Art 2. Ghanaian Arts 3. Art forms and their functions 4. Design 5. Composition and drawing 6. Colour and Drawing 7. Lettering 8. Printmaking

Table 2: The Basketry Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. History, scope and uses of Basketry 2. Tools and Materials 3. Design and Finishing 4. Making of articles 	<ol style="list-style-type: none"> 1. Survey of Basketry in Ghana 2. Additional skills in design and decoration 3. Additional Skills in making articles 	<ol style="list-style-type: none"> 1. Basketry and the learner's future 2. Additional skills in design and decoration 3. Additional skills in making articles 4. Costing, Pricing and Marketing

Table 3: The Sculpture Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Sculpture as a vocation 2. Exploration of tools and materials 3. Preliminary designing 4. Methods of Production 5. Creating articles in Sculpture 6. Lettering and Calligraphy 	<ol style="list-style-type: none"> 1. Exploration of tools and materials 2. Preliminary designing 3. Creating articles in Sculpture 4. Lettering and calligraphy 5. Decorating and finishing 	<ol style="list-style-type: none"> 1. Exploration of tools and materials 2. Preliminary designing 3. Creating articles in Sculpture 4. Lettering and calligraphy 5. Decorating and finishing 6. Introduction Small - scale Industries 7. Costing, Pricing and Marketing

Table 4: The Textiles Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Textiles as a Vocation 2. Tools 3. Materials 4. Yarn making and preparation 5. Weaving: <ol style="list-style-type: none"> (a) Designing (b) Laying of warp 6. Knitting and crocheting 7. Decoration of woven fabrics 8. Appreciation 	<ol style="list-style-type: none"> 1. Tools and Materials 2. Exploration of dyes and classification of dyes - reactive, vat dyes 3. Dyeing processes 4. Designing for printing 5. Printing 6. Weaving 7. Finishing of Textile goods 8. Appreciation 	<ol style="list-style-type: none"> 1. Identification of fabrics 2. Weaving 3. Designing for dyeing and printing 4. Resist dyeing 5. Screen Printing 6. Embroidery 7. Appliqué 8. Appreciation 9. Costing, Pricing and Marketing

Table 5: The Ceramics Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Ceramics as a Vocation 2. Tool, Equipment and raw materials 3. Drawing and Designing 4. Creating objects with clay 5. Decorating and Finishing 6. Drying and firing (Indigenous) 7. Glazing 	<ol style="list-style-type: none"> 1. Tool, Equipment and raw materials 2. Drawing and designing 3. Creating objects with clay - Brick and Tiles (Press Mould) 4. Ceramic Sculpture 5. Wheelwork 6. Decorating and finishing 7. Kiln Construction 8. Firing - wood kiln 9. Glazing 	<ol style="list-style-type: none"> 1. Tool, Equipment and raw materials 2. Drawing and designing 3. Hand building and Construction 4. Wheelwork 5. Kiln Firing - Electric Kiln 6. Glazing and glazing defects 7. Establishing Small - Scale Industry 8. Costing, Pricing, and Marketing

Table 6: The Leatherwork Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Leather as a Vocation 2. Basic tools in Leatherwork 3. Materials for leather works 4. Drawing, designing and decorating in Leatherwork 5. Sewing in Leatherwork 6. Making articles in Leatherwork 	<ol style="list-style-type: none"> 1. Additional Tools 2. Designing and making models 3. Cutting and decorating 4. Sewing - Types of stitches 5. Making Leather articles 6. Finishing 	<ol style="list-style-type: none"> 1. History and Social values of leather articles 2. Additional tools 3. Additional materials 4. Additional Sewing techniques 5. Drawing, designing and sketch modeling 6. Making additional leather articles 7. Finishing 8. Establishing Small - scale Industry 9. Costing, Pricing and Marketing

Table 7: The Graphic Design Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Graphic Design as a vocation 2. Exploration of Tools and Materials 3. Drawing and Illustration 4. Layout 5. Lettering and Calligraphy <ol style="list-style-type: none"> a. Block Lettering b. Freehand Lettering c. Freestyle Lettering d. Spacing 6. Paper craft 7. Printmaking Simple Direct Print <ol style="list-style-type: none"> a. Low relief prints b. 'Stencil edge or hole printing' 	<ol style="list-style-type: none"> 1. Exploration of Tools and Materials 2. <ol style="list-style-type: none"> a. Drawing from objects b. Drawing from human figures c. Perspective 3. Layout:- Design Lettering and Calligraphy 4. Roman Lettering 5. Communication Design <ol style="list-style-type: none"> a. Poster b. Greeting Cards c. Identity Design d. Labels 6. Packaging <ol style="list-style-type: none"> a. Jackets b. Labels c. Wrappers d. Containers 7. Book craft <ol style="list-style-type: none"> a. Single Section Binding b. Multi-Section Binding 8. Printing <ol style="list-style-type: none"> a. Relief b. Simple Stencil prints d. Scraperboard technique 9. Cartooning (illustration) 	<ol style="list-style-type: none"> 1. Further 2. Exploration of Tools and Materials 3. Drawing and Illustration (Cartooning) 4. Communication Design <ol style="list-style-type: none"> a. Posters b. Identity Design c. Greeting Cards 5. Packaging <ol style="list-style-type: none"> a. Jackets b. Labels c. Wrappers d. Containers 6. Lettering <ol style="list-style-type: none"> a. Gothic Lettering b. Freestyle lettering c. Italics d. Stenciling 7. Book craft <ol style="list-style-type: none"> a. Single-Section b. Repair Binding 8. Printmaking <ol style="list-style-type: none"> a. Block Printing b. Screen Printing 9. Costing, Pricing and Marketing

Table 8: The Picture Making Syllabus

YEAR ONE	YEAR TWO	YEAR THREE
<ol style="list-style-type: none"> 1. Picture making as a vocation 2. Tools and Materials 3. Ghanaian Examples 4. Composition 5. Drawing 6. Painting 7. Printmaking 8. Collage 9. Mosaic 	<ol style="list-style-type: none"> 1. Drawing 2. Composition 3. Painting 4. Mural Painting 5. Body painting 6. Printmaking 7. Collage 8. Mosaic 	<ol style="list-style-type: none"> 1. Drawing 2. Painting 3. Mural Painting 4. Collage and 5. Mosaic 6. Costing, Pricing and Marketing

2.5.3 Rationale for the Visual Arts Course

According to the S.S.S. syllabus, the reasons outlined for the inclusion of Visual Arts in Secondary education consist of the following:

1. That the national developmental scene especially the cultural front has been in crisis and there has been "a general lack of creativity." This situation has been largely due to the lack of clear understanding of the values of our arts, both in education and national development. It is stated that we have failed to recognize the relevance of the arts in socio-economic life and there is the need in the Educational Reform to attempt a change by making Visual Arts Education more relevant to national development.
2. Art has been used to impart accumulated knowledge, values, beliefs and attitudes of society to the younger generation therefore Visual Arts have been chosen to assist

students acquire competence and skills in art for individual and national development.

3. In going through the Visual Arts, the individual acquires visual education through art in responding to culture, psychology, sociology, philosophy, anthropology and religion of society as recorded in artifacts. Moreover, our whole life is influenced by the arts and we are thus identified as a people by the arts as almost everybody uses some form of art in one way or the other.
4. The art subject as outlined in the Visual Arts course is indigenous with tools and materials readily available in the locality. It is for this reason that Visual Arts should be taught in the schools to preserve, transmit, improve and promote indigenous art technologies.

Other reasons cited include using art as the basis for small scale and cottage industries, to promote the design base for technological development and to promote opportunities for a variety of vocations.

2.5.4 Duration of the Course

The syllabus stipulates that the Visual Arts course should cover a three (3) year period in which the student learns in detail the topics listed in Tables 1-8. General Knowledge in Art (GKA) and the Electives are allocated seven periods a week on the Visual Art timetable. This gives all the subjects equal time for Years 1 – 3.

2.5.5 The Structure of the Visual Art Syllabus

The content of the Visual Arts syllabus in recapitulation includes an introduction which gives general information comprising the preamble, duration of course, rationale for Visual Arts education, and need assessment. It also makes mention of the main concerns of the syllabus and provides information on evaluation, specialized art courses and selected possible vocations in Visual Arts.

2.5.6 Objectives of the Syllabus

The syllabus outlines thirteen (13) objectives, which are expected to be achieved within the three years in order for students to attain the needed development through Visual Arts. These are:

- Foster and promote creativity by helping students to think, act and feel creatively through a variety of art activities.
- Demonstrate art as an integral part of living activity.
- Provide a variety of vocational and carrier opportunities.
- Inculcate in students the need to appreciate the values of their own arts so as to arouse pride, confidence and patriotism in them.
- Generate in the students a lasting interest in the arts.
- Enable students acquire competencies in art and apply their skills to national development.
- Let students acquire visual literacy and develop confidence and understanding of visual relationships in the changing environment.
- The students will acquire perceptual and analytical skills through art experience as well as self-expression and communication skills through response to art.

- All activities will develop in the student subjective qualities in harmonizing healthy relationships.
- The students will gain knowledge and understanding of the meaning, significance and the role of art in socio-economic development.
- The course encourages the acquisition of skills and development of local materials and resources in promoting small scale and cottage industries.
- The course promotes skills in development of Indigenous art technologies, aesthetics, beliefs, and values among other things.
- Theoretical knowledge, practical skills and visual thinking in art provide the student with cognitive, psychomotor and affective mode.

2.5.7 The Main concerns of the Syllabus

The main points in the syllabus are:

1. Creativity, Appreciation of artifacts; Concepts of mass production; Promotion of artifacts and Production of marketable artifacts.
2. Exploration of ideas, tools, materials and resources in the environment. Exploration of concepts and principles of design; and encouraging the transformation of ideas into artifacts.
3. Understanding of concepts like creativity and its processes, qualities of a creative person and problem solving through art activity.
4. Appreciation of human senses as well as the application of some improved methods in art technology as a means to achieve creativity.

For artifacts to be appreciated, the syllabus outlines five steps to be followed:

- a. The procedures in art appreciation.
- b. The need for applied aesthetics.
- c. Vocational possibilities in each art subject and appreciation of their relevance to socio-economic development.
- d. Relevance of Ghanaian concepts of symbolism in arts and the functions of artifacts in society to be upheld.
- e. Guidance in the basic concept of design and technology, skill development, draughtsmanship and craftsmanship and good finish of products.

In the promotion of artifacts, the syllabus provides for skills in communication design with poster making, packaging, illustration and advertising as examples. It also advocates exhibition of artifacts produced by the students.

In spite of the laudable intentions of the syllabus, the researcher sees the syllabus contains no information on the use of computers to increase the aesthetic qualities of artifacts and also facilitate production on large scale for the realization of economic development.

To be able to produce artifacts for marketing, the syllabus highlights on

- Designing.
- Applied aesthetics (retention of Ghanaian cultural identity).
- Adaptation of modern technology and improvement of indigenous art technologies in sculpture, textiles, ceramics.
- Decoration and high quality finish of artifacts.

- Elements of small-scale art industrial concerns.

2.5.8 Need Assessment Summary

- The Visual Art programme seeks to attain and maintain physical and mental health of students in the sense that art is used as a therapy for growth and psychological state of mind.
- It also seeks to protect and maintain natural and physical resources since artifacts provide economic satisfaction through the proceeds of the art works.
- The art forms must exhibit understanding of civic rights and responsibilities as seen in the monumental pieces, textiles, smockery, advertisements, and illustrations for literacy.
- Artists apply their senses to the environment and listen to society in order to communicate their observation. The course thus helps to develop the ability to listen and express ideas and understand other people's ideas.
- The course also promotes the ability to deal with quantitative relationship whereby the artist will be able to deal with a number of materials related to art works.
- The artist should be able to manage personal finances and resources to achieve optimum satisfaction of needs as well as wants. This could be seen in how the artist plans, organizes and manages which, in the ultimate reflect in how to manage his own life.
- Understanding economic forces and relationships that determine material welfare and progress in that, the artist should be seen as been resourceful in the production of artifacts. Understand and apply scientific knowledge in everyday

life and using the benefits of technology wisely and build healthy relationship among human beings.

- Meeting family responsibilities and maintaining family relationships. Be able to exhibit leadership qualities in personal and interpersonal differences.
- Understand and appreciate the national culture heritage through art history, appreciation and criticism in art.
- Be able to think comprehensively and solve problems systematically through exploration, identification, and synthesis.
- Value and enjoy leisure and recreational activities by visiting museums, cultural centres, art galleries, art exhibitions and collecting antiques. Also, express cultural, spiritual and aesthetic values.
- Be able to cope with the stress and strains of life. This is derived from careful organization and arrangement of art forms in art.
- Be able to plan work and time well so that the artist is organized and punctual.
- Understand African and world affairs through art history and appreciation, collections of artifacts and gifts.
- Learning to learn skills with the ability to identify tools, materials and ideas for art, interpret the information and derive meaning from the interpretation.

The above are the basic elements that can be used to ascertain the fact that a student has undergone a programme in the Visual Arts. The general outlook and behaviour of those who have undertaken this programme should exhibit an embodiment of the above qualities or any group of them.

2.5.9 Notes to the Teacher

Below are the guiding principles that are expected to govern the teaching of Visual Arts. Their observance will help fulfill the demands of the curriculum. These, the syllabus states as follows:

- As many Visual Arts subjects as possible according to the syllabus could be offered in a particular school provided that there are teachers to handle them and resource are also available. This is to enable students choose from a wide range of subjects.
- Subject selection (for example the decision to offer Basketry, Ceramics, Textiles, Graphic Design, etc) should be based on the availability of resource in the locality.
- The Visual Art student is required to choose General Knowledge in Art as a compulsory subject and two art subjects of his choice.
- The three subjects so chosen must be allocated seven (7) periods a week.
- Regarding General Knowledge in Art, two periods are to be earmarked for theoretical studies while five periods are to be used for practical activities.
- Each year's work should be planned according to three terms with a logical sequence of topics.
- During teaching, transfer of learning should be adhered to thereby making relevant references to ideas in other sections of the syllabus.
- The assistance of local experts, artists, craftsmen and elders may be sought where necessary.
- Knowledge acquired in the General Knowledge In Art course should be applied to activities in other subject areas.
- Every practical activity must be considered as a problem-solving issue requiring identification of the problem, research, analysis and eventual suggestion of

solutions. A Suggested procedure for appreciation is also outlined.

- The principles of product design as outlined in the General Knowledge section should be applied when designing artifacts.

The teacher is asked to pay attention to articles produced by students taking into consideration the following factors:

- a. Identification, discussion, care and testing of tools and materials
- b. Preliminary designing and sketching modeling
- c. Translation of designs and sketch models into articles
- d. Construction of the articles
- e. Decoration and finishing
- f. Discussion of importance of the article

2.5.10 Evaluation

In evaluating artworks, teachers are expected to look for the following qualities:

1. Creativity involving originality and innovation.
2. Use of media: material and tools.
3. Design activities, consisting of composition of elements and principles of art.
4. Technical competence: draughtsmanship, craftsmanship and good finishing.
5. Uses and relevance of artworks to the community.
6. The teacher is also asked to continuously assess his teaching techniques and the students' performance through assignment, short tests, quizzes and practical demonstration of skills. The assessment is to be done following objectives set for every activity.

2.5.11 Final Examination

The mode of the final examination takes this form:

- Paper 1: General Knowledge in Art (Compulsory)

One hour multiple choice and a test of practical Knowledge

- Paper 2: First Art Elective Subject

Practical – One artifact to be produced.

- Paper 3: Second Art Elective

Practical – One artifact to be produced.

2.5.12 Possible Careers in Visual Arts

After going through a successful Visual Arts programme, the syllabus lists a number of vocations that are open to those who acquire knowledge in the various subject areas.

History of Art and Appreciation

Art Critics, Art Editors, Art Historians, Curators, Art Directors, Art Collectors, Art Consultants.

Basketry

Cane work, Rattan or Bamboo work, Straw and raffia work, Bulrush work, Macramé, Plaited work, Hat making, and Bag making.

Ceramics

Brick and Tile work, Studio Pottery, Ceramic Art, Cooler and Flower Pot work, Industrial Ceramics, Indigenous Pottery, Material Scientist, Ceramic Engineering, Ceramic Muralist, Architectural Ceramics.

Graphic Design

Postage stamp designing, Illustration, Poster Designing, Stage Designing, Greeting Cards Designing, Logo Designing, Bookbinding, Printmaking, Sign writing, Package

Designing, Calligraphy, Rubber Stamp Designing, Letterer, Commercial Artist, and Cartoonist.

Leatherwork

Shoe making, Bag making, Wallet making, Decorative Leather, Hassock making, Upholstery, Hat making, Glove making, Leather furniture, Belt making.

Picture Making

Painting, Portrait art, Landscape art, Water Colour painting, Pastel work, Drawing, Mural painting, Collage and Mosaic.

Sculpture

Ivory carving, Wood carving, Portrait carving, Metal Sculpture, Tombstone building, Plaque making, Stool and Linguist staff as well as Umbrella Tops carving, Canoe, carving, Furniture carving, Container carving, Toy making Calabash or Gourd work.

Textiles

Fashion design, Kente weaving, Tapestry, Appliqué work, Embroidery, Dyeing, Knitting and Crocheting.

Others

Stylist, Engraver, Retoucher, Display Artist, Set Design, Window Trimmer, and Costumer.

2.5.13 Evaluation of the Syllabus

It is evident from the Visual Art syllabus that the student who offers these courses has opportunity to select from subjects offered in a school to develop his or her potential in the field of Art. Apart from the General Knowledge in Art which is compulsory for all Art students,, students are to select any two of the other subject as their Elective course.

This provision is strictly adhered to in all the schools visited.

There is no doubt that the subjects outlined in the subject are very relevant but the researcher is of the view that Visual Art subjects should have included Information technology education to enhance the career prospects of the students for the simple reason that the world has entered into the technology era which allows people to do digital art that can be applied to other vocations that the Senior Secondary School programme is expected to prepare them for. Including computer literacy in the Graphic Design course in particular will enable students to cope with the dictates of today's world and that of tomorrow's, the researcher therefore advocates that that Computer Graphics should be an integral part of the Senior Secondary Visual Art curriculum for balanced education.

2.6 Review of the Graphic Design Syllabus

2.6.1 Introduction

The introductory part of the Graphic Design syllabus makes it imperative for the teacher to ensure that:

- The subject is allocated seven (7) periods per week on the timetable.
- Graphic Design students should as well offer General Knowledge in Art and another Art course to serve as the Elective subjects.
- Emphasis is placed on Practical work.
- Availability of tools and materials in the environment is explored.
- The teaching of Graphics is related to the compulsory General Knowledge in Art topics to avoid repetition.
- The need for good finishing is stressed to achieve durability, well fitting parts, surface decoration, appropriate treatment and preservation of products.

- The importance of good designing is be stressed by means of identifying the problem, analyzing the problem, suggesting solutions, getting ideas from the environment, making preliminary sketches, making sketch models, making prototype articles and working drawings for the articles for mass production.
- The need for proper care and maintenance of tools and materials are emphasizes, in addition to encouraging the experimentation of the use of tools.
- Experimentation of different materials as well as the use of mixed media such as charcoal, wax, pen, pencil ink, paper, fabric and plastic is emphasized.(source: SSS Visual Art Syllabus, 1991)

2.6.2 Duration of the Graphic Design Course

The Graphic Design course takes three (3) years to complete. Below is the breakdown of the period allocation per week.

Table 9: The Graphic Design Period allocation

SUBJECT	YEAR ONE	YEAR TWO	YEAR THREE
GRAPHIC DESIGN	7 Periods Per Week	7 Periods Per Week	7 Periods Per Week

2.6.3 Rationale for Graphic Design

The Visual Art syllabus outlines three major reasons for the study of Graphic Design.

These are:

1. Graphic Design provides activities for skill development in communication design such as advertising, posters, greeting cards, etc.

2. Graphic Design provides development of skills in package designing. Examples are containers, wrappers and boxes.
3. There is the need for designers to be educated. Such designers include illustrators, Commercial designers, costume designers, layout artists, display artist, fashion, artists, interior decorators, letterers, engravers, lithographers and sign writers.

2.6.4 Objectives

The course is intended to develop skills in

1. Drawing and illustration,
2. Poster designing,
3. Lettering,
4. Sign writing,
5. Layout Designing
6. Printmaking
7. Book craft
8. Package designing
9. Construction of articles with paper
10. Greeting Cards designing and application of competence and knowledge to personal needs and community needs (Source: SSS Visual Art Syllabus, 1991)

2.6.5 The structure of Graphic Design syllabus

The Graphic Design syllabus has been arranged under four main headings:

- i. Topic and scope
- ii. Main Generalizations, Skills, Competencies and attitudes to be developed
- iii. Suggested teaching and Learning Activities, and Notes to the Teacher

The Topic and Scope column spells out the major topics for study and areas to be covered. For Example, under "Graphic Design as a vocation", it is stated that teachers would guide students to explore and become familiar with the tools and materials needed for Graphic Design. The order in which the topics have been presented is to be followed. However teachers are encouraged to deviate from this procedure where necessary and where the deviation would help make teaching more meaningful.

Column Two consists of the Main Generalizations, Skills, Competencies and attitudes to be developed by students. This column provides the general over view of skills to be acquired and specific objectives to be achieved. Examples of these are acquisition of skills in drawing, illustration, package designing and sign writing just to mention but few.

The third column is made up of suggested teaching and Learning activities that will ensure student participation in the teaching-learning process. This is where students apply the knowledge in graphics they have been taught , develop analytical thinking skills, generate new and creative ideas, use the knowledge and ideas to solve problems in the design process and design new products.

The fourth column specifies points that the teacher should emphasize in order to achieve the individual lesson objectives (source: SSS Visual Art Syllabus.1991).

The researcher sees these arrangements as a step in the right direction since they offer simplified approaches to the teaching and learning of Graphic Design. It also serves as a guide which, when followed will lead to the realization of the course objectives.

2.6.6 The Content of the Graphic Design syllabus

Year One

The topics outlined for first year Graphic Design course comprise the following:

- Graphic Design as a Vocation.
- Exploration of tools and materials.
- Drawing and Illustration.
- Layout.
- Lettering and Calligraphy.
- Paper craft.
- Printmaking.
- Further Exploration of tools and materials.

Under "Graphics as a Vocation", students are expected to identify careers in Graphic Design as well as use jury as a tool for evaluating designs and under "Exploration of tools and materials", students are to identify and describe the maintenance of tools and materials required in graphics, and how to prepare and use some of the tools, and materials in designing. "In Drawing and Illustration", students are expected to learn about basic shapes and forms, rapid visualization of forms and how to apply these in idea development.

In addition to these, students would learn and discuss the arrangement of lettering, and illustration in Posters, Greeting Cards and acquire planning and organizational skills. They are expected to do exercises in decorative writing, block lettering, freehand lettering and freestyle lettering under "Lettering and Calligraphy". In Paper craft, students are expected to acquire skills in cutting, folding, gluing and stitching as a basis for constructing useful articles with paper.

The Printmaking syllabus consists of topics in simple direct printing, low relief printing and stencil printing, cut out holes or the edges of templates. Additional topics include Exploration of materials suitable for printmaking as well as exploration of other tools and materials for graphics.

Year Two

In the Second Year, Graphic Design students are expected to be taught Drawing and Illustration from objects and human figures, perspective, linear drawing and shading. They are also expected to be taught skills in Layout design, organization of elements of design; Lettering and Calligraphy, Stencilling and their use.

Other topics to be treated in the second year consist of communication design where students will develop skills in planning, designing, production of posters greeting cards, logos, notices, sign writing, labels and signs. In packaging, students are expected to plan layouts for the production of book and dust jackets, labels, and wrappers. They also expected to acquire skills in cutting, folding, stitching, gluing, and pasting.

Furthermore, the students are supposed to be taught single-section and Multi-section bookbinding.

In Printmaking and Cartooning are other aspects of the second year syllabus. Skills that are to be taught in printmaking include preparation of relief blocks and the making of relief prints from the relief blocks. And in Cartooning, students are to develop the ability to portray various human expressions.

Year Three

The Third Year syllabus consists of:

- Further Exploration of Tools and materials
- Drawing
- Illustration and Cartooning
- Communication Design
- Packaging
- Lettering
- Book craft
- Printmaking
- Costing, Pricing and Marketing

At this level, students are expected to use the knowledge they have in previous years to identify, select, prepare and explore tools and materials in producing drawings (including cartoons) that tell a story or describe an event. In Communication Design*, third-year students are expected to design and produce posters, signs, greeting cards in addition

to planning, designing and constructing book jackets, labels, wrappers, containers and other packages that have text.

The lettering skills to be taught include Gothic, Freestyle, Italics, and stenciling while measuring, cutting, folding stitching, gluing, pasting, trimming, rounding, backing as well as repairing of torn books, care and maintenance of same are the skills to be acquired from Book craft lessons. The Printmaking syllabus focuses on the acquisition of skills in screens, stencil and block printing. The year three syllabus also offers opportunity for students to be taught Costing, pricing and marketing of products, and market survey.

2.6.7 Mode of Assessment

The mode of assessment of Graphic Design as an elective course in the syllabus is based on one artifact that students produce in the Third year.

The researcher found out that the assessment procedure in the Senior Secondary School Certificate Examination (SSSCE) contravenes the provisions of the Visual Arts Syllabus. In the examination, instead of producing one artifact, students are required to produce one artifact and in addition, write a 40 minute long multiple choice tests and take a second paper which consists of eight essay type questions out of which they are required to answer six in three hours. Therefore, the researcher suggests that curriculum planners should take a second look at this part of the Visual Arts syllabus to correct this anomaly.

2.6.8 Evaluation of the Graphic Design Syllabus

A critical look at the syllabus under review reveals the absence of Colour work for the three-year period of study. Colour is known to contribute immensely to the aesthetic appeal of Graphic Design products such as logos, greeting cards and packaging.

It is also obvious that the syllabus consists of virtually the same topics from Year One to Year Three. A careful analysis of the content however, shows that the differences in the areas of study lay only in additional content matter that makes the progression from one stage to the other possible.

The introduction of Costing, Pricing and Marketing of products in the third year is important at that level to enable graduates to have an idea of marketing their products.

The nature of work that the Graphic Design students are expected to produce requires skills that will communicate visual information in an attractive way. This offers students the opportunity to try their hands on and acquire good drawing skills. Acquiring effective visual communication skills is very demanding at that level. Achieving accuracy in manual designing is a problem in the field of Graphic Design which computer software like CorelDraw can resolve if this is available in the schools. Unfortunately, Senior Secondary Schools in Ghana do not apply computer technology in graphic design to enable students solve pertinent problems presented by the syllabus.

Aspects of the Graphic syllabus that can be effectively be taught with computers comprise Communication Design where students are expected to design and produce

posters, banners, greeting cards, certificates, logos, labels, package designs, cartooning, drawing, drawing, layout, and colour work. In bookbinding, the computer will enable students to produce attractive book cover designs using less than the time required to do that normally by hand.

In designing posters, students can learn to use the colour palette in the Microsoft Word, Paint and CorelDraw to select colour schemes. This is because the various graphics software on the computer provides a palette that contains a variety of colours that can be selected by clicking on the desired colour option. Adding text to posters would also be easy as fonts can be selected from an array of typefaces such as Bodoni, Helvetica, Squire, University Roman, Balloon, Souvenir, Brush script, Old Times, Horatio and others, which are available on the computer. This means that with a vast variety of text available, the graphic student only has to select the appropriate one(s) for his or her work.

In drawing, Microsoft Works, Paint, PowerPoint, CorelDraw, and Office provide various lines and shapes that could be used to create objects; they have arrows, drawing lines and shapes that students could use to create the kind of drawings they want. The software also has "Fill" tools from which the student can select shade types to be given to drawn objects and backgrounds.

Layouts in general can be made easily with computers. All the student has to do is to select what is required from hundreds of formats that software such PowerPoint and PageMaker provide, to create works such as invitation or greeting cards, certificates,

brochures, envelopes and newsletters. PowerPoint in particular presents the student designer with varying backgrounds and templates to choose from, at the click of a button while following instructions for the design of one's choice.

PowerPoint does not just present the graphic design student with templates but also line colour, text colour and font sizes. It allows the user to incorporate WordArt to enable students create decorative letters in their works. This would help teachers to achieve the syllabus objective that demands that students should be able to do skilful decorative writing.

Designing colourful and attractive wrappers, containers and book jackets as well as making other package designs will best be done with the computer. Students would be able to use the computer to produce high quality illustrations and to present accurate and fitting text to match attractive colours. Using Graphics software on the computer to design packages could be done with little or no difficulty as the various parts that form the package can be worked on simultaneously. At any given point in the course of the design, the student can rotate the design on the computer and view it from various angles so that the necessary corrections could be made before printing the result. It is also important to note that Graphic Design students would be able to calculate the component parts and view how they would fit when scored and creased.

In the same way, the students can design logos and labels on the computer will present them with the appropriate fonts and font sizes to be used for the text aspect, shapes and objects for the illustration; and finally various colour for the colour work.

For the reasons stated above, the advocacy for the inclusion of computer graphics in the SSS Graphic Design syllabus is justified as this presents an added advantage. The inclusion will greatly assist students in their study of graphic design. And to the teacher, the use of the computer would serve as a powerful instructional medium that will help him do the teaching with fewer problems.

2.7 The Need for the Introduction of Computer Graphics into the Senior Secondary School Visual Arts Programme

The importance of Information Technology makes it imperative for every country to diversify its education to include acquisition of computer literacy to make their graduates competitive on the job market.

Information Technology via computer provides a means for people to access knowledge from other parts of the world and also process information quicker and more efficiently. Incorporating computer literacy in the Senior Secondary School Visual Arts programme will enhance teaching and learning of graphic design in particular as this will provide the graduates with skills that would enable them fit into the job market.

In this regard, McCormick (1993:253) declares that

"the computer serves as an aid, extending the skill and working speed of the operator."

This means that the introduction of computers in graphic design in particular would enhance the creative skills of the students and speed up the design process. Teachers whose primary responsibility is to impart knowledge and skills to students also need to

be computer literate and highly skilled in computer usage. This is necessary for improving their teaching methodology to ensure meaningful learning for their students. Availability of and accessibility to computers in the various Senior Secondary Schools would get students interested in information technology and create in them excitement in the design and learning process.

Today, the artist's palette has been turned into computer images that those who are knowledgeable and skilled in computer usage can access at the click of a button to communicate their ideas to others. It is necessary that acquisition of knowledge in computers and its application in the various Visual Arts disciplines and graphic design in particular should begin with the Senior Secondary School curriculum so that SSS graduates acquire skills that would equip them to join the designing industry if they are unable to further their education.

Personal classroom teaching experience indicates that drawing with pencil and painting with a brush seems cumbersome to the average SSS student. This stems from the fact that many students who offer Graphic Design and General Knowledge In Art in the Senior Secondary Schools are compelled to opt for the course for lack of placement.

Graphic Design is not taught in the majority of Junior Secondary Schools in Ghana so many students end up with this course without prior knowledge of what the subject entails. Besides, many school heads decline to admit brilliant students with god grades for Visual Arts. Rather, those students are asked to offer science while students who

obtain lower grades are admitted into the Visual Arts irrespective of the subjects they offered for the Basic Education Certificate Examination (B.E.C.E.).

The implication is that many Visual Arts students who offer Graphics enter a completely new field which they no idea of and therefore lack the basic skills required. Such students therefore have to be taken through the rudiments that should have been taught in the J.S.S. For this reason, they spend a greater part of their first year acquiring basic knowledge instead of moving ahead in the programme. This presents additional problems that Graphic design tutors of Senior Secondary Schools must help their students to overcome.

Another problem is that the SSS syllabus does not emphasize the teaching and learning of colour under General Knowledge in Art and so students generally find it difficult to do effective colour work yet they are expected to design colourful posters, logos, labels, book covers, wrappers for class and examination purposes. Students are unable to confidently mix and paint colours well when using water based colours resulting in blemishes being left on their work thereby rendering the works unattractive.

The selection of suitable colour schemes for design work is also a problem area for students offering Graphic Design. The high cost of Poster colour which is the predominant medium used at this level makes it difficult for many students to produce enough colour exercises that would enable them master skills in colour work, in particular, tinting and shading, colour gradation, and colour harmonies, among others. Such exercises offer in-depth knowledge in colour and its application on paper. The

above problem stifles the creative potentials of design students and limits their ability in colour work.

Lack of opportunity to handle lots of colour work also stifles self-confidence, which is a vital factor in effective graphic designing. Teachers therefore have to spend long time coaching students to gain confidence, which many do not gain before they graduate. Learning to use the computer and the appropriate software for drawing can help solve some, if not all, of the problems outlined. The interesting features CorelDraw present will make drawing simpler and easier to learn. Additionally, the palette of colours could be accessed by students at no extra cost and within a short time.

The wide variety of drawing and painting tools available via the computer is like having several pens and brushes of different widths for drawing lines of varying qualities. The range of colour choices that Paint software offers is adequate. The capacity to blend and smear colour as if they were wet paint also makes the dynamics of designing pleasant and interesting.

The computer can also enhance students' drawings with respect to colour, texture, light and shadows. These elements can be repeated and duplicated in a short time and make skillful; user of the computer obtain results he or she wants look almost as real as a photograph.

Because computer-generated images are easier to create, graphics students who have inadequate drawing and rendering skill can learn to use the Paintbrush and Paint box

software for example to create images that they can manipulate in various ways even when the teacher is not available. This means students can take control of the learning situation and free the teacher to attend to students who need help.

As Gilbert (1992) points out, the computer has done more to influence design than anything else since the invention of the printing press. Inferring from this claim, the researcher believes that incorporating computers in the Senior Secondary School Visual Arts programme would create opportunities for students to work more and design. Their knowledge in design within the same duration presently available; and provide opportunity for students to try their hands on alternative modes of designing without sketch pads. With the computer, students could also have a feel of creating and printing design for advertisements, magazines, posters, and other graphic products.

Computers would offer students a hands-on experience and a platform to experiment and test their ideas in colour while simultaneously viewing these on the screen. The computer would therefore offer a more flexible medium for teaching and learning than the current non-digital approach.

One other advantage is the image database that computer graphics software offers students image libraries that they can make use of as well as add to on the screen.

Computer technology can be harnessed to improve the competitiveness of graphic designing. Graphic Design students who acquire the relevant knowledge about

computers and their application in Graphic Design will be better equipped to be leaders in the use of computers for achieving results.

The Computer can readily support the creation of unique projects of high technical and aesthetic quality. Computer simulations can identify mistakes, facilitate changes and improve methods while realistic electronic prototypes before they are rendered in whatever material is required for the production of a particular graphic design work.

By introducing computer graphics, the full economic force of computer technology can be made to work for the graphics industry and the potential benefits for doing this are very great.

Graphic Design is a very versatile branch of art that can be enhanced even at the Senior Secondary School level through training in the use of computers and their application in industry so that students who might not have opportunity to further their education will be better prepared for apprenticeship or the job market. As it has been the practice, artists and designers take advantage of and use available materials and techniques to suit their needs. The computer should therefore serve as an extension to the artist's imagination as it offers a variety of media to work with.

Moreover, the creative output of the graphic design student will be increased by the use of the computer which can assist the artist to find quick solutions to artistic problems they encounter and thereby enhance the quality and originality of work produced.

It is very important to acknowledge that with the computer, many solutions can quickly be created for the same artistic problems. For example, if an artist wants to use a particular design and colour combination and cannot immediately decide whether to include a background or find the most effective combination to use, he or she could use the computer to quickly create several versions of the design, choose the best one and sketch that drawing on paper. In this case, the artist would not have to go through the tedium of manually producing the same thing several times (as is the case with manual rendering) before deciding on the best design.

Fales, Kuetemeyer, and Brusich (1988:93) indicate that

"advancing technology makes some extraordinary things possible today."

Even though computers cannot think like humans, they can be taught to think like people. Fales *et al* argue that since the computer can handle and sort large amounts of information at a faster speed, they can be programmed to make certain decisions and predictions better than a person.

Computer usage will encourage students to take more risks during the designing process. This is because while experimenting with an image on the computer screen, students can erase, change or save it for later use in less time than will be required when designing with the hand. Artists can also store such images and make further changes at any time. Since most computer graphics software offers opportunity to change images, their use increase the artist's chances of finding original solutions to visual problems.

The computer's potential for quality designing makes it a necessary tool for effective teaching and learning of graphic design and its introduction into the Senior Secondary School Visual Arts programme will yield quality design outcomes as students will acquire marketable skills and experience that is crucial in the creation of innovative and unique designs.

To start with computer graphics, the researcher suggests that schools can move on successfully with 20 desktop computers and increase the number when funds become available.

However, in advocating computer literacy for Senior Secondary School students, the teachers who are going to do the teaching cannot be left out. Teachers should be given the necessary computer graphics education for them to handle the subject effectively and confidently.

REFERENCES

1. Bertoline, Gary R. , **Technical Graphics Communication**, Times Mirror Higher Education Group Inc, U.S.A, 1995, P.9
2. **Oxford Dictionary of Art**, Oxford University Press, Oxford, 1988, P.218
3. **World Book Encyclopedia**, Vol. 8, 1985, P.313
4. **Longman Dictionary of Contemporary English**, Longman Group, U.K., 1987, P.456
5. Amenuke, S. K., Dogbe B. K., Asare, F.D.K., Ayiku, R.K., and Baffoe, **General Knowledge in Art**, Evans Brothers Ltd, London, 1991, P.53
6. Segal, Audrey, **Careers Encyclopedia**, 8th Edition, Cassel and Company Ltd, London, 1975, P.53
7. Crampton, K. and Finney, M., **Design And Communication**, Harper Collins Publishers, London, 1988, P. 65
8. **Encyclopedia Americana**, Americana Corporation, 1976, P.479
9. Bertoline, Gary, 1995, P.16 - 17
10. Gilbert, Rita, **Living With Art**, McGraw-Hill, New York, 1992, P.269
11. Baardsley, Wendy Louise, **Introducing Information Technology**, Longman Group, U.K., 1987P.8
12. Walter, Russ, **The Secret Guide to Computers**, 21st Edition, 1995

13. **McGraw-Hill Encyclopedia of Science And Technology**, Vol.3, McGraw-Hill book Company, New York, 1997, P.330
14. Paulson Jnr, Boyd C., **Computer Applications In Construction**, McGraw-Hill Inc, New York, 1995, P.581
15. Media Computer Series, U.C.E.W., Winneba, 1997, P.1
16. Mireku, D. K., **An Introduction to Educational Computing**, U.C.E.W., Winneba, 1996, P.9
17. Segal, Audrey, 1975, P.636
18. Mittler, Gene A., Humpheries, Holle and Howze, James, **Creating And Understanding Drawings**, Glencoe Publication Company, New York, 1989, P. 238
19. Dunn, Stewart, **An Introduction to Craft Design and Technology**, Collins Educational, London, 1986, P. 98
20. Hutchinson S. E. and Sawyer C. E., **Computers, Communications, and Information, The User's Introduction**, 7th Edition, Irwin? McGraw-Hill, Boston, 2000, P.13 - 14
21. Norton, Peter, **Introduction to Computers, Essential Concepts With Microsoft Works For Windows**, Glencoe/ McGraw-Hill, New York, 1995, P.9

22. Norton, Peter, 1995, P.52
23. Norton, Peter, 1995, P. 11
24. Williams, Brian K., Sawyer, Stacey C., and Hutchinson Sarah E.,
Using Information Technology, A Practical Introduction to Computers And Communications, 3rd Edition, Richard Irwin Inc., 1995, P.95
25. **McGraw-Hill Encyclopedia of Science and Technology, Vol.3, 1997,**
 McGraw-Hill book Company, New York, P.393
26. Sippl, Charles J. 1985, **Macmillan Dictionary of Microcomputing,**
 3rd Edition, Macmillan Press Ltd, London, P.53
27. Gilbert, Rita, 1992, P.280-281
28. Gilbert, Rita, 1992, P.280-281
29. Bardsley Wendy Louise, 1987, P.17
30. Slotnick D. L. et al, **Computers and Applications, Lexington, 1986,**
 P.133
31. Slotnick D. L. et al, 1986, P.142
32. Sippl, Charles J. 1985, P.52
33. **Encyclopedia Americana, Americana Corporation, 1976, P.479**
34. Crampton, K. and Finney, M., 1988, P.148
35. Paulson Jnr, Boyd C., 1995, P.580
36. Paulson Jnr, Boyd C., 1995, P.5
37. Harms, Henry R, et al, **Experience Technology, Glencoe/McGraw-Hill,**
 Columbus, 1993, P.330

38. Fales, James F., Kuetemeyer V. F., and Brusic, Sharon A.,
Technology Today and Tomorrow,
 Glencoe/McGraw-Hill, New York, 1993, P.149
39. Sherwood, Ruth,
Homes Today and Tomorrow, Glencoe/McGraw-
 Hill, New York, 1996, P.28
40. Sherwood, Ruth,
 1996, P.402
41. Sherwood, Ruth,
 1996, P.28
42. McCormick, R.,
Technology For Technology Education,
 Addison Wesley Publication, Wokingham, England,
 1993, P.253
43. Whitehead, Jack,
Graphic communication, Richard Clay Ltd,
 Suffolk, 1985, P.349
44. Sullivan, David R., Lewis, T. G. and Cook Curtis R.,
Using Computers Today, Mifflin Company,
 Boston, 1986, P.355
45. Sherwood, Ruth,
 1996, P.402
46. Williams, Brian K., Sawyer, Stacey C., and Hutchinson Sarah E., 1995, P.105
47. Mireku, D. K.,
 1996, P.45
48. **The Longman Encyclopedia,** Longman Group U.K. Ltd / Columbia
 University Press, London, 1989, P.243
49. McCormick, R.,
 1993, P.243
50. Gilbert, Rita,
 1992, P.280
51. McCormick, R.,
 1993, P.243
52. **Senior Secondary School Visual Arts Syllabus,** Ghana education Service,
 Accra, 1991,

CHAPTER THREE

COMPUTER PROGRAMMES AVAILABLE FOR GRAPHIC DESIGNING

3.1 Introduction

Computer programmes, otherwise referred to as "software", are instructions that are written in a special format that the computer can read and process in order to perform specific commands. Software that is designed to enable users to create a variety of two and three dimensional static and motion images are referred to as Computer Graphics programmes.

Computer programmes available for graphic designing include Microsoft Publisher, CorelDraw, PageMaker, PowerPoint, Microsoft Office, Microsoft Works, QuarkXpress, Adobe Photoshop, Adobe Illustrator, Jet Set, Corel Photo-Paint, Macromedia Freehand and Microsoft Paint. All these are application software that assists the designer to create quality graphics. Ability to use the software is an asset to the designer.

For the purpose of this report, which focuses attention on beginners in the Senior Secondary schools, the scope of programmes is limited to Desktop Publishing, CorelDraw, PowerPoint, Microsoft Office, Microsoft Works Paint, and WordArt.

3.2 CorelDraw

CorelDraw is a drawing programme that provides the artist an easy way to create profession artwork. The graphic designer can use it to make design ranging from simple

logos to intricate technical illustrations. CorelDraw provides efficiently produce high quality graphics with special tools.

CorelDraw imaging application is generally vector graphics-based although it has reasonable capability for bitmap images. Vector (also called object oriented or draw image) means the use of a series points joined by lines to represent shapes or a series of lines and curves that can be reshaped without the slightest loss of quality. Drawing programmes such as CorelDraw are thus the most ideal application programme for illustration that requires the manipulation of individual objects.

Bitmap image on the other hand is composed of tiny dots (called Pixels). Bitmap images look best when displayed on the screen or printed at their original size. To enlarge or reduce a bit map work means extra pixels are to be added or subtracted respectively. A Bitmap image does not lend itself to the manipulation of parts as if they are individual components, which is the case with vector images. Though a number of dots are used in the creation of images, when it is viewed from a distance, the shape and colour appear continuous.

With CorelDraw, Bitmaps can be cropped to decrease the visible area and reduce the size of files by clicking bitmaps to drawing. The designer can also trace and convert bitmap images to vector images to make it easy to manipulate it. It offers the designer a lot of exciting opportunities to make his or her job less cumbersome. The features available on CorelDraw make it easy to create a number of documents such as newsletters, pamphlets business cards, labels, among others.

CorelDraw enables the artist to create new drawings or open existing files, save, close and back up documents. There are a variety of options that assist the artist to set up the drawing page, size of page, page orientation and others. To ensure that objects are drawn accurately, the scrap book feature can also be accessed for files, clip art, photos that the designer can use to organize, store and access designs.

This programme offers specialized drawing tools such as "Natural Media" for creating special effects to lines and basic shapes. Another important aspect of CorelDraw is the availability of tools for organizing objects in drawings. Other activities such as copying, grouping and combining of objects are possible to enhance the designer's creativity and efficiency. CorelDraw allows objects in a drawing to be controlled in vertical order, aligned on the page. The artist working with CorelDraw can employ the default outline or fill attributes or a combination of them in drawing objects and producing text. This programme affords the designer the opportunity to change the appearance of objects and text at will.

Basically, CorelDraw helps the designer to understand the use of colour schemes and how to manage colour to achieve the desired results as well as choosing the precise colour needed for a particular project. This ensures that the final colours of the work that the designer sees on screen are close reproductions of the ones he or she wants no matter the type of devices used. To fill objects with solid colours, one can select from the colour model, palettes and colour mixers. And from the scanner to printers, each piece of equipment used to create the design has specific range of colours called "device gamut" from which colours can be selected.

This in turn enables the artist to display multiple on-screen colour palettes. This assists a designer to choose a colour for a piece of work.

In addition to colour work, CorelDraw enables the designer to apply word processing features to text. By using the text tool, the designer can create artistic and paragraph text. One important thing that makes CorelDraw unique for artists is that after adding text to a document, the text type can be changed from paragraph text to artistic text and vice versa. It can also convert Artistic text to curves. Besides this, it provides capabilities for text spacing, bold formatting, addition of columns and creation of Drop caps.

CorelDraw also allows the designer to edit text in the Drawing window and in the Edit Text dialogue box. While working with text, the writing tools can be used to verify grammar and spelling, replace a word, generate a count of text elements, open a document containing different fonts from which suitable ones could be selected and used for works.

One problem that confronts basic designers and for that matter Senior Secondary School graphics students is the construction of fonts but CorelDraw offers a variety of fonts to select from in the Font list box. Fonts can thus be changed at will to create specific characters while their sizes can be altered. The student designer can also align text in various ways by clicking on the Align tab.

CorelDraw could also be used to enhance work by adding special characters and symbols or embedding graphics especially in the designing of cards and certificates to achieve very attractive backgrounds. Special effects such as drop shadows and contoured objects can be created while perspective can be added to objects on the screen. These features of CorelDraw therefore enables the designer to do serious work and also create fanciful and attractive graphics in less time, thus making the artist's work less cumbersome and enjoyable.

3.3 PowerPoint

PowerPoint is a versatile presentation programme. This software has an outliner to help organize presentations in the form of an on-screen slide show complete with special effects that designers would find very useful for their presentations. On starting PowerPoint, various options are presented from which a choice is made including "Creating a new Presentation", "AutoContent Wizard", "Template", "Open a presentation", and "Blank presentation".

The designer is also presented with an Auto Layout, which displays a variety of layout to select from. The default is highlighted with a dark border. Auto Layout provides nine types of layouts for the designer to choose from simply by clicking the O.K button to use it.

The PowerPoint editor page is which is shown at the top of the screen allows one to create presentations. Another feature is the floating Common Tasks Menu palette, which contains three commonly used functions namely, "New Slide", Slide Layout and "layout

Design". The Designer can position this floating menu to a location of choice and click on it to begin PowerPoint operation.

3.3.1 PowerPoint 'Apply Design'

This PowerPoint resource is equipped with a number of designs or background templates that assist the designer to create presentations. The user is presented with more than just a background after selecting the design. The design controls many different features of the slide including the background image, text size, text location, text colour and others.

The "Apply Design" feature of PowerPoint presents the designer with a window of design options to choose from and the template of one's choice can be previewed by clicking on the name of the design upon which the design or template will be displayed in the right hand window. If the designer wants to apply the design to all slides, he or she clicks on "Apply" to get a particular design template applied to all the slides. The design or Template can be changed.

Presentation designers can decide to select a design or templates when they begin a series of presentation slides or add their design after building the initial slide. The important thing is that when a design or template is added after building the slides, the text, location of text and colour of text will probably change.

3.3.2 Other Features of PowerPoint

PowerPoint simplifies the complicated process of creating effective presentation by providing assistance in the content development, layout, and design phases. It assists one to produce support materials to go with a slide presentation. PowerPoint helps designers to organize their thoughts on the kind of presentation being made. Depending on the type of presentation being made, the programme has a feature that gives suggestions and organization tips for effective presentation.

The programme also helps in the planning of slide layout by suggesting text layout features such as title placement, bullets and columns. More importantly, PowerPoint allows graphs of data, tables, organizational charts, clip art and other text effects to be incorporated in a work.

The PowerPoint software offers design templates, which could be used to enhance the appearance of the slides. These include standardization of the appearance of slides in a particular presentation. It also offers opportunity to select combinations of text and background, colours, typefaces (fonts) and sizes borders and other designs.

Once presentation has been designed the slides can be converted into black or white or colour overhead transparencies or 35mm slides. Alternatively, the slides can be used in an on-screen presentation which uses the computer to display the slides on an overhead projection screen.

PowerPoint also allows the user to produce printouts of the materials that have been created on screen. One can choose to print an outline of text showing the titles of the slides and the main text and leave out the art. In this way, the designer is able to check the organizational logic of the presentation. On the other hand, the speaker's notes can be printed out to enable the one making the presentation refer to or point out details to the audience. Finally, printed handouts of the slides can be created.

According to O'Leary and O'Leary (2000), this graphic presentation programme includes features such as text handling, outlining, graphing, drawing, clip art and multimedia support, which one can use to quickly change, correct and update presentations.

3.4 Microsoft Office

"Microsoft office" is a programme which shares some common drawing functions with programmes such as PowerPoint and Word. This drawing function is controlled by the drawing toolbar, which loads automatically at the start of PowerPoint or Word.

With Microsoft Office, the 'Draw' pull down menu contains a number of operations, which assist in managing drawings. These include Grouping, Order, Grid, Nudge, Distribute or Align, Rotate or Flip and Edit Points.

The 'grouping' feature makes it possible to move development drawings that are made as different entities at the same time. All the entities could be selected and then grouped. This will group all the separate entities into one. When there is the need to

edit just one entity of a group, it will be ungrouped and edited. In short, this feature can group, ungroup and regroup different or various drawing entities.

The 'Order' feature enables the designer to arrange separate entities forward or backward. This occurs when one wants to position an entity on top of another, or establish the order of multiple entities with regard to what should be forward and backward. For example, if a work contains text, and an illustration that contains two or more objects such as a box, a bottle and an orange, the order feature allows any of these objects or the text to be moved to the desired position by choosing the appropriate option from a list that include the following: 'Bring to front', 'Send to back', 'Send behind text', 'Bring to front of text', among others.

This means that if the designer wants to move the orange on the box to the front of the box, he or she just clicks on the orange, selects the "Bring to Front" option and click again to effect the positioning. Similarly, if the designer wants the text to be in front or behind, of the illustration, he or she clicks on the text and selects the appropriate order option to position the text where it is needed. If the designer wants to move an entity a little bit in a certain direction, the 'Nudge' option allows this to be done upwards, downwards, to the left or right as desired.

The 'Rotate or Flip' feature allows the designer to rotate or flip an entity by selecting it and one of the following options: Free Rotate, Rotate left Rotate Right, Flip Horizontal, and Flip Vertical. The Rotate or Flip' tool is also available on the Draw toolbar. To use the Free Rotate, one has to select the work to be rotated, click on the Free Rotate, and

move the cursor to one of the handles, click on it and hold to rotate the entity. With this an object can be rotated 90° to the left or right or to any angle preferred.

Microsoft Office also provides users with an AutoShapes toolbar containing assorted options that make it easy to draw perfect lines, arrow lines, rectangles, squares, ovals and circles. The 'Textbox' function allows one to add to drawings while the Word Art function presents a palette of style options for creating fancy text. The programme also allows fonts and their sizes to be changed; they may be made bold or italicized. The designer can change the size or location of the WordArt by repositioning, selecting, and resizing.

Microsoft Office allows the user to change the colour of lines and shapes using the 'Fill' and 'Line colour' feature which displays a rich colour palette from which desired colours could be chosen to suit one's work. Additionally, selecting fonts colour from the palette can also change the colour of fonts and graphic text. Line styles can also be changed as desired.

3.5 Microsoft Works

This programme provides a draw module that provides tools for enhancing documents with drawings and special effect. This Microsoft Draw software allows the user to insert drawings and Clip Art into word – processed and database documents. One can edit drawings and Clip Art that have been inserted into a document. One can also use Microsoft Draw to import and edit drawings created in other Works applications.

Yasuda and Freda (1993) admit that Works is similar to many other computer graphics applications, in respect of the Draw tool and palette, which enable designers to draw various shapes in different line widths, to type text and create columns. Like other programmes, Microsoft Works provides options for changing the colour of shapes and text, the background as well as fonts in what the designer does.

According to Norton (1995), when Works open on the Microsoft Draw window, nine tools appear down the left border of the draw window while the Line and Fill colour palettes display across the bottom of the screen. These tools enable the designer to draw shapes and lines, select objects, drag to create as well as drag to move objects.

Microsoft Works enables the designer to draw boxes around text or numbers and charts and also draw diagrams to emphasize points in a document. The line colour palette also allows the user to change the colour of outlines of objects with any of the colours shown on the palette.

Microsoft Works offers opportunity to resize objects, undo mistakes, copy and paste objects, rotate objects and above all, create three-dimensional effects or group objects to form a composite work. Works also provides other options that allow designers to draw three-dimensional objects. To draw several of the same objects, the designer draws only one of such objects and then duplicates it to create the remaining ones.

When the designer prefers to fill objects with patterns other than colour, he or she selects the Pattern Command from the Draw menu to reveal a number of patterns to

choose from.

Works provides horizontal and vertical rulers that enable designers to easily judge the placement of objects while working. Moreover, the ruler has the Nudge arrow button, which can be used to move objects just one pixel up, down, or side-ways while the Alignment button allows the user to align text. In using the Draw Module to create work that requires text, the text object is created first and then an appropriate alignment button clicked to align the text. The arrow keys on the Keyboard can also be used to create this same effect on the object selected.

The Insert Drawing feature of Works allows an already created drawing to be inserted into a document by choosing the "Exit and Return to" command from the File Menu. Works displays a message box that allows the designer to update the destination of documents before inserting the drawing. For instance, if the "Yes" button is clicked on, Works inserts the drawing into the document the designer has designated to receive the drawing.

The Draw Exit menu allows the artist to re-arrange the sequence of layers by selecting an object and choosing "Bring to front" or "Send to Back" to move one object on top of another. This is made possible by the fact that each element in a drawing occupies different layers.

Microsoft Works is able to group and ungroup objects in a particular work, which has individual objects that occupy different layers in the window. Similarly, the fill pattern

can also be changed to make a group of objects look as if like a single object. To effect changes to just one object demands the use of the Ungroup command option on the 'Draw menu' to ungroup the combined objects so that the desired object can be worked on.

Furthermore, Works allows the designer to create interesting works by adding graphic elements from the Insert menu. This presents the designer with a number of pre drawn objects (called ClipArt) to select from to reveal a shaded square, which indicates the position where the Clip Art will be inserted in the works page. Works therefore displays the Clip Art Gallery Dialogue box that allows the designer to view the Clip Art categories available in order to select the appropriate ones to use. Microsoft Office can assist designers to create works that they will be proud of within a short time.

3.6 WordArt

WordArt is a way of converting text into a graphic. This program is accessed from the 'Drawing' tool bar in Microsoft Word and used in times when plain words will not satisfy the design requirements of the artist. WordArt helps to create attractive logos and fancy text to really catch the reader's eye. WordArt text is not regular text. It can be edited only with WordArt. Even though it is a word program, the 'Spell Check' feature of Microsoft Word can not detect spelling mistakes.

WordArt Features

WordArt comes with some pre-designed special effect scheme to get one started. The designer can edit every aspect of the scheme including the rotation, line colours, line

widths, 3D perspective, and texture. It also allows the designer to use and edit light source, fill effect, font, and font size.

There is a 'WordArt' feature offers the designer the opportunity to add shadows to entities by selecting a shadow button to bring up a pop-up shadow style options palette from which to select the desired effect. The Word Art Gallery offers a real help because there are so many settings that one can change even if he winds up changing several settings.

The 'Insert' features on the Drawing tool bar, also enables the designer to include pictures from a file and a camera, or scanner connected to the computer. With these the designer is able to achieve satisfying results in the design process.

3.7 Microsoft Paint

Microsoft Paint is a drawing tool which is used to create simple or elaborate drawings. These drawings can be either black-and-white or color, and can be saved as bitmap files

The designer can print the drawings he makes, use it for desktop background, or paste it into another document and can even use Paint to view and edit scanned photos. Microsoft Paint can also be used to work with pictures, such as Joint Photographic Expert Group (.jpeg) Graphic Interchange Format (.gif), or Bitmap (.bmp) files and also paste a Paint picture into another document one has created, or use it as a desktop background.

Microsoft Paint Common Task Feature

When using Microsoft Paint, the tasks that are frequently performed include, drawing straight lines involving horizontal, vertical, or diagonal lines; Filling an area with background or foreground colour and setting a Paint picture as a desktop background.

Microsoft Paint allows the designer to display gridlines to make fine adjustments with colour. With this, the designer can easily make detailed changes to the design and colour of an image. It also Offers the designer the opportunity to work with images acquired from a digital camera or a scanner connected to the computer and send an edited images to friends, business associates, or anyone else using e-mail.

3.8 Drawing and Painting Programmes

According to Williams, Sawyer and Hutchinson (1999) a Drawing Programme is graphic software that allows the user to design and illustrate objects and products. They admit that there is a similarity between CAD and Drawing programmers but conclude that drawing programmes provide special effects that CAD programmes do not.

The Drawing Programme offers the artist a number of textures ranging from plain paper textures. It also provides a variety of choices in pencil, chalk, pen, marker as well as charcoal. Drawing programmes also offer the graphic artist the shapes, colour, starting and ending points needed to create line Art for magazines, books and special publications. This feature makes it possible for a computer to calculate mathematical properties of the objects on the screen, present different views or perspectives, store drawings in less memory space and to perform operations that require greater precision and accuracy. Examples of Drawing Programmes are CorelDraw, Adobe Illustrator and Macromedia Freehand.

Paint programmes on the other hand, according to Williams, Sawyerr, and Hutchinson (1999) are graphic programmes that allow users to simulate painting on screen.

O'Leary and O'Leary (2000) identify the paint programme as Image editor which is used to create and modify bitmap images that are created from thousands of dots. According to them, Graphic artists use this programme to correct or change colours and to create special effects such as Morphing. Morphing is a technique that allows the designer to smoothly blend two images in a way that makes one seems to be "melting" into the other. This special effect can be used to create amusing results. Examples of Paint Programmes include Mac Paint, Corel Photo-Paint, Adobe Photoshop, JASC's PaintShop, Metacreation and Microsoft Paint. Unlike the Drawing Programmes, which produce vector images, Paint programmes produce bitmap images made up of dots.

Sharp (1999) declares that Paint Programmes give the user the tools to draw and paint computerized pictures. To Sharp, what makes Paint unique for the classroom lesson is the advantages that the student of Art has in using Drawing and Painting programmes. The artist can correct mistakes easily since there is no real paint or water colour to spill, drop or smear the paper or material being used. The Painter only clicks on the mouse and instantaneously, the correction is done. Enlargement and movement of objects are also done by the click of the mouse button.

Sharp confirms that Paint programmes offer colouring and texturing capabilities, brushes of different widths and shapes, drawing tools as well as a mirror image function. It also

provides different fonts and an undo function. There is the Cut and Paste facility that enables the artist to import objects from other programmes.

3.9 Computer Animation

This is the Art of creating moving images by the use of computers. It is a subfield of computer graphics. According to the Wikipedia, it is created by means of 3D computer graphics though 2D computer graphics are still widely used.

The Microsoft Encarta Encyclopedia (2005) declares that computer Animation is the simulation of movement produced by displaying a series of successive images on the screen. It adds that in computer graphics, animation can be accomplished in several ways, depending on the tools provided by the programmer's choice of programming language and on the working environment

Animation programmes enable the graphic designer to create the illusion of movement, by displaying on the computer screen which is then quickly replaced by a new image that is similar to the previous image, but shifted slightly. This technique is identical to how the illusion of movement is achieved with television and motion pictures.

3-D Computer animation is essentially a digital successor to the art of stop motion animation; the animated figure is built on the computer monitor and rigged with a virtual skeleton. Then the limbs, eyes, mouth, clothes, etc. of the 3D figure are moved by the animator. Finally, the animation is rendered.

Computer animation combines Vector graphics with programmed movement. The starting point is often a stick figure in which the position of each feature (limb, mouth etc) is defined by an Avars (animation variable).

3.10 Presentation Graphics

Presentation graphics Software are used to combine a variety of visual objects to create attractive, visually interesting presentations. Commonly used presentation graphics programmes include Microsoft PowerPoint, Corel Presentations and Lotus Freelance Graphics. These help in creating professional and exciting presentations.

Presentation graphics programmes are excellent tools to communicate a message or to persuade people, such as fellow students, instructors, supervisors, or clients. They are often used by marketing or sales people as well as many others.

The features of most of the presentation programmes help the designer to organize the content of his presentation. Presentation programmes have an outline feature that help one to enter and organize the topics of the talk. In most cases, the programmes provide presentation Layout files that include sample text for many different types of presentations. They also provide designed templates which according to O'Leary and O'Leary (2000) help to take the worry out of the design and layout decisions. These templates include a combination of text layouts with features such as title placement and size.

In addition to the features mentioned above, various bullets styles, backgrounds colours, patterns, borders, animations such as visual and sound effects like blinking texts

transitions, and offers the opportunity for inserting audio and video clips that play automatically. One can even record his or her own voice to provide to accompany a slide show.

3.11 Photo and Image Editing on the Computer

Photo -editing programs are just paint programs and are often called. They are used to create and modify bitmap image files. It is just that they include many sophisticated functions for altering images and for controlling aspects of the image, like light and color balance.

For the most part, any paint program can open and display a digital photo image, but it will probably not offer the range and depth of features that a true photo-editing program does.

Graphic artists use image editing programmes to correct or change colours and create special effects. An example of such effects is morphing which allows two images to be blended smoothly to seem as if one image is melting into the next to create amusing result.

Available software for image editing include PhotoDeluxe, Photoshop, Picture it, PictureWorks, Photo Soap, Photo Impact , Corel Photo-Paint and Live Picture as well as Micromedia xRes.

Williams, Hutchinson, and Sawyer (1999) discuss that with this software, the designer can make changes from minor to the most outrageous. That is to say that Image editing software enable the designer to erase scratches on the photograph, the wrinkles

from the face, or the teenager's nose ring in the special photo for grandma or placing one's self in a picture of New York etc .

Image editing software provides features that allow the designer to stretch, shrink, and distort images; remove the flash-photo "red eye"; turn pictures around; sharpen the focus of fuzzy pictures; crop awkwardly shot pictures; cut and paste segment of photos; apply special effects filters ; retouch photos ;and merge alter images.

The opportunity to familiarize students with photo and image editing professional software packages opens doors to new careers for them and helps prepare them for good jobs in the real world.

3.12 Page Layout

Page layout, like presentation, multimedia authoring, and Web development programmes, usually contains a variety of graphics functions ranging from the simple to the complex, but its main purpose is composition, not image creation or editing. That is, it allows one to create or import text and graphics and, even animation into a word processed document.

Page layout programs, such as PageMaker and QuarkXPress, are for composing printed pages. They provide different ways for the designer to arrange text and graphics in many ways and also provide different ways for the designer to get a good view of his work, depending on the task at hand. These include print layout, web layout, normal view, outline view and thumbnail.

The researcher believes that the capabilities of the computer graphics software described in this chapter and the unique features each of them possesses are adequate tools for making designing easy and more interesting than manual designing. These programmes provide all the essential elements such as fonts, lines, textures, patterns and shapes that every graphic design student requires to carry out effective designing. They also provide different colour backgrounds and formats that can help make the design process faster. It is also easy to learn to use these programmes and so incorporating them in the SSS Visual Art programme and the Graphic Design option will benefit the students and provide them with adequate tools for effective learning.

REFERENCES

1. Haynie, W. J. and Peterson R. E., **The Technology of Communication**,
Thompson Learning Tools, Cincinnati, 1995,
P.170-171
2. [Http://www.orst.edu/instruction/ed596/ppoint1.htm](http://www.orst.edu/instruction/ed596/ppoint1.htm)
3. [Http://www.orst.edu/instruction/ed596/ppoint/wizard.htm](http://www.orst.edu/instruction/ed596/ppoint/wizard.htm)
4. O'Leary, Timothy J. and O'Leary, Linda L., **The O'Leary Series Microsoft PowerPoint**, Irwin / McGraw Hill, Boston, 2000,
P.1-4
5. [Http://www.orst.edu/instruction/ed596/draw/draw.htm](http://www.orst.edu/instruction/ed596/draw/draw.htm)
6. Yasuda, Phyllis and Fred, V., **Using Microsoft Works 3.0 on the Macintosh**, Mitchell McGraw-Hill, New York,
1993, P.345-352
7. Norton, Peter, **Peter Norton's Introduction to Computers – Essential Concepts with Microsoft Works For Windows**, Glencoe McGraw-Hill, New York, 1995,
P.345-352
8. [Http://www.geocities.com/prof_al/WORD/wordart2000.htm](http://www.geocities.com/prof_al/WORD/wordart2000.htm)
9. [Http://www.jegsworks.com/Lessons/words/autotools/step-wordart.htm](http://www.jegsworks.com/Lessons/words/autotools/step-wordart.htm)
10. [Http://pubs.logicalexpressions.com/pub0009/LPArticle.asp?ID=346](http://pubs.logicalexpressions.com/pub0009/LPArticle.asp?ID=346)
11. O'Leary and O'Leary, **Computing Essentials 2000 – 2001**, 2000,
P.210
12. Walter, Russ, **The secret Guide to Computers**, 21st Edition, 1995

13. Williams et al, **Using Information Technology Today**,
3rd Edition, Irwin / McGraw-Hill, Boston, 1999, P.79
14. Sharp, Vicky, **Computer Education For Teachers**, McGraw
Hill, Boston, 1999, P.225
15. **Microsoft Encarta Encyclopedia 2005**, 1993-2004 Microsoft Corporation
16. [Http://en.wikipedia.org/wiki/Computer_animation](http://en.wikipedia.org/wiki/Computer_animation)
17. Williams, Sawyer, and Hutchinson, **Using Information Technology**, 3rd Edition,
McGraw-Hill, Boston, 1999, P.298
18. O'Leary, T. J. and O'Leary L. I, **Computing Essential 2000 – 2001**, Irwin /
McGraw-Hill, Boston, 2000, P.34-35

CHAPTER FOUR

RESEARCH METHODOLOGY AND ANALYSIS OF FINDINGS

4.1 Introduction

Keeping abreast with knowledge and skills in the design industry is a challenge that only computer technology can help solve as far as graphic design is concerned. Based on this fact, the researcher has identified Microsoft Works, CorelDraw, and PowerPoint as the preferred software for introduction into the Senior Secondary School curriculum to equip students offering Graphic Design with skills needed to face the challenges that lie ahead of them in their education and industry.

Identifying the right programmes alone is not enough to ascertain their application in the teaching and learning process. For this reason, the researcher subjected the identified software to pre-testing in selected Senior Secondary schools in the Kumasi Metropolis to ascertain their feasibility and fit with the teaching and learning of graphic design in Ghanaian schools.

4.2 Population for the study

To facilitate easy data collection and effective analysis of the research findings, the researcher employed the purposive sampling technique to select the population for the study. Generally, the purposive sampling technique is based on the previous knowledge of the population and the specific purpose of the research. In This sampling technique, which is also referred to as judgment sampling, the sample elements judged are

representative of the population. Therefore the researcher used his personal judgment to select the sample based on availability of computers in the school, the teaching of graphic design and access for the pre-testing. It is the researcher's knowledge of the schools that motivated his choice of the six schools named in 4.2.2 as representative of Senior Secondary Schools in Ghana.

The basis of selection hinged mainly on the schools currently offering graphic Design as an option of the Visual Arts programme and access to the school's computers for the project. Schools that have computers but do not use them for teaching and learning were not included in the sample. Schools that had computers but whose students had no experience in mouse handling and typing were also excluded from the study.

4.2.1 Sample studied

In all, 256 students drawn from the six schools participated in projects identified for the pre-testing of the identified computer graphics programmes. Table 12 identifies the participating schools.

Table 10: Participating schools in pre-test

School	No. of students
AFST (A)	39
KST (B)	44
PC (C)	48
TSS (D)	40
KHS (E)	44
TIA (F)	41
Total	256

4.2.2 Duration of Pre-testing

Pre-testing of the identified software lasted 18 weeks. Each school was allocated a period of three weeks to test a particular computer programme. The schedule followed the normal school timetable, which allocates 40 minutes for a single period and 80 minutes for a double period of teaching time. Only the graphic design periods on the time tables were used.

4.2.3 Resources Available

Nine Information Technology (I.T.) teachers and a graphic designer, who is computer literate, served as resource persons during the period of pre-testing. The number of computers used for the pre-testing was 234 and the distribution is as follows:

Table 11: School distributions of computers

School	No. of Students	No. of Computers	Ratio
A	39	25	1:0.6
B	44	44	1:1
C	48	60	1:1.3
D	40	30	1:0.8
E	44	40	1:0.9
F	41	35	1:0.9
Total	256	234	1:0.9

As shown in the Table above, School C had the highest number of computers while School A has the lowest. All the 256 students who pre-tested the software offer graphic design. It is evident from the table that there were not enough computers to go round the students in Schools A, D, E, and F. While in schools B and C, their computers were adequate. Schools A, B, D, and F are co-educational whereas Schools C and E are Boys' schools.

The computers available in the schools included old brands of Dell, NEC, IBM, Apple Macintosh, Hewlett-Packard (HP), and Compaq. The computers capacities were generally low because their primary use in the schools is word processing.

Table 12: Programmes available and Programme tested

School	Programmes Available	Programme Tested
A	Word, Excel, PowerPoint	PowerPoint
B	Word, Works,	Paint
C	Word, PowerPoint, Excel, CorelDraw	CorelDraw
D	Word, Office, Access	Office
E	Word, Works, CorelDraw	Works
F	Word, Excel	WordArt

4.3 Procedure for Pre-testing

As indicated in the table above, different programmes were tested in different schools depending on the graphics software available on the computers in each school. The choice for a particular programme for the pre-testing exercise in each school was based on the type of computers available and their compatibility to computer graphics software. In all the schools students were first taken through introductory activities aimed at equipping them with mouse handling skills. The students were all introduced to the working environment of each programme tested.

4.3.1 School 'A'

- Class: Form 2
- Programme Tested: PowerPoint
- Previous Knowledge: - Students were familiar with Excel and could construct a Spreadsheet.

Introductory activities:

Students were taken through exercises in identifying the various features of PowerPoint. This involved studying the display of the Windows features, identification of Icons, Mouse Pointer, Start button and the task bar. They were also taught how to load PowerPoint from the Start menu.

The features of PowerPoint were thoroughly discussed with the students explanation of the PowerPoint window features offered. Their discussion and explanation covered the Title bar, Menu bar, Tool bar, Workspace and the status bar. The students were also asked to observe the fact that the title bar displays the name of the programme in use. They were also taught how to use the Office Assistant when they needed help.

Teaching and learning procedure

The Students were taken through the use of the AutoContent Wizard which offers assistance when creating a presentation. This is an in-built, step by step guided approach that assisted students to organize their work. With this feature available, designs templates enabled the students to select preferred colour schemes, fonts, and other design elements for their work.

Students also practiced how to edit and save a document. During editing, they were taught how to use the AutoCorrect and Automatic spelling Checker to correct misspelled words and grammatical mistakes by clicking on the spelling indicator in the status bar or using either the Spell Check or the Spelling command on the Tools menu.

They were also engaged in selecting and changing fonts and font sizes. During this process, the students were taught to

- Open the font menu,
- Scroll through the list and
- Selected fonts of their choice.

To reduce or enlarge font sizes, students were asked to

- Click on the font size button to display the current font size
- Highlight an already typed text
- Click on a point size of choice to effect the change.

Another important activity students learnt was the sizing and moving of objects. This they did by

- Selecting the object to display handles around the object
- Selecting one of the handles
- Dragging outward to enlarge and
- Dragging inward to reduce the object

Students were asked to notice how the mouse pointer changes from an arrow (\uparrow) to a double arrow (\leftrightarrow) to signify that an object could be dragged to adjust the size.

To move an object was to

- Place the pointer on the object
- Hold down mouse button and
- Drag to the desired position

To add graphics such as a picture to a work or presentation, students were taught to

- Choose 'Insert' from the Tool bar
- Click 'Picture' then
- Select 'From File'
- Look for the drive containing the pictures,
- Select the picture and
- Click on 'Insert'.

Because sizing handles appear around the identified picture indicating that it has been selected, its size can be manipulated and it can also be moved to where it is needed.

The Picture tool therefore provides a means for modifying a presentation.

A similar process was used to insert 'ClipArt', the students were taught to

- Click on 'Insert' in the drawing tool bar,
- Click 'ClipArt' which is represented by a cartooned portrait to display the Clip gallery which contains Clip art, photographs, drawings and other graphics.
- Select the appropriate ClipArt and
- Click on 'Insert' or 'Enter'

They were also asked to observe how each ClipArt image has been assigned keywords that describe their contents, such as bouquet for a picture of flowers. In the search for Clip text box, students were only required to

- Type bouquet,
- Press 'Enter' on the keyboard to display matching icons
- Pointed at desired one and
- Clicked to use it.

After this they were taught to move the object that had been selected and to centre it over the picture or text. They were also asked to drag the adjustment handles outward until the picture is fully visible in the frame they had selected.

The final lesson involved students practice on how to save a presentation by 'File' or 'Save As'. To do this they had to click at the end of the filename (example Augustine01) and click on 'Save' to complete the process.

Student's Response

In the course of the lesson, students asked pertinent questions on things they found difficult to do and the appropriate help was offered by the I.T. teachers and the researcher. They were excited for being exposed to the PowerPoint. Plates 1-4 show students of School 'A' learning to design on the computer during the pre-testing



Plate 1 Students of School 'A' being introduced to computer graphics



Plate 2 Some students of School 'A' learning to design with the computer



Plate 3 The Researcher supervising Graphic Design students in School 'A'



Plate 4 A group of Students School A designing with the computer

4.3.2 Pre-testing in School 'B'

- Class: Form 2V
- Programme Tested: Paint.
- Previous Knowledge: Students knew how to create a document, save it and also retrieve saved files.

Introductory activities:

Students were first taught how to get into the 'Accessories menu' on the screen and to select 'Paint' from the options provided and to display the Paint Window on screen. On launching the Paint window, students complained and questioned about the size of the workspace. They were made to understand that when the Paint programme is selected, sometimes a smaller screen appears at the left hand corner of the screen and this has to be maximized to ensure that the active window covers the entire screen. They were therefore taught to click the resize button to maximize the screen to get the full use of the screen. After several attempts, they became conversant with the Paint Window.

Teaching and learning procedure

Students were first made aware of the Paint tools (figure 6) they were going to work with and their functions. It was explained to them that the paint has very few tools in designing. These are the 'Free Form Select', 'Eraser', 'Pick colour', 'Pencil', 'Airbrush', 'Line', 'Rectangle', 'Ellipse', and 'Select'. The rest of the tools are 'Fill with colour', 'Magnifier', 'Brush', 'Text', 'Curve', 'Polygon' and 'Rounded Rectangle'

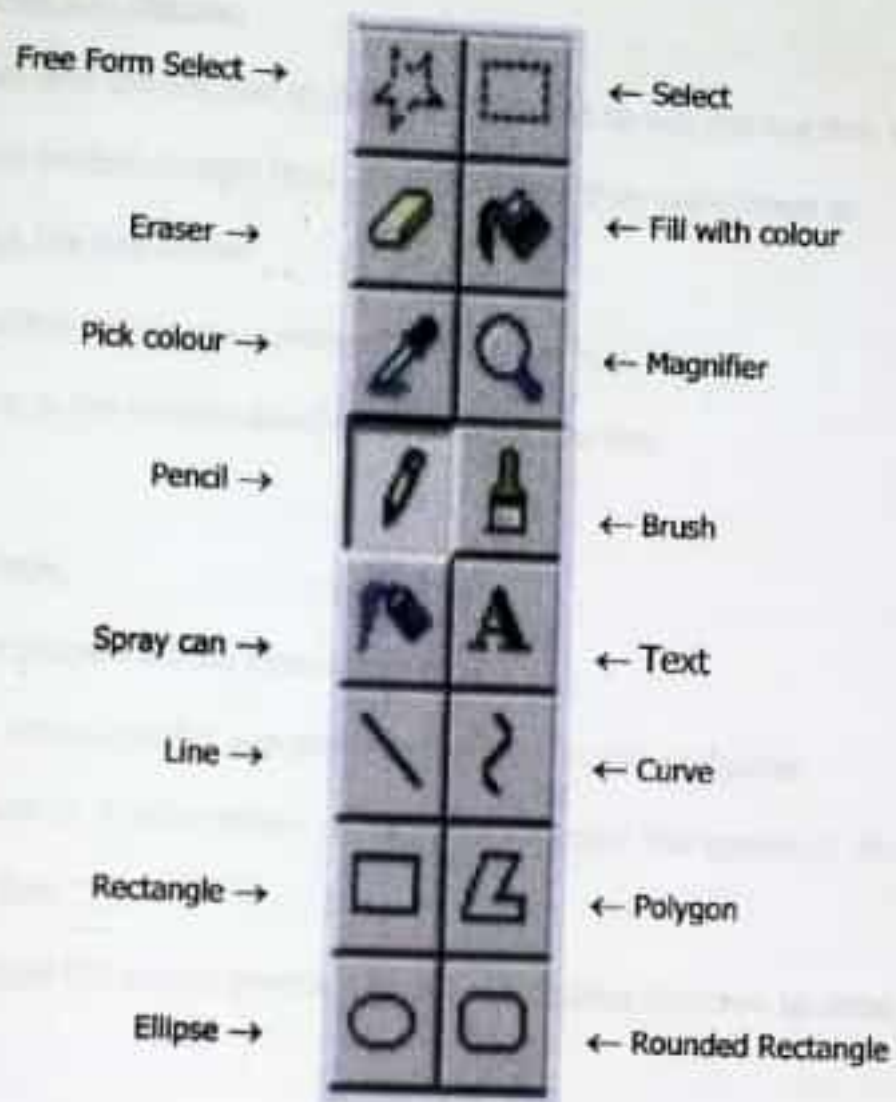


Fig. 5 The Paint Toolbox

To begin a task, students were informed that the computer automatically highlights the pencil tool with the assumption that it is going to be used. However, if a different tool is to be used, they have to click on that particular tool to select it. They were taught that if they want to paint, they have to

- Select the brush button by clicking on it and then
- Position the mouse pointer on the screen where work is to be done and
- Drag.

Drawing Lines and Shapes.

To draw lines and shapes, the students were taught to use the line tool which allows the artist to draw perfect straight lines. To draw a line, they were made to

- Click the line button
- Position the mouse pointer where the line is to begin.
- Drag in the desired direction to produce the line.

To draw a shape,

- That shape's button was clicked on.
- The mouse pointer was placed in position in the workplace
- Clicked at a point where the students wanted the corner of that shape to be and then
- Dragged the mouse pointer towards the desired direction to obtain the shape.

The Airbrush

The Airbrush enabled the students to spray an area of the drawing by using a can of spray paint. To do this, students were taught to

- Click on the Airbrush button,
- Position the mouse pointer where spraying will begin and
- Drag to spray.

Using the Eraser

The students were taught that by clicking the Eraser button and dragging it across the part of the drawing that needs to be erased, that part that is affected by the eraser

assumes the background colour of the screen. To clear an entire image, students were taught to click to

- Select the whole image.
- Move to Image menu and
- Click on 'Clear image'

It was also brought to the students' notice that they could undo up to three changes by clicking the Edit menu and then Clicking undo for each change.

Using the Text Tool

The Text tool enables one to use text when working with this programme. To type and format text, students were taught to

- Click on the text tool button labeled 'A' and
- Drag the pointer diagonally to the size desired to create a text frame.

On the 'text toolbar', they

- Clicked on the font,
- Chose the size and style to be used
- Clicked inside the text frame and
- Typed the text.

Students then moved and enlarged the text frame and clicked on a colour to change the colour of the text. The students were also made aware that they could view the 'Text toolbar' by

- Clicking on the 'View menu' and then
- Clicking on the 'Text toolbar'.

During this process, they realized that text elements could only be entered in the normal view. Also, text could be inserted into a picture by clicking outside the text frame. They realized that when the text tool is selected, it is only text that can be pasted and not graphics (pictures).

Working with colour

Working with colour under Microsoft Paint, students were taught that the default background and foreground colours appear on the left side of the colour box. They were taught to recognize the top colour chip as the background colour. To set the foreground colour, the students were taught to right-click a colour in the colour box.

To fill an area or object with colour, students were taught to

- Click on the 'Fill can' button and
- Click the area or object to be filled.

To create an airbrush effect in a picture, students were made to

- Click on the 'Airbrush' button in the toolbox
- Click a spray size at the button of the toolbox and
- Drag the pointer to spray.

In order to create custom colours, students were taken through five processes where in the colour box, students

- Clicked on the colour that is to be changed
- Clicked on 'Edit colours' on the colour menu and then

- Selected 'Define custom colours'
- Clicked on the colour swatch to change the hue and saturation
- Moved the slider to change the luminescence
- Clicked on add to custom colours and
- Pressed 'Enter'.

Other activities that students were taken through while working with colour were

- How to use black and white instead of colour,
- How to invert all the colours in a picture,
- Changing the colour of an existing line and
- Copying colour from one area or object to another.

Working with parts of the Picture

Students were taken through exercises in how to select part of a picture, for copying and pasting in different locations on screen. To select part of a picture, students had to

- click 'Select',
- click on 'Free form' from the toolbox
- drag the pointer to define the area to be worked on.

Another way was to

- click the 'Select a free form' button and
- drag the pointer across the part to be worked on. Six steps were followed in order to copy and paste parts of a picture. These were:
 - Clicking on the select button.
 - Dragging the pointer to define the area to be copied.

- Selecting a method of pasting (opaque or transparent).
- Clicking on copy in the 'Edit menu'.
- Clicking on paste in the 'Edit menu'.
- Dragging the selection to the desired position.

Changing how a picture looks on the screen

Under this topic, students learnt to change the size of their picture, zoom in and out, enlarge the size of the viewing area, display grid lines, flip or rotate a picture and stretch or skew an item.

To change the size of one's picture, students were taught to

- Click on the Image menu and click on 'Attributes'
- Click on the 'Unit measurement' to use for the width and height of the picture.
- Type the desired measurement in the width and height dialogue box.

With regard to zooming in and out of a picture, students learnt to

- point to 'Zoom' in the 'View' menu and
- Click 'Normal size', 'large size' or 'custom' to see the effect each item has on the work.

To enlarge the size of the area, students were taught to

- Click on 'View Bitmap' on the 'View' menu to let the picture fill the entire view area.

To revert to the original size, they only had to

- Click in any part in the picture to effect the change.

To flip or rotate a picture or object, the procedure used was to

- Click on 'Select' from the toolbox
- Drag a box around the item to be flipped or rotated
- Select 'Flip' or 'Rotate' opaquely or transparently at the bottom of the Toolbox
- Click on 'Flip' or 'Rotate' in the Image menu
- Click the desired option

In order to skew or stretch an item, students observed that they have to

- Click 'Select'
- Drag a box around the item to be changed.
- On the 'Image' Menu, click 'Skew' or 'Stretch'
- Click the option wanted and then enter the numerical value of the rotation (e.g. 48°)
- At the bottom of the toolbox, select 'Stretch' or 'Skew' opaquely or transparently

Finally, students learnt how to save and print by going to the 'File' menu and clicking 'Save' or 'Print'. In the course of learning, students asked questions on the things that bothered their minds and the I.T teachers and the researcher explained their concerns.

Students' Response

Students showed interest in the activities and lauded the opportunity they have had to participate in the Pre-testing exercise. Plates 5 and 6 show School 'B' students being introduced to computer graphics.



Plate 5 Graphic Design students of School 'B' being introduced to Computer Graphics



Plate 6 Students of School 'B' designing with keen interest

4.3.3 Pre-Testing at School C

- Class : 2V
- Programme Tested: Microsoft Office
- Previous Knowledge: Word Processing: - Students could create documents and edit them.

Introductory activities

A familiarization exercise covering the Microsoft Office screen and the Drawing Toolbar was carried out to let students identify the various tools with their particular functions. Students undertook some practice in using the mouse to manipulate objects on the screen under instructions of the I.T. teacher. They were shown the similarities between Microsoft Office and PowerPoint programmes as well as the common features available for designing.

Students were alerted on how the mouse pointer changes its shape on the screen depending on what it is pointing at. They were introduced to ways of starting the Office application and an explanation of the toolbar and workspace was given. They also realized how the drawing toolbar loads automatically on starting Microsoft Office, PowerPoint and Word. Figure 7 shows the Microsoft Office drawing toolbar.



Fig. 6 The Microsoft Office Drawing toolbar

Teaching and learning Procedure

The I.T. teacher took the students through a thorough discussion of the functions of the icons on the drawing toolbar. Students realized that the drawing tool bar could be repositioned. They understood that the 'Draw' pull down menu contains a number of operations, which can be used to manage drawings. Such operations included 'Grouping', 'Order', 'Grid', 'Nudge Align' or 'Distribute', 'Rotate' or 'Flip' and 'Edit Points'.

The students recognized that when drawings are made up of different entities, they could be grouped, ungrouped and regrouped. Also, they were made to understand that the arrangement of objects in a design can be adjusted by accessing the 'Arrange' tool menu to enable them position one entity on top of the other.

The AutoShape Menu

Students realized that 'AutoShape' menu has a number of shape options on a selection palette. They were made to click on the desired shape and move the cursor to position, click once to establish the starting position, and move the cursor to the size desired and click to finish the operation.

To obtain proportional shape, students were taught that the shift key has to be held down as the cursor is being moved.

The Nudge function Property

The nudge button enabled students to move objects a little bit by selecting the object with the 'Pick' tool and using the up, down, left and right arrows keys on the keyboard to move them on screen.

Rotating objects

The Rotation tool offered the students the opportunity to select an object to be rotated by clicking on the 'Free Rotate' and move the cursor to one of the handles. They clicked and held; and then finally dragged to rotate.

Working with Text

Students were taught how to add text to drawings by using the Text box, which is labeled 'A' on the toolbar. This resource allows for the creation of text and makes manipulation of the text easy and possible. To do this, students were asked to click on the text box button and select the size of the text box and enter.

Students were also taught how to create 'Fancy' text by using the WordArt function. When the Word Art button is selected, a palette of WordArt (Figure 8) style options is presented. The appropriate WordArt style is then selected, which also brings up the 'Edit WordArt' textbox.

This enabled students to change the font, font size and make it bold or italic. The text is entered and the O.K. button is clicked. The word then displays on the drawing. Students selected handles to change the sizes and location of WordArt items by dragging the handles.

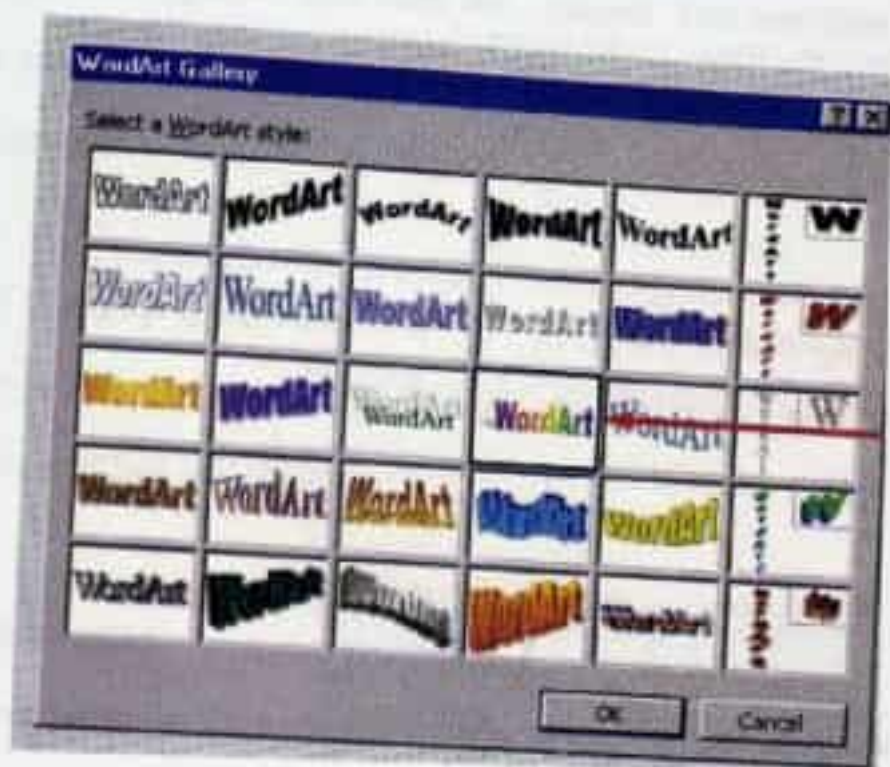


Fig. 9 WordArt Gallery

The Fill and Line colour effects

Students used the 'Fill' and 'Line colour' feature to change the colour of their lines, rectangles, ovals and other shapes. To change the colour of a rectangle students were taught to select the 'Fill colour' pull down button. By so doing the 'Fill colour palette' displayed from which a colour or effect could be selected for objects.

The line colour effect is obtained in the same way. Students only had to select the 'Line colour' pull down button. This presented the 'Line colour palette from which a colour was selected for the line.

Font colour effect

The colours of fonts (graphic text) were also changed. This was done by selecting the font colour pull down menu to display the font colour palette from which the desired colour was selected.

With regard to changing line style, Dash style and Arrow style, students were taught to use the appropriate pull down button. Similarly, students made use of the shadow menu to add shadows to text and objects.

Students' Response

Students were happy to have the opportunity to explore further avenues in the office programme. They were also amazed. This is because they did not know that Microsoft Office had artistic features. Plates 7 and 8 show School 'C' students learning to design with the computer.



Plate 7 Students of School C being introduced to computer graphics by the I. T. teacher



Plate 8 Students of School 'C' busily designing with the computer

4.3.4 Pre-Testing at School 'D'

- Class: SSS2
- Programme Tested: CorelDraw
- Previous Knowledge: Word processing: - Creating a document. Students could also format text.

Introductory activities:

Students were introduced to all the tools in the CorelDraw Toolbox that would enable them use the software effectively. The basic characteristics of the tools and their functions were discussed with them. They were made aware that when the mouse pointer is placed on a particular icon for a second, CorelDraw automatically displays the function on a highlighted background.

Exercises on the function keys, menus and the workspace were explained to assist students become accustomed to them. They observed the large white position of the CorelDraw application Window as the Drawing window whereas the rectangle in the centre with drop shadow is the drawing page. (See figure 9)

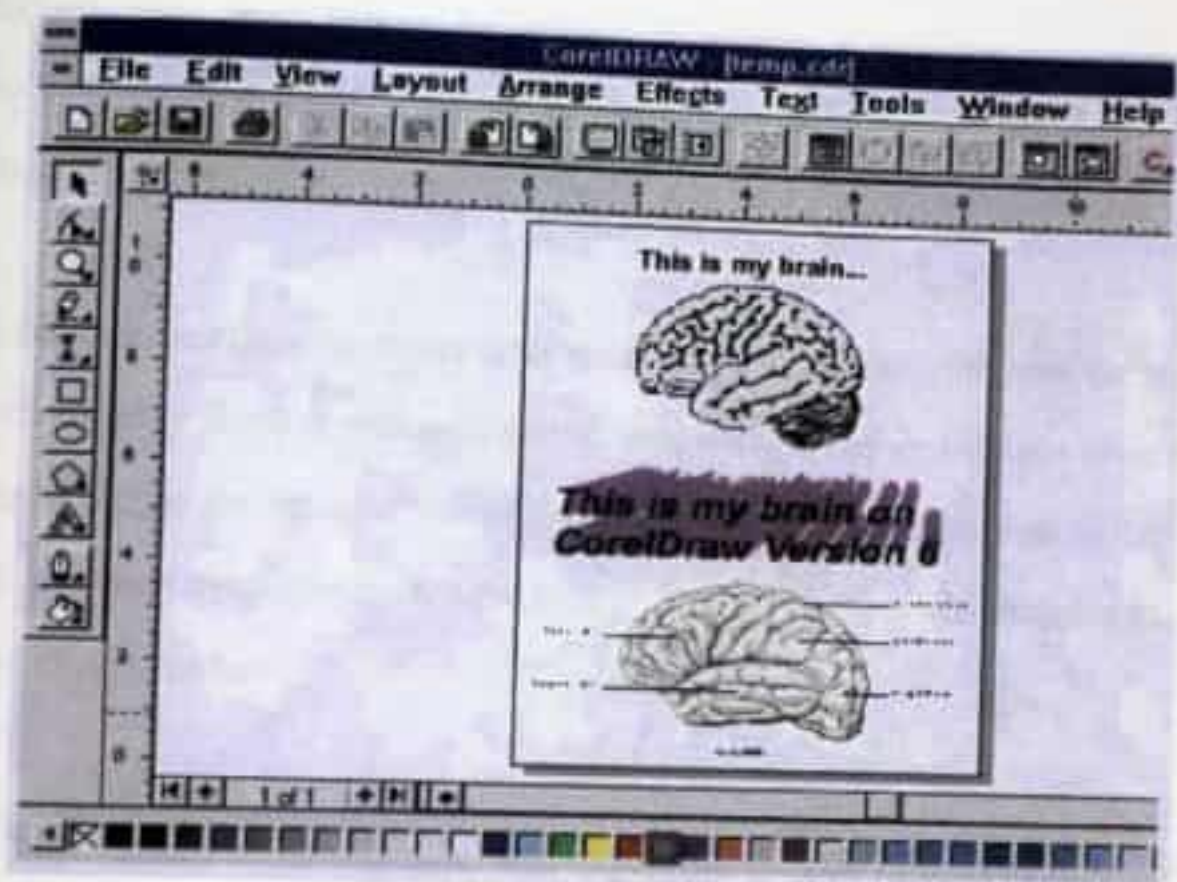


Fig. 8 The CorelDraw toolbox

Students were made aware that normally, only the parts of drawings that fall within the drawing page can be printed though the remaining space (called the Desktop layer) could be used to keep tools and pieces of drawing handy.

Students were also introduced to the Property bar that provides quick access to frequently used functions that are important to the active tool. For example, when the Text tool is clicked, the Property bar will show only text-related commands. The students were also taught that the Toolbox contains Fly outs which when clicked display additional tools.

Teaching and Learning Procedures

Students were taken through the process of creating a new drawing, opening an existing drawing, opening the last drawing worked on, and creating a new drawing from a template.

To create a new drawing, the students were taught to click on 'File', then on 'New' to cause the blank drawing window to appear. They were subsequently taught to access fly outs by clicking the arrow on the tool and to display a fly out as a separate toolbar. This was also done by clicking outside the button's area on the flout and dragging the flout from its host toolbar.

To open a drawing, students were taken through the procedure which involved the following:

- Click 'File'
- Click 'Open'.
- Choose the drive where the file is stored from the 'Look In box'.
- Double click the folder where the file is stored.
- Double click the filename.

Creating a new drawing

Students were taught how to use the specialized drawing tools such as the Natural Media, which is a powerful tool that allows different line effects to be applied. This tool has five drawing modes namely, 'Pre-set', 'Brush', 'Object sprayer', 'Calligraphic' and 'Pressure-sensitive'. Students also undertook exercises in setting up the drawing page to enable them know what page size and orientation they want to use (whether portrait or landscape).

Moving and making changes to objects

To make changes to drawn objects, students were asked to select the object by clicking on it with the 'Pick' tool for 'handles' to appear. Handles are made up of eight black squares arranged at the corners of the object with a small 'X' in the center. These enabled students to move or shape objects.

Organizing objects

Students were taken through the organization of objects. In the process, they used the 'Undo' and 'Redo' tools from the Edit menu to alter drawings or start over. They copied, cut, pasted and duplicated objects. They also learnt to group and ungroup objects.

To group objects, they needed to

- Select the object with the 'Pick' tool.
- Hold down the Shift key to select multiple objects if they needed to.
- Click on 'Arrange' and then click 'Group'.

To ungroup objects, students were taught to

- Select one or more groups.
- Click on Arrange and then click 'Ungroup'.

The students were made aware that they can also ungroup objects by clicking the 'Ungroup' button on the property bar. They also realized that they could ungroup all the nested groups in an object by clicking the 'Ungroup all' button.

To combine objects therefore meant the selection of the objects in the work, Click on 'Arrange' and then click 'Combine'

Working with colour

In working with colour, the students observed that they could change the appearance of an object by using a 'Fill'. This is a reference to the application of colour or pattern inside the borders of the object. CorelDraw provides 'Uniform', 'Fountain', 'Texture' and 'Postscript Fills'. To apply a 'Uniform fill', from the 'Uniform Fill' dialog box, students had to:

- Select the object with the pick tool.
- Open the 'Fill' fly out and click colour dialog.
- Choose a colour model from the model box.
- Click a colour from the colour bar and the Visual selector.

Students were also taken through the following:

1. choosing colours by using the On-screen colour palette,
2. choosing a colour from a colour model and

3. choosing a colour from a colour palette (fixed colour palette or custom colour palette).

To choose outline colour of an object, students had to

- Select the object with the pick tool.
- Click either in the On-screen or Custom palette to change the outline colour.

Students also went through exercises on sizing of objects using the mouse. They learnt that the easiest way of sizing objects is to drag the corner handles of the selection box using the mouse.

To re-size an object with the pick tool required a dragging of the corner selection handles inward and outward to decrease or increase respectively the size of the object.

To re-size an object from the centre, the following steps were used:

1. Select the object.
2. Hold down the Shift key and
3. Drag one of the corner selection 'handles'.

To stretch an object horizontally or vertically, the object had to be selected and one of the sides 'handles' dragged outward to increase (stretch) the size of the object.

Rotating objects

Like all other movements, objects could be rotated interactively by dragging its rotation handles with the mouse or by using the 'Free Rotation' Tool. To rotate an object by

means of the mouse, it was noticed that the object had to be clicked with the 'Pick' tool for the rotation and 'handles' to appear. To rotate an object, students had to

- i. click a rotation handle
- ii. drag the object clockwise or anticlockwise to rotate.

To rotate an object using the 'Free Rotation' tool, students were taught to follow this procedure.

- Open the 'Shape Edit' fly out and click the 'Free Transform' tool.
- Click the 'Free Rotation' tool.
- Select the object to be rotated.
- Click in the Drawing window to specify the center of rotation.

Working with text

Students learnt how to add and Edit Text with the Text Tool as well as how to use the Artistic Text that allows them to modify the shape of characters, adding graphics, symbols and special characters such as a text object. They also learnt how to change fonts for specific characters, how to change font sizes, apply bold and italic formatting, underline text case and how to align Artistic Text horizontally.

Moreover, students learnt how to create special effects such as creating drop shadows to an object and how to change the colour of a drop shadow.

Finally, students were taught how to add perspective to objects to create the illusion of depth. This enabled them to add another dimension to drawings. For example applying one-point perspective made an object look like it was receding from the viewer in one

direction while a two point perspective made the object look like receding from the viewer in two directions.

To add one-point perspective effect to an object the following steps were followed:

- Select the object with the pick tool.
- Click Effects, and then 'Add Perspective'.
- Hold down the Control (Ctrl) key and drag one node horizontally. (To move the opposing node the same distance, hold down Ctrl + Shift as dragging continues.)

To add a Two-point perspective effect to an object,

- Select the object.
- Click Effects, Add Perspective.
- Drag on the grid box nodes diagonally or away from the object's center.

The CorelDraw software offers interesting features which when studied in detail, would make students produce superb artworks.

Students' Response

The students understood that just a few of the numerous features on CorelDraw were tested and that further practice and exploration would enhance their ability and creativity on the computer. (Refer to plates 9-11 for students' activities during the pre-testing)



Plate 9 A cartoon drawing by a student in School 'D' during the pre-testing

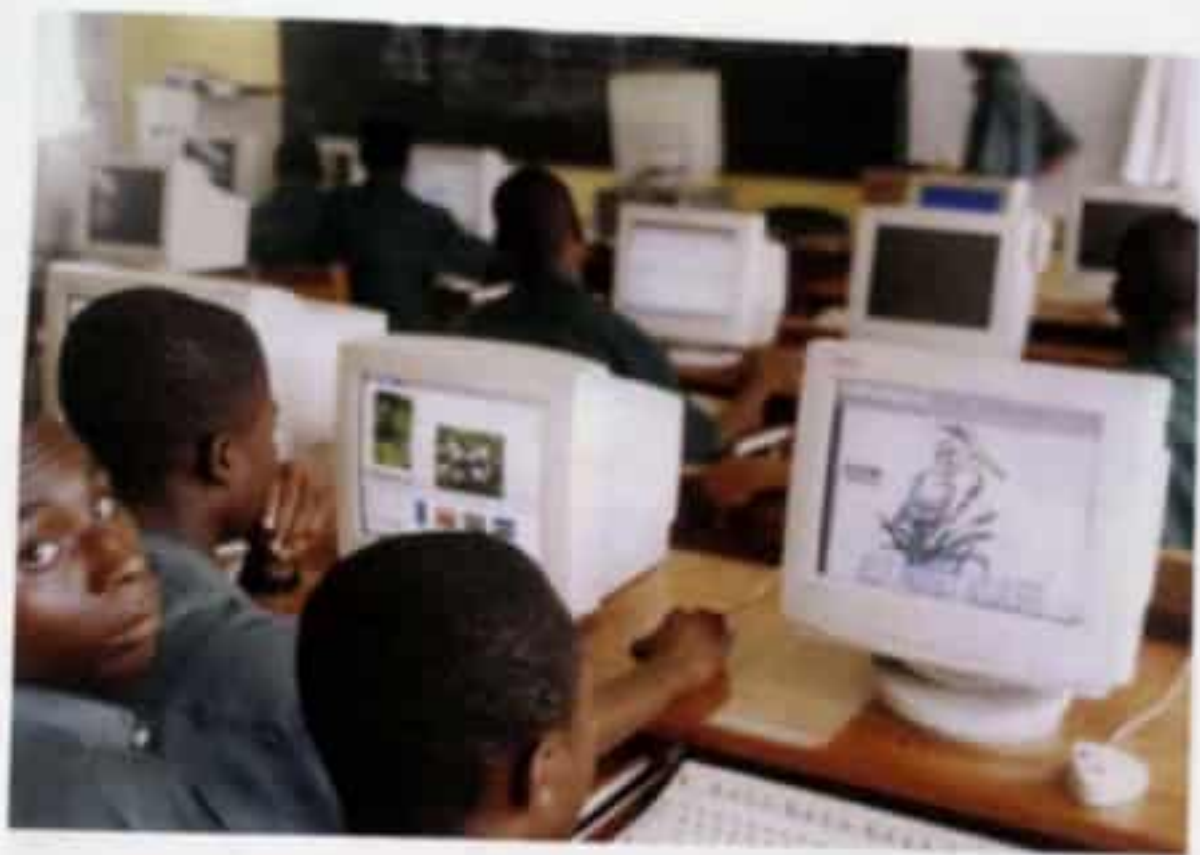


Plate 10 Students designing in School 'D'



Plate 11 Students in School D designing on the screen

4.3.5 Pre- Testing Activities at School E.

- Class: 2V2
- Programme Tested: Microsoft Works.
- Previous Knowledge: Word Processing: - Student could type document and use the Tools menu to check spelling and grammar

Introductory activities

A review exercise on the basic skill of selecting a programme from the 'Start' menu was carried out. Rolling of the mouse and locating the mouse pointer on the screen was also practiced. Students were taught how to launch Microsoft Works by inserting the data disk drive, open a new draw document by double clicking on the draw icon to display the Draw tool palette and drag the tool palette to the side of the workspace.

Students were also taken through the Tool palette to familiarize themselves with the icons on it. They recognized that the Tool palette is similar to that of Microsoft Paint as well as other graphics applications. The features of the screen when opened were also discussed. Figure 10 shows the display of Microsoft Works Window.

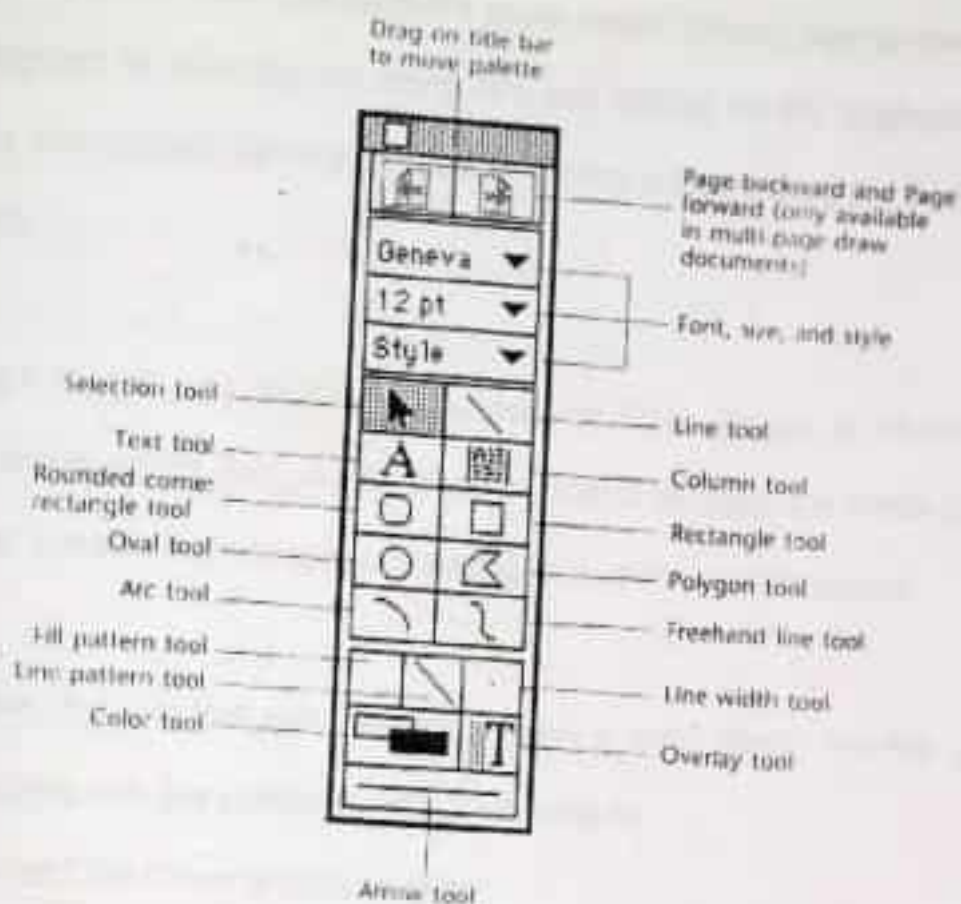


Fig. 9 Display of Microsoft Works Drawing tool Palette

Teaching and Learning Procedure

Students were made aware that the Draw document contains horizontal and vertical rulers. The purpose of these is to enable them judge the placement of objects. To notice this well, they were asked to move the cursor across the screen while observing that a faint hairline marker moved in both rulers. To start an object one centimetre from the top for instance, and one centimetre from the left side, the hairlines on the rulers are positioned one centimetre on the horizontal and vertical rulers.

In addition to this, students could use the 'Nudge' arrow buttons to move objects one

pixel at a time. This means that students could nudge (move) objects one pixel up, down or sideways by selecting the object first and clicking on the appropriate nudge button. They also realized that objects could be moved done by using the arrow keys on the keyboard.

Students were taught how to draw rectangles and other shapes by clicking on the appropriate button on the Tool palette. When the tool is selected, the cursor changes to a crosshair as it enters the workspace. Dragging is done to draw the square.

To draw a line, the line tool was used and to give it some depth, the line width tool provided students with line variations. This is obtained by

- moving the cursor to the line width;
- holding the mouse button down, and
- dragging to select the appropriate line width.

Students recognized that after drawing a shape or line, the cursor or pointer automatically changes back to the selection tool arrow. To draw more than one object in succession, with the same tool, the Shift key is held down to let the tool remain active until the selection tool is clicked. They also learnt how to deselect all objects by clicking outside the location of the selected objects.

Moving an object was also done by choosing the selection tool, moving the pointer over the object (but not the handle) and dragging to reposition it. However, smaller objects were moved using the Nudge button.

To draw objects and fill with colour or pattern, students used the following process:

- Click on the bottom line of the image for handles to appear
- Place the pointer on the 'Fill' or 'Pattern' box
- Hold down the mouse button and drag to select the desired pattern.
- Select the percentage option. When the selected pattern or colour fill option becomes surrounded by a square, the mouse button is released.
- Click on the area or object to fill.

Students also did copying and repositioning. An item had to be selected and from the 'Edit' menu, click 'Copy' and then click 'Paste'. By so doing, the new object appears with handles very close to the original object.

Working with Text

Students practiced typing and placing text objects in a work. They observed that moving text is very essential especially when there is the need for more exact placement. In doing that, students clicked on the Text tool. Here, students realized that the Text tool remained selected until another tool was selected.

To embolden the text, students were asked to

- Choose 'Bold' from the 'Style' menu of the palette.
- Position the crosshair at the appropriate place to create the block and
- Click on the 'Selection' tool to make an outline of the text block disappear.

This process enabled students to type words and figures; resize them and move to fit the appropriate places in the work.

Students' Response

Students attended the session regularly and on time. They were very keen to learn this new programme.

4. 3. 6. Pre – Testing at School 'F'.

- Class: SSS 3
- Programme tested: Microsoft WordArt
- Previous Knowledge: Microsoft Word

Introductory Activities


Students were introduced to Microsoft Word Screen and the features that appear on it when it is launched. Students were also taught that Word Art will enable them to create special effects with the Microsoft Word as well as some versions of the Office software. With these, students could create the effects directly in their programme through the insertion of WordArt drawing objects by using the WordArt button on the drawing tool bar. They will also have access to added features such as 3-Dimensional effects and textured fills.

Teaching and Learning Process

Students went through the process of Using WordArt, Inserting ClipArt, Formatting ClipArt, Drawing AutoShapes, Working with colour and text.

Using WordArt

Students were taught that WordArt enables documents to be improved visually by combining Text and graphics into one object. Since the elements become an object, its Size, shape and colour can be manipulated. To do this, student were taught to

- Click the Insert WordArt button on the Drawing tool bar for the WordArt gallery to open.
- Select a WordArt style and click 'OK' for the 'Edit WordArt Text' dialogue box to appear.
- Type the text to be turned into WordArt in the box with the highlight, "Your Text Here".
- Click OK and place the mouse pointer over the WordArt for the pointer to change to .
- Click and drag the WordArt and drop it at the desired position.-

Changing the Shape of WordArt

Students learnt that their WordArt could be given so many different shapes by clicking the WordArt Shape button to display the menu (See Fig11). From the menu, they could select the desired shape for the WordArt to change itself with the new shape and then click a blank space to deselect it.

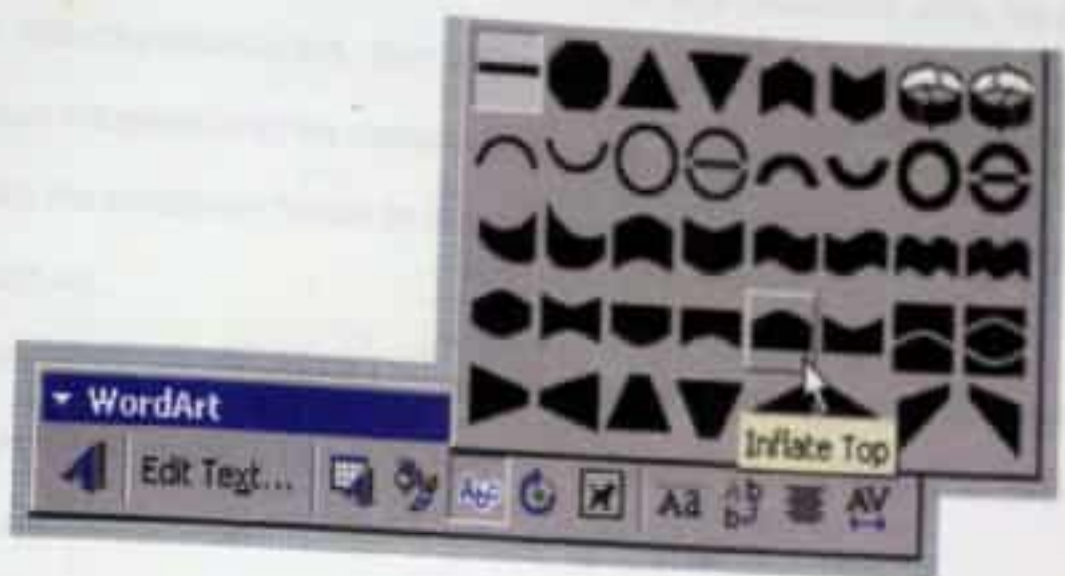


Fig.10 WordArt Shape

Inserting ClipArt in a document

Students also practiced how to insert ClipArt into a document by accessing the Microsoft Clip Gallery. In order to insert Clip Art, students were taught to:

- Click the area where they want to insert a picture or clip art.
- Click 'Insert Clip Art' on the 'Drawing' tool bar and then click the 'Picture tab'.
- Click the category wanted.
- Click the picture wanted and then click 'Insert Clip' on the menu that appear and click the 'Close button'.

Students also learnt to format a Clip Art using various techniques to change the size, position, alignment, contrast and the brightness of the picture.

Drawing AutoShapes

Students went through the drawing of lines, shapes, and pictures by using the Drawing tool bar. With the Drawing tool, students had complete control over items with regard to where they are placed and the amount of space they occupy. The process to follow was:

- Click the AutoShape button on the Drawing toolbar for the AutoShapes menu to appear.
- Point to the Shape required on the menu to highlight it. A submenu then appears from which a shape is selected for the pointer to change into a cross (+) as it enters the document

To insert a different size, it was necessary to drag the shape to the desired size. To draw a circle or square, students learnt to click 'Oval' or 'Rectangle' on the Drawing tool bar and then clicked on the document.

To insert text in an AutoShape, student were taught to:

- Select the AutoShape or Textbox. To add text for the first time,
- Right click any shape except a freeform.
- Click 'Add Text' on the shortcut menu and then type the text.

Working with colour

To apply colour to a text, students were guided to click 'Font Colour' on the Formatting tool bar and to apply the desired colour. (The colour was selected by clicking the arrow next to the Font colour).

To add or change a fill colour in a drawing object, this process was followed.

- Select the drawing object.
- On the Drawing toolbar, click the arrow next to Fill colour.
- Click the colour wanted.

To add or change a shaded pattern, textured or picture fill in a drawing object, students were taught to:

- Select the drawing objects.
- Click the arrow next to 'Fill colour', then
- click 'Fill Effects' and finally
- click 'Gradient', or 'Texture', or 'Pattern' or 'Picture Tab' to select the desired option.

Students' Response

With the above procedures student could create documents by themselves. See plates 13 and 14.



Plate 12 A section of the pre-testing class of school 'F'



Plate 13 Some students from School 'F' working during pre-testing

4.4 Problems Identified

There is always the tendency of encountering problems when using unfamiliar tools, materials and equipments. As such the Pre-Testing session encountered some problems as almost all of the students were using the computer for the first time to create designs. The problems identified were common to all the schools in which the programmes were Pre-tested.

The first problem was that the students fumbled as they used the mouse to control the cursor and also found it difficult to roll the mouse to locate an icon or button and clicking on it to perform a task. This was large due to the fact that all the computer exercises they had had centered solely on the typing of documents in Word Processing. Another problem was that the students found the cursor to be very slippery when they started using the mouse to draw Auto shapes. Sometimes they end up going beyond the next page of the workspace because the more they kept pressing the mouse button, the farther and faster the cursor moved. At other times, some students could not locate the cursor, on the screen.

Some students ended up clicking on other items they did not intend to click on because of the slippery nature of the mouse. For this reason, they worked on a trial-and-error basis.

Drawing with mouse was found to be difficult for some students since they had to control the arrow or cross that creates the outline of the object as the mouse kept

rolling on the pad. At some points, the shape of objects intended to draw ended up distorted and lines extended beyond control.

In filling objects and shapes with colour, most of the students encountered some problems and ended up filling the entire work instead of the selected objects. The inability to achieve the desired results led to the repetition of the filling process.

In the case of text, at certain times, when student wanted to type capital letters they unexpectedly got small letters instead and when they wanted to type small letters, the text became capitals.

Lastly, in most of the schools, the computer laboratories were congested and that did not allow free and easy movement of students. This made supervision and monitoring of students' work difficult.

4.5 Solution to the Problems Identified

To resolve the problems associated with the mouse, students were taken through a special mouse handling exercises involving clicking, dropping and dragging. These activities enabled the students to realize that moving the mouse gently with the hand, in any direction, on the mouse pad, produces similar movements of the pointer. During this process they observed that the mouse pointer changed from to a cross (+), beam (I), arrow (↔), a rectangle (◻) or a hand (b) depending on what it is being used for.

Students were also taught that in the event where they cannot locate the pointer on the

screen, rolling the mouse in a scribble manner on the pad would bring it back on the screen.

They were also taught that their inability to fill spaces successfully was due to the joints of the outlines on the objects not being properly closed. To solve this problem, they were taught to acquire the skill of joining lines properly to ensure that there are no gaps or leakages.

It was also observed that the problem of getting capital letters (Uppercase) instead of small letters (Lowercase) and vice versa was because either the Shift key or the Caps Lock was activated at the time of the typing. The students therefore were asked to make sure the Caps Lock was not activated when they did not need capital letters. They were also made aware that the computer sometimes automatically activates the cap key, as some programmes want the input to be capitalized. However, they were advised to avoid accidental pressing of the Shift and Cap keys. They learnt that taking the trouble to observe whether the Caps Lock light was on or not could help avoid such problems.

4.6 Evaluation of the Pre-testing Activities

Following weeks of testing the identified computer graphics programmes, it was found out that the students became more proficient in using the computer to design graphic products. (See Appendix: P.166 following)

During the period, the Visual Art teachers exhibited a high sense of professionalism

leading to the attainment of the objective set for the pre-testing. They were very dedicated and sacrificed time and energy and made their students available for the Pre-Testing when it was time for that, and they taught with zeal.

Students who participated in the pre-testing exercise showed keen interest in what was done. They were very regular and punctual at class. They were prepared to learn to design with the computer. Even though this did not form part of their normal class work, the students approached the exercise with all the seriousness it deserved as they saw it as an opportunity to broaden their horizon.

The rate at which students adapted to the new technique (of using the computer in designing), attests to the fact that should computer graphics be introduced and is given ample time as the existing Visual Art subjects on the School time-table, Graphic Design students can produce marvelous design works.

The students found the CorelDraw, Microsoft Word, Office, Works, PowerPoint and other programmes easy to learn and their introduction into the Senior Secondary School Visual Art Programme would enhance the capabilities of students in designing and that would make them fit better into today's job market.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The use of the computer in designing has greatly enhanced the job of the graphic artist. Available computer graphics software enable the designer to explore alternative avenues in creating designs that manual tools cannot match. This, however, depends on one's knowledge and skill regarding application of the software, manipulating the computer keyboard, mouse and other related hardware.

Several computer software offer ready-to-use options that the designer can access in order to achieve the most effective poster, newsletter, brochures, package, book cover, certificate, greeting card and other visual communication materials.

Computer software identified for this study include Paint, Drawing, Photo, Publishing, Presentation and Word processing programmes. These can be adapted for beginners and in particular, Senior Secondary School graphic design students in Ghana.

From the myriad of software available for graphic designers, CorelDraw, Microsoft Paint, PowerPoint, Microsoft Works, WordArt, and Microsoft Office were identified as the most suitable for inclusion in the Visual Arts curriculum. To test the suitability of the software for the research, selected students were taken through exercises in these programmes.

Students who participated were from Armed Forces Secondary Technical (School A), Kumasi Secondary Technical School (School B), Prempeh College (School C), Technology Secondary (School D), Kumasi High School (School E), and T.I Ahmadiyya (School F).

Those in Prempeh College, Kumasi Secondary Technical and Armed Forces Secondary technical were quick in learning what they were taught. Technology Secondary and T. I. Ahmadiyya students were average. On the other hand, students of Kumasi High School were however slow in learning the skill they were taught mainly because they had just been introduced to Information technology as part of the general Senior Secondary School curriculum.

Majority of the student participants preferred PowerPoint to the other programmes because they found it easy to work with. With CorelDraw, the students were able to create interesting. Few of the students had some difficulty using the Paint programme. On the whole, the students found that using the computer in designing reduced the amount of time they have spending to do the same type of work manually.

None of the schools visited was offering computer graphics as part of their Information Technology curriculum even though CorelDraw, PowerPoint and other graphics software were available on their computer. All the schools generally taught Word processing.

The study makes it clear that software available for teaching and learning of graphic design should be utilized to enhance performance of Visual Art students, particularly those reading graphic design as their Elective subject.

The programme identified for the study have common features like colour palette, fill, alignment, textbox, order tools and layouts resources that are useful to the graphic designer. They provide unlimited opportunity to enhance the development of designing for optimum results as well as saving instructional time when compared with manual approach to graphic design.

5.1 Conclusion

From the study, it was observed that the computer has assumed so much responsibility that designers rely on it to broaden their horizon. In the Senior Secondary School, more importantly in the Graphic Design departments, computer hardware and the software can be considered as a subject for study and a tool to be used in the education as well as in the design process.

It has been noted strongly that the computer graphics technology is a modern trend and it serves as a gateway to modern education in art and design, which needs to be given the fullest attention. More so, computer graphics technology when introduced into the Senior Secondary School Visual Art curriculum would not only make students computer literate but when it is well integrated, it will make life easier for its graphic design graduates. That is to say that those students who will be unable to continue their education beyond the SSS level can acquire jobs in publishing and advertising firms. Others could go into self-employment can rely on computer graphics skill to minimize or curtail the laborious way of designing.

Computer graphics encourages the designer to be more accurate and precise in creating

standard communication formats that could be accessed for the purpose of mass production.

Computer Graphics can bring to the educational process such attributes as patience, around-the-clock availability and student-paced instruction. The use of computers in designing, leads to improved student performance in logical or critical thinking, formulating problem-solving procedures and understanding visual relationships.

Computer Graphics can make the teacher more effective and also provide for students a new and fascinating platform for designing.

It is interesting to note that the software identified for study in the selected schools suit the course objective and also contribute more vividly as instructional materials. The systematic instructions they provide guide the students to follow sequentially as well as provide immediate feedback on their progress to them.

From the interactions the researcher had with the students during the pre-testing, it was realized that the student were interested in the use of computers as a learning tool. They were also amazed at the wonderful resources available on the computer and wished that the exercise continued.

5.2.2 Effective ways of teaching Computer Graphics

The curriculum

The computer graphics course should emphasize hands-on learning with a wide variety of amusing applications. As a Visual Art programme, the concentration should be on Art

and Word processing. The reason for the inclusion of word processing is to make the artist become fully computer literate and not to be a master in the arts only and be deficient in the most commonly used application of the computer.

5.2.3 The Computer Centre

Computers available in Ghana Senior Secondary School are generally few when compared with the number of students enrolled. While these computers have multi-purpose functions such as being used for clerical work, teaching of science related subjects, computer graphics can also be taught along side.

It is important that the computer room, laboratories or centre be spacious enough to foster effective teaching and supervision. The tables there should be arranged in such a way that both teachers and students can move about freely without obstructions. Such a room should be well ventilated since computers generate heat.

5.2.4 Teaching Computer graphics

The computer graphics teachers should be knowledgeable and versatile in a number of graphics programmes so that they can effectively teach the subject. They must be tolerant in order to deal efficiently with students' questions and problems. Teachers should be selected by their technical knowledge of the new technology as well as their ability to teach the subject well. The teacher should be able to argue cheerfully about the computer and its hassles to allay students' fears.

5.2.5 Organization of classes

Satisfactory teaching and learning would be achieved depending, in part, on the number of computers available in a school's computer centre and the class size. If the class size is 60 and the school has 30 computers, the students should be grouped in such a way that two students could be allocated to a computer. Where the class size is so large that the centre cannot take at a time, they can be put into clusters – Cluster 1, Cluster 2, and Cluster 3 for the practical sessions with a well defined time table for the students to know when each group should attend its practical session.

For the theoretical aspects, teaching and learning could proceed just as the other Visual Art theory lessons are treated and just as it is done for English language and the other core subjects that are purely theoretical and involve many students. However, more time has to be allocated for the practical hands-on experience than the theory for emphasis on skills development and confidence building.

5.2.6 Assessment.

The assessment of students' performance could be made 50% each for the practical and the theoretical aspects so that students will devote equal attention to both sessions. To ensure that the objectives of the course are realized, the teacher should give regular assignments; organize juries and exhibitions from time to time to evaluate students' progress.

As a means of boosting the morale of students, and to create interest in the subject, the teacher can form a computer graphics club in the school so that if the club functions responsibly, it can assist to teach the rest of the student about computer graphics. With

this, the teacher in his speeches can inform and encourage team spirit among the students to ensure that they help each other on the computer. This will foster collaboration among the learners, which will in turn enrich and possibly speed up the teaching process.

5.3 Recommendations

Based on the results obtained from the study, it is recommended that:

1. Graphic Design students are introduced to the computer and made aware of its application and benefits.
2. Students, who offer graphic Design as an Elective subject, should be taught computer graphics so that the transition from the S.S.S. graphic design to the graphics education in the University and polytechnic will be smooth.
3. An introduction of a well-designed computer graphics course in the Senior Secondary School Visual Arts is essential. Apart from the obvious benefits to graphic design already discussed, it also makes teaching and learning of concepts and tasks in the various discipline less difficult.
4. Senior Secondary School students are at the adolescent stage in human development and needs the opportunity for self-expression and recognition from others. As such when they are introduced to computer in designing, they will use the computer as a medium to express their inner feelings by way of creative designs.
5. The Ministry of Education and Ghana Education Service should introduce computer graphics into the Senior Secondary School Visual Arts syllabus to make the graphic design component more interesting for students to choose it.

6. Introducing the identified software will demystify graphic designing, which some people see as a very difficult subject within the Visual Arts programme and for which reason many students avoid the subject.
7. The provision of marketable skills in computer graphics for design students even at this level will enhance the school-job market transition for those who would have no opportunity for further education.
8. In advocating computer literacy in graphic designing in the Senior Secondary School, the teachers that do the teaching should not be left out. The effectiveness of the programme (computer graphics) will depend largely on the teachers who teach it. Therefore the curriculum of the University for Education should include teacher-education in I.T. especially CorelDraw, PowerPoint, Microsoft Works, etc for Visual Arts teachers so that they can teach the software well.

BIBLIOGRAPHY

1. Amenuke, S. K. Dogbe, B. K., Asare, F.D. K., Ayiku, R. K., and Baffoe, A.,
General Knowledge In Art, Evans Brothers Limited, London, 1991
2. Bardsley, Wendy Louise **Introducing Information Technology**, Longman Group; U.K.; 1987
3. Bertollne, Gary R **Technical Graphics Communication**, Times Mirror Higher Education Group Inc; U.S.A; 1995
4. Crampton, K. and Finney, M. **Design And Communication**, Harper Collins Publishers, London, 1988
5. Curzon, L. B. **Teaching in Further Education – An Outline of Principles and Practice**, Holt, Rinehart and Winston, London, 1985
6. Dunn Stewart **An Introduction to Craft Design and Technology**, Collins Educational, London, 1986
7. **Encyclopedia Americana**, Americana Corporation, New York, 1976.
8. Fales, J. F., Kuertemeyer, V. F., and Brusic S. A.,
Technology Today and Tomorrow, Macmillan / McGraw-Hill, 1988
9. Gilbert, Rita **Living with Art**, McGraw Hill, New York, 1992.
10. Harms, H. R., Kroon K. and Weigel M, **Experience Technology**, Glencoe / McGraw Hill, Columbus, 1993

11. Haynie, W. J. and Peterson, R. E., **The Technology of Communication**,
Thompson Learning Tools, Cincinnati, 1995
12. [Http://www.orst.edu/instruction/ed596/ppoint1.htm](http://www.orst.edu/instruction/ed596/ppoint1.htm)
13. [Http://www.orst.edu/instruction/ed596/ppoint/wizard.htm](http://www.orst.edu/instruction/ed596/ppoint/wizard.htm)
14. [Http://www.orst.edu/instruction/ed596/draw/draw.htm](http://www.orst.edu/instruction/ed596/draw/draw.htm)
15. [Http://www.geocities.com/prof_al/WORD/worart2000.htm](http://www.geocities.com/prof_al/WORD/worart2000.htm)
16. [Http://www.jegsworks.com/Lessons/words/autotools/step-wordart.htm](http://www.jegsworks.com/Lessons/words/autotools/step-wordart.htm)
17. [Http://pubs.logicalexpressions.com/pub0009/LPArticle.asp?ID=346](http://pubs.logicalexpressions.com/pub0009/LPArticle.asp?ID=346)
18. Hutchinson, S.E and Sawyerr, C. E., **Computers, Communications,
And Information, The User's Introduction**
7th Edition, Irwin/McGraw-Hill, Boston, 2000
19. **Longman Dictionary of Contemporary English**, Longman Group,
U. K. 1987
20. **Macmillan Dictionary of Microcomputing**, 3rd Edition, Macmillan
Press Limited, London, 1985
21. McConick, R., **Technology For Technology Education**,
Addison Wesley Publication, England, 1993.
22. **McGraw-Hill Encyclopedia of Science and Technology**, Vol. 3,
McGraw-Hill Book Company, 1957
23. Mireku, D. K. **An Introduction to Educational Computing**,
U.C.E.W., Winneba, 1996.
24. Mittler, G. A., Humphries H., and Howze J., **Creating and Understanding
Drawings**, Glencoe Publication Company, 1989.

25. Norton, Peter **Introduction to Computers, Essential Concepts With Microsoft Works for Windows,** Glencoe / McGraw-Hill, New York, 1995
26. O'Leary, T. J. and O'Leary, L. I. **The O'Leary Series Microsoft PowerPoint,** Irwin / McGraw-Hill, Boston, 2000
27. **Oxford Dictionary of Art,** Oxford University Press, Oxford, 1988
28. Paulson Jnr, B. C. **Computer Applications in Construction,** McGraw Hill Inc., New York, 1995
29. Segal, A., **Careers Encyclopedia,** 8th Edition, Cassel and Company Limited, London, 1975
30. **Senior Secondary School Visual Arts Syllabus,** Ghana Education Service, Accra, 1991
31. Sharp, V. **Computer Education for Teachers,** McGraw-Hill Boston, 1999
32. Sherwood R. **Homes Today and Tomorrow,** Glencoe/McGraw-Hill, New York 1996
33. Sippl, C. J. **Macmillan Dictionary of Microcomputing,** 3rd Edition, Macmillan Press Limited, 1985
34. Slotnick D. L. et al **Computers and Applications,** Lexington, 1986
35. Sullivan D. R., Lewis T. G. and Cook, C. R., **Using Computers Today,** Houghton & Mifflin Company, Boston, 1986
36. **The Longman Encyclopedia,** Longman Group Limited, Colombia University, U.K., 1989

37. Walter, Russ **The Secret Guide to Computers,**
21st Edition, 1995
38. Whitehead, J. **Graphic Communication,** Richard Clay Ltd,
Suffolk, 1985
39. Williams, B.K., Sawyerr S. C. and Hutchinson S. E. **Using Information
Technology Today,** 3rd Edition, Irwin/McGraw-
Hill, 1999
40. **World Book Encyclopedia,** Vol. 8, 1985.
41. Yasuda, P. and Fred, V. **Using Microsoft Works 3.0 on the Macintosh,**
Mitchell McGraw-Hill, New York, 1993.

