

**DEVELOPING INTERACTIVE LEARNING SYSTEM FOR TEACHING
THE ELEMENTS OF DESIGN IN SENIOR HIGH SCHOOLS**

By

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DECLARATION

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

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ABSTRACT

The study of Visual Art at the SHS is faced with various challenges. Some of the challenges negatively affect students' performance at the WASCE level. This study is conducted to assess the performance of Visual Art students at Winneba Senior High School and suggest ways to improve performance in the study of Basic Elements of Design. Based on the study an Interactive Learning System (ILS) was developed to aid teaching and learning of Basic Design Elements (BDE). Students' output was compared using the ILS against the Traditional Textbook and Lecturer method of teaching respectively in teaching the Basic Elements of Design. The Project Topic **“Developing Interactive Learning System for Teaching the Elements of Design in Senior High Schools”** was thus derived. The study adopted a Quantitative Research Methodology. Purposive and stratified sampling techniques were employed to select the respondents for this exercise. The main data collection tools were Interviews (Unstructured), Observation (Quasi- Observation). Data collected was analysed using figures and tables. The study revealed that when Visual Art students are taught using Interactive Learning Systems, their performances improved as compared to the use of the Traditional Textbook and Lecture method of teaching. This implies that students' performances are largely dependent on the teaching methodologies of their teachers. In order to achieve the aim of the research, interventions were implemented to improve the performance of the First Year SHS students of Winneba Senior High School. A simple, attractive and easily understandable Interactive Learning System was developed using Microsoft PowerPoint. Again, to ensure that the problem has been sufficiently addressed, a post-intervention test was conducted and the results were presented. In conclusion, suggestions and recommendations have been made to develop and further enhance the performances of students of Senior High Schools in the study of Basic Design Elements.

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Benedicat vos Deus

God Bless You All Bountifully

TVQN

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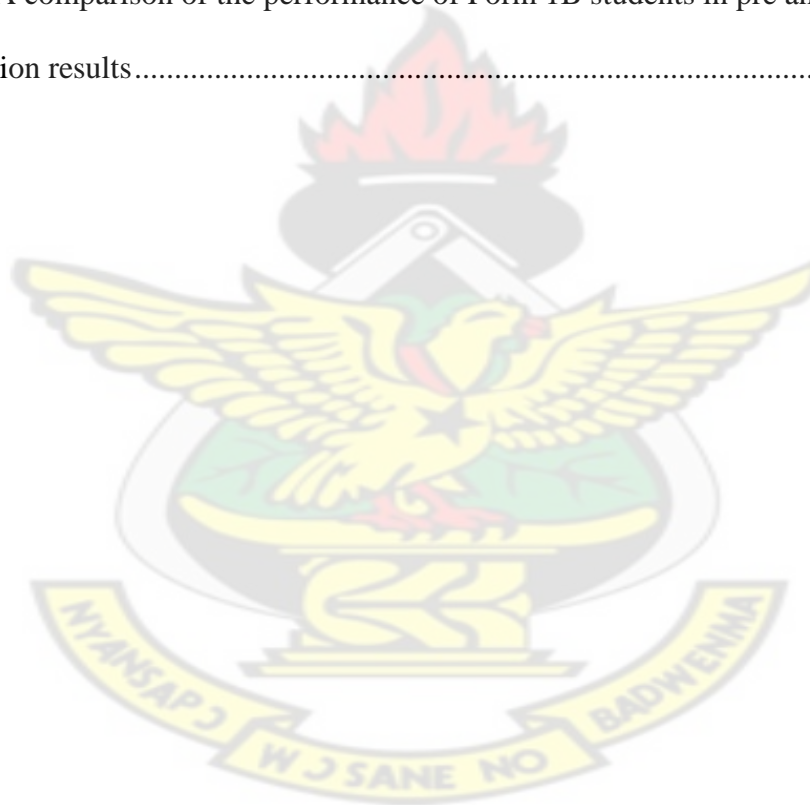
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CHAPTER ONE

INTRODUCTION

1.1 Statement of the Problem

In the teaching of basic design in most Ghanaian schools, natural objects are used to explore the idea of elements of design and how they can be related to form a desired design. There are however, some problems that hinder the understanding of the concepts of basic design. Learners at many points have to imagine by trying to create mental pictures of what has been said or taught. It leads to distortions in their understanding. This is a limitation to the teaching and learning of basic design in most senior high schools today. This challenge should be addressed.

Secondly, preliminary investigations made by the researcher showed that most Graphic Design teachers in the Senior High Schools teach their topics in abstract. Their illustrations and explanations, while teaching are without teaching- and- learning materials which make the understanding of the subject matter difficult. A problem is therefore presented when what is being taught or learnt is only perceived through abstractions.

Observations made by the researcher over time, indicate that there are prospects for Interactive Learning Systems (ILS) for the teaching and learning of basic design. This study seeks to explore ILS using elements of basic design as a theme that supports a good design in the SHS in Ghana.

An ILS is a programmed automated software designed to aid learning by dialogue or interaction between the user and the system being used. It plays a very important role in the teaching and learning processes in and outside the classroom. This software can be designed to aid teaching and learning at all levels in academia. The software only needs to be run via the internet/intranet or compact disc read-only memory (CD- ROM) on a computer following relatively easy instructions.

Different kinds of software are adapted for teaching and learning in foreign countries, designed to meet certain design requirements, thus making designing an interesting activity for both teachers and students.

1.2 Research Questions

1. What role will the Interactive Learning Systems play in the teaching and learning of the Basic Design Elements at the SHS level?
2. What are the benefits and risks associated with the use of Interactive Learning Systems in the teaching and learning of the Basic Design Elements?
3. What challenges will arise using the ILS in teaching the Basic Design Elements?
4. What are the roles of teachers and learners in the Interactive Learning Environment?

1.3 Objectives of the Research

The following objectives are set to guide the researcher:

- To study the advantages and disadvantages of Interactive Learning Systems over the textbook and lecture method of teaching in Senior High Schools.
- To discover the vital points to consider when producing ILS for SHS students.
- To identify some challenges with respect to educational infrastructure and financing.
- To identify and address challenges learners could face using the Interactive Learning Systems.

1.4 Justification of Objectives

Most Educational Systems in the developed world are shifting to simple, effective and reliable approaches that enhance teaching and learning without compromising content knowledge of facts and principles. ILS seeks to achieve the same objective. The objectives are thus justified to the extent that they:

- Discover the advantages of Interactive Learning Systems over the Textbook and Lecture method of teaching Basic Design in the Senior High Schools. The research proves the overriding importance of ILS for the consideration of educational policymakers in Ghana in the ICT environment today.

- Discover the vital points to consider when producing ILS for SHS students. The study recommends best practices using pictures, illustrations and video footages that best explain the concept for learners to grasp easily.
- In addressing some of the challenges learners faced in using the ILS, the automated systems made interesting with user friendly graphical user interface for teachers, learners and other users.

1.5 Limitation

This Interactive Learning System is considered a prototype of an actual software to be developed and produced. It is not made to be run on a cross platform (Currently it runs on Windows only). It is compatible with Windows Operating Systems such as Vista and Windows 7 only. It is limited in scope as the study is meant for SHS levels only. This is a limitation because the researcher found it very difficult to produce a cross platform ILS for the teaching of the basic design elements in the SHS.

Microsoft Windows platform was used because it has the highest usage rate in Ghanaian Homes and Schools. According to the researcher's survey in fifteen (15) Senior High School Computer Laboratories in the Central Region of Ghana, hundred percent (100%) of the results show that all the Senior High Schools' Computer Laboratories use the Windows Operating System. The Interactive Learning System was designed with Ghanaian Visual Art Students in mind.

Finally, the researcher designed the ILS software with the intention that students should manipulate the software themselves but due to the lack to computers and headphones to aid the lessons, the researcher manipulated the lesson but was done to the pace of students understanding.

1.6 Delimitation

One Senior High School in the Central Region was used. The selection was based on proximity to the researcher. The school is Winneba Senior High School, Winneba.

Variety of software will make this Interactive Learning System possible. These software include Adobe Flash, Adobe Flash Catalyst, Adobe Captivate, Microsoft PowerPoint.

In essence, the Interactive Learning System's scope cover the Elements of Art and Design only.

1.7 Research Methodology

Quantitative research methodology was employed.

1.8 Justification of Research Methodology

The researcher employed quantitative research methods for the study because they were the most appropriate for the study. A descriptive approach was used for treating data collected for the study.

1.8.1 Sampling Techniques and Description

Purposive sampling was adopted for a reason of identification.

- **Purposive Sampling:** this technique of sampling was necessary for this study because it helped the researcher to identify units out of large population who satisfy the characteristics of the matter to be investigated.
- **Stratified Sampling:** was also used with this technique, the entire study was divided into workable components by the researcher to enable him gather sufficient data from each group separately according to the proportion in which the various groups were represented.

1.9 Research Tools/ Instruments

The following instruments were used:

- Interviews (Unstructured)
- Observation (Quasi- Observation)

1.10 Facilities/ Resources Available

- The Internet
- Resource persons knowledgeable in ILS development
- The KNUST Libraries

1.11 Importance of the Study

- The Interactive Learning System (ILS) will make teaching and learning much more interesting and realistic.
- The study will introduce a new approach for teaching and learning Art.
- The study will arouse student's interest in learning by themselves.
- This ILS software will be a guide for art teachers.

1.12 Organisation of the Rest of Text

The thesis is organized in chapters including chapter one tackling various aspects of this research. Chapter two is a review of related literature covering both theoretical and empirical aspects of the research focus. Methodology adopted covers chapter three involving research design, library research, population of the study, sampling, data collection instruments adopted. It also embodies the types of data, administration of instruments, data collection procedures and data analysis plan used by the researcher. Chapter four deals with presentation and discussion of findings from data collected under the study. The research concludes with a summary, conclusions and recommendations to be implemented of all the chapters in chapter five.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews and discusses the relevant literature related to the development of interactive learning systems for teaching the Elements of Basic Design in Senior High Schools. For the purpose of the study, this literature review was organized around the following subheadings:

- The role of Interactive Learning Systems in teaching and learning
- The benefits and risks associated with the use of Interactive Learning Systems
- Real challenges in integrating ICT tools in Art Education
- The roles of teachers and learners in the use of Interactive Learning Systems

2.1 The Role of Interactive Learning Systems in Teaching and Learning

Crook (1996) explores a number of orientations to the technology or frameworks for change that discuss the following:

- Computer as a Tutor
- Computer as a Learner's tool
- Computer as a Resource

2.2 Computer as a Tutor

Considering 'computer as a tutor'; Crook compares this with the transmission model of teaching and alluded to Interactive Learning Systems (ILS) as a better tool to coach students in basic skills, which could assess their performance on items and take them to a

higher level if they were succeeding, or had more reinforcement when needed. Often shortcomings in current educational practice were cited as justification for using technology. Interactive Learning System can be shown to be of benefit when combined with effective teacher input, and students' collaboration.

Crook contends that ICT can change teachers' views of teaching and the learners approach to learning:

Underwood , Cavendish, and Lawson, (1996) reported that teachers saw ILS as a supporting tool for diagnosing weaknesses in pupil's understanding, and that ILS proved to be a tool rather than a substitute for teachers. An understanding of students' learning through the use of appropriate pedagogies is needed to make informed judgments about how best to employ ILS; to help students perform most appropriately. Facts learnt out of context are not helpful. They need to be placed in a range of contexts so that students understand how to make use of their new knowledge.

2.3 Computer as a (Pupil) Learner's Tool

The next framework for change that Crook, 1996 suggests is computer as tool for learning and cites Papert's contribution to thinking in this area. The idea is to regard the computer as a tool which the learner may have to control (p 80). It implies that students should use computers to perform various functions- the computer responds to commands as a pupil with the student as teacher. However, some structures may need to be imposed on learners, to ensure that the meaning of what they are doing is clear. There has to be some purpose and motivation for engaging in the activity. Students need their achievements to be located in broader frameworks of knowledge.

This framework does not make teachers redundant; it merely changes their role in which learners are encouraged to engage in purposeful and creative exploration - one that Papert (1993) describes as 'constructionist'. The goal of a constructionist teacher would be to teach 'in such a way as to produce the most learning for the least teaching' (p.139).

2.4 Computer as a Resource

In Crooks' third framework, he considered the 'computer as a resource' and cites the definition of Taylor and Laurillard (1995) as “open access, self-directed learning from a large information source”. Students in their interaction with the computer are active, and knowledge is discovered and understood. Computers can present information in ways in which teachers are unable to; they can present information in multimedia formats allowing users to select and experience new knowledge in text, graphics, sounds or video; make use of hyperlinks to link concepts together. It allows the learner to make choices about the medium through which they learn and present them with a wide range of ideas hitherto unimaginable.

However, turning these experiences into meaningful knowledge and understanding usually relies on the support of a teacher who has some understanding of the learners' preferred learning styles and can help them make appropriate choices and decisions.

2.5 The Benefits and Risks Associated with the use of Interactive Learning Systems (ILS)

The use of ILS in schools can enable learners to be active in the teaching and learning process, and discover new knowledge. According to the UNESCO Institute for Information Technologies in Education (2006), the use of ICT in schools can enable learners to communicate, participate in lessons, and learn more effectively.

According to Selinger (n.d.):

Computers can present information in ways in which teachers are unable; they can present information in multimedia formats allowing users to select and experience new knowledge in text, graphics, sounds or video; make use of hyperlinks to link concepts together. It allows the learner to make choices about the medium through which they learn and present them with wide range of hitherto unimaginable resources. (p.5)

Some benefits of using ILS are as follows:

2.5.1 Improved Learning

Numerous studies over the years have shown that interactive multimedia learning takes less time, is more enjoyable and increases learning. According to Najjar (1996:30), "learning was higher when information was presented via computer-based multimedia systems than traditional classroom lectures".

Interactive Learning System can benefit both teachers and learners in three areas: teaching and learning, research, and service. The most commonly stated goal of Interactive Learning System is to improve student learning in the following areas:

- i. Improved class attendance and students preparedness
- ii. Clearer comprehension,
- iii. More active participation during class,
- iv. Increased peer or collaborative learning,
- v. Better learning and higher retention,
- vi. Greater student satisfaction.

A second basic goal of all Interactive Learning Systems is to improve teaching effectiveness in at least two ways. With student response systems, immediate feedback is easily available from all students (not just the few extroverts in the class) on the pace, content, interest, and comprehension of discussion. This timely feedback allows the teacher to better judge whether and how to amplify, clarify, or review points as the case may be. In addition, the teacher can also easily collect data on student demographics, attitudes, or behaviors to better assess the group characteristics of student needs.

2.5.2 Active Participation during Class

Birdsall (2002) stated that: “Obtaining feedback and ensuring students participation in large classes are impossible without ILS system. Even in small classes, which can be made highly interactive without technology, this type of system ensures that all the students think through questions, without leaving it to the vocal minority.” (p. 2)

Even in small-enrollment classes, many students are reluctant to respond to questions; the anonymity of responding with an Interactive Learning System guarantees total participation by the entire class.

2.5.3 Peer or Collaborative Learning:

David Lowe as quoted in Birdsall (2002) opined that, “I think the interactive methods are great for getting students started in thinking through the material, as well as getting them talking to each other about the material, which often leads to discussions that continue outside the class. For example, I think these methods increased the number of students who got together in informal study groups.” (p. 3)

According to Mazur (1997): a commonly recommended strategy is to allow students to confer before submitting their answers. Students can be encouraged to defend or explain their answers promoting further student discussion. Judson and Sawada (2001), “opined that, when multimedia is used in teaching, students’ understanding of concepts are advanced and misconceptions are unveiled” (p. 177). Woods and Chiu (2003), also confirmed the fact that “If most of the class answers a question correctly, the students answering incorrectly may be motivated to read or think more deeply about the subject matter.” (p. 2). With ILS every student is equally motivated and engaged purposefully at all times.

2.5.4 Student satisfaction

Students satisfaction and better performance are achieved using ILS. In a review of four decades of literature, Judson and Sawada opined that, “Students perform better when their lessons are taught using multimedia or instructional technology. They attributed such factors as attentiveness and personal understanding to the use of ILS.” (p.167). Judson and Sawada (2002) also conclude: “Polls from the 1960s through the late 1990s found that the use of ILS made students more likely to attend class, pressed them to think more, promoted them to listen more intently, and made them feel instructors know more about them as students.” (p. 177)

2.5.5 Interactivity

Interactivity is mutual action between the learner, the learning system, and the learning material. Numerous studies have established that interactivity has a strong positive effect on learning (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990). For example, Bosco (1986) reviewed 75 learning studies and found that learners learn faster, and have better attitudes toward learning when using interactive multimedia.

2.5.6 Flexibility

Multimedia courseware on CD-ROM can be used to work on the desktop or at a learning centre, at home, while travelling, or to enhance facilitated management development programs. Multimedia courseware can also be used on networks, Intranets or the Internet. These distributed learning approaches allow for even more flexibility which in turn

involves much lower quality images and will preclude the use of video (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.5.7 Modular

Each topic or section can stand alone, so teachers or learners can delve deeply into the topic areas they need to learn, and skip over the ones they do not and come back to them later. In many cases applications include the option to customize the application for specific use where one can choose modules, and even edit the content in some fields (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.5.8 Practicality

ILS is capable of presenting true-to-life situations that learners face every day. As practical learners they learn best when faced with real problems that have real consequences. Decision simulation, video simulations or simple animations allow learners to learn-by-viewing, learn-by-doing or learn-by-coaching. All are effective methods for developing practical skill and increasing information retention (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.5.9 Consistency

All learners learn the same principles and skills. Computer-based courseware typically forces instructional designers to better organize and structure learning materials, and this alone can result in learning advantages (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.5.10 Recapitulation

Learners can turn to the program when they need to, or when they are faced with new or increased responsibilities. This is critical, since research has shown that learning is enhanced and better retained when the topic is relevant to current needs (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.5.11 Engaging

Interactive Learning System with live-action videos, audios and graphics, instant feedback, expert advice, and questions and answers keep learners interested with reinforced skills. Because it is exciting, challenging, and fun to use, it encourages learners to return to the program again and again. Through continuous practice, learning is absorbed and integrated into daily performance (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.5.12 Cost-effectiveness

Multimedia courseware may have higher up-front development costs, but overall studies have shown that it is less expensive and more effective than traditional classroom learning cost. The loss of productivity caused by sending learners away on field trips and other expenses are saved. The ability to practice new concepts in a risk-free environment improves learners' skills and ability. When using a built in course management system like the ILS which collects and analyses learner delivery and performance data substantial administrative time savings result (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.6 Challenges in Integrating ICT tools in Education

Although valuable lessons may be drawn from best practices around the world there are considerable challenges involved in integrating ICT tools in education. There is no single full proof formula for determining the optimal level of ICT integration in the educational system. Significant challenges confront policymakers education planners, educators, education administrators, and other stakeholders. They have to consider which educational policy and planning, best infrastructure, financing and capacity building that will suit each situation (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.7 Challenges with Respect to Infrastructure and Financing:

2.7.1 ICT Infrastructural Challenges

A country's educational technology infrastructure depends on the national telecommunications and information infrastructure. The following are critical factors that hinder the integration of any ICT-based programme, which policymakers and planners must carefully consider.

- ✓ The lack of adequate computers and laboratories in our schools could hinder the use of ILS on a large scale. Without the computers and appropriate facilities, interactive learning systems cannot be deployed in some schools and colleges. Therefore stakeholders in education must make it a point to provide such facilities if ILSs are to be used in teaching and learning.
- ✓ Another basic requirement is the availability of electricity and telephony. In developing countries like Ghana, large areas are still without reliable supply of

electricity and the nearest telephones are several miles away. The unavailability of electricity and telephony in some parts of Ghana makes its very challenging to introduce ICT tools into educational institutions. This in turn, makes it impossible to use Interactive Learning Systems in such environments.

✓ The cost of Internet service is another challenge confronting the use of Interactive Learning Systems in Ghanaian schools and colleges. Educational institutions are unable to pay for internet services, which makes them reluctant in deploying ICT tools (which require the internet to run) in their schools (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.7.2 Financial Challenges

One of the greatest challenges in ICT use in education is balancing educational goals with economic realities. ICTs in educational programmes require large capital investments and developing countries (like Ghana) need to be prudent in making decisions about what models of ICT use should be introduced and also be conscious of maintaining economies of scale. Educational administrators and other stakeholders lack the courage to invest in the development and integration of ICT (including ILS) into educational institutions, because of cost implications ultimately it becomes an issue of whether the value added by ICT use in schools could offset the cost of its integration, relative to the cost of other alternatives (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.7.3 Challenges with Respect to Capacity-building:

Various competencies must be developed throughout the educational system for ICT integration to be successful. Such competencies include of the following: Key factors:

2.7.4 Teachers' Capacity

Teacher professional development should cover the following:

- ✓ Skills for specific applications and tasks:
- ✓ Integration into existing curricula:
- ✓ Curricular changes related to the use of IT (including changes in instructional design);
- ✓ Changes in teacher roles
- ✓ Updates on underpinning educational theories.

Ideally, these should be addressed in pre-service teacher training and built on and enhanced at in-service trainings. In some countries, like Singapore, Malaysia, and the United Kingdom, teaching accreditation requirements include training in ICT use. ICTs are swiftly evolving technologies, however, most ICT competent teachers need to continuously upgrade their skills to keep abreast with the latest developments and best practices.

While the first focus skill with particular applications is self-evident, the four other foci are of equal regard, if not of ultimately greater importance. Research on the use of ICTs in different educational settings identifies the inability of teachers to

understand why they should use ICTs and how exactly they can use ICTs to help them teach better as a barrier to success. Unfortunately, most teacher professional development in ICTs is heavy on “teaching the tools” rather than “using the tools to teach.”

Teacher anxiety or phobia is another challenge for the integration of ICT in education. They worry over being replaced by technology or losing their authority in the classroom as the learning process becomes more learner-centered, an acknowledged barrier to ICT adoption which can be alleviated only if teachers have keen interest understanding and appreciation of the changing ICT environment (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.7.5 Education Administrators

Educational Administrators role in ICT integration in education is very critical. Most teacher or student ICT projects have been undermined by lack of support from above. For ICT integration programmes to be effective and sustainable, administrators themselves must be interested in the use of the technology. They must also have a functional understanding of the aspects technical, curricular, administrative, financial, and social dimensions of ICT use in education to make it successful (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.7.6 Technical Support Specialists

Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in the schools.

While the technical support requirements of an institution depend ultimately on what and how technology is deployed and used, general competencies that are required would be in the installation, operation, and maintenance of technical equipment (including software), network administration and network security. Without on-site technical support, much time and money may be lost due to technical breakdowns.

In the Philippines, for example, one of the major obstacles to optimizing computer use in high schools has been the lack of timely technical support. In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the immediate vicinity and so the computers have to be sent to the nearest city hundreds of kilometers away (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.7.7 Content Developers

Content development is a critical area that is too often overlooked. The bulk of existing ICT-based educational material is in English. To be of relevance to education in developing countries (especially at the basic and senior high school levels) content development should also be subject based. There is a need to develop original educational content based on subjects taught (e.g. radio programmes, interactive multimedia learning materials on CD-ROM or DVD, Web-based courses, etc.) It should be possible to adapt existing content, and convert print-based content to digital media.

These are tasks for which content development specialists such as instructional designers, scriptwriters, audio and video production specialists, programmers, multimedia course authors, and web-developers need to collaborate. Like technical support specialists, content developers are highly-skilled professionals and are not readily available (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.8 The Roles of Teachers and Learners in the use of Interactive Learning Systems

2.8.1 Role of the Teacher in ILS Environments

McFarlane (1997), states that “research supports the view that teachers play a key role in ILS”. Their role in making the systems effective is crucial. Teacher support in the classroom is essential for effective learning because not all students are capable of grasping curriculum content at the same rate. Some students enjoy more success in assimilating curriculum content and favourable teacher and peer interaction than other students.

Lewis and Doorlag (2003) emphasised the teacher’s support in organising the curriculum, grouping students and setting up delivery systems for students’ performance as well as their achievements. In support of this, Udvar-Solner (1992) cited by the National Information Centre for Children and Youth with Disabilities (NICHCY), talked about adaptation of the curriculum as teachers support. This means that, the teacher is expected to adjust the curriculum by breaking down the content to the level of the students taking into consideration their individual differences.

Often in the ICT age students know more about computers than their teachers. Students thus pursued areas of interest to levels at which they become more knowledgeable and versatile than their teachers. Therefore the idea that teachers are fountains of knowledge and students are empty vessels waiting to be filled with the knowledge and wisdom of their teachers is untenable in the information age. The amount of knowledge available and the breadth and depth of it are far beyond the realms of only teachers. Their control of learners' access to knowledge is diminishing. The teacher's role within an ICT environment must necessarily change to help students learn in the best way they can by recognising different learners' needs and capabilities approach and guide students into making choices about how and where they could access new knowledge. The role of the teacher is therefore important in the learning process. The use of ILS affects teachers' views of the learning process, changing the teacher's role from whole class to individuals or pairs facilitator.

Teachers need to be more adaptable; more open to alternative teaching approaches, and the use of peer teaching. Access to and availability of information has expanded overwhelmingly since the inception of ILSs. Information on the Internet vastly exceed the amount of information available to students through school libraries and access to it is difficult to control. Teachers must therefore help their students to pick their way through resources in the ILS, to use the materials wisely or profitably.

Access to information in libraries has always been stressed to students from early times (study skills), especially at senior high school level so that they could read around and

beyond their subjects, or for in-depth study. With the advent of ILS and communication technologies, students cannot only read around their subject, but also be exposed to simulations, videos, graphics, images and audio notes. Teacher control of new knowledge is weakened yet their role does not diminish; it changes to one of supporting learners to assimilate new information, process it into knowledge and understanding within a nurturing and supportive environment.

When designing any learning experience teachers will need to consider what it is they wish to achieve and then consider the most appropriate approaches to achieving their goals for the learners in question. Whether the technology chosen is face-to-face lessons, print-based distance learning or Web-based activities what is important is that they design the experience to make appropriate use of the characteristics of the chosen technology. The teacher's role is to help students learn to make links between new knowledge and existing knowledge if new knowledge is to be of any value (Skemp, 1976).

2.8.2 Role of the Learner in ILS Environments

According to Weimer (2002), the teacher should not do anything for the students that the students can do for themselves. This implies that learners must play their roles in all learning activities. Felder & Silverman (1988) contend that Learners have a variety of preferences for how they learn new material. In order for learners to meet their individual learning needs, they must play their roles in the learning process.

The role of the learner in the ILS environment consists of a combination of skills and competences outlined below; the role is structured, dynamic combination of five competences:

- Operational
- Cognitive
- Collaborative
- Self-directing and
- Course-specific.

According to Badia & Monereo (2005), the concept of the role of the online learner implies that knowledge building is not enough, and that competences in relation to reasonable expertise in the use of ICT, to effectively manage information and resources, communicate and collaborate skills, manage time and self-regulate learning, and to strategically use knowledge and information, are as important as knowledge itself. Competences in the role are understood as invisible traits which are manifested in performing a task efficiently. These tasks can vary in complexity, and the student is competent in a way that he or she uses a selection of strategies and skills, together with all that the student is and knows. These are the competences that make up and facilitate the role of the learner in the Interactive Learning System environment (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.8.3 Operational Competence

The efficient use of Interactive Learning Systems as tools for learning, communicating, collaborating and self-direction is a critical role of learners. It should be noted though that proficient use of these tools does not automatically result in a higher level of overall performance as an ILS user in basic design. Learners must have adequate expertise in the use of ICT tools for communication and collaboration. They must also be able to use ILSs for information search, retrieval, analysis and dissemination. The general knowledge of how to use tools and facilities for navigation throughout the ILS environment cannot be overemphasized (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.8.4 Cognitive Competence

Learners must be able to learn from course content, applying own knowledge, and ask for help only when necessary. Learners should know how to access and go about course materials to get the most out of them. Learners must learn in a reflective way through critical thinking, where knowledge is applied to solve problems (Bosco, 1986, Fletcher, 1989, 1990, Stanfford, 1990).

2.8.5 Collaborative Competence

Communication and collaboration with classmates and teachers in ILS environments is one of the roles of the learner. Learners must be willing to communicate, and to express their ideas, opinions and feelings. They should also be capable of engaging classmates in learning or in group work, participate in class discussions and class activities, be prepared

to seek feedback and learn from it, and give feedback in order to learn (Bosco, 1986, Fletcher, 1989, 1990, Stanford, 1990).

2.8.6 Course-specific Competences

The efficient assimilation or use of terminologies and processes or know-how specific to the subject area or field of knowledge in an ILS is very critical. These could include the use of language and basic design terminologies with classmates and teacher, reading classmates' contributions to class discussions and class activities, and taking note of new or interesting expressions and vocabulary used by the teacher or classmates. It also includes participating with ideas, opinions and experiences in class discussions, going beyond being a mere reader.

Students must be connected to the learning community. Research suggests that to have meaningful learning the members of the community have to be socially connected and feel confident about the learning environment and trusting of other learners before achieving any cognitive gain (Conrad, 2005; Maor, 2003; Rovai, 2002).

According to Brown (2001), when students perceive a close connection to an online learning community, they often place a higher priority on learning and spend more time devoted to it. This in return may result in more productive learning communities, which are essential for successful learning (Palloff & Pratt, 1999; Squire & Johnson, 2000; Wenger, 1998).

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter discusses the structures provided in the literature review in relation to how scholars expressed their views theoretically. It gives further information on the processes of collecting data necessary for the study, including the research design and library resources (primary and secondary source of data). The population for the study, sampling design, data collection instruments, and data collection procedure were presented. The tools and materials used in the design of the ILS are also described. The chapter chronologically dealt with the description of the project including preliminary designs and layouts of the basic design ILS and its experimentation.

3.2 Research Design

There are a variety of methods taken into consideration when dealing with educational research. For the purpose of this study, it was expedient to employ the qualitative research method because it provided the researcher with a systematic approach in unfolding the actual facts to determine how suitable it is to teach the Elements of Basic Design using an Interactive Learning System (ILS).

Qualitative research answers questions about the complex nature of phenomena, often with the purpose of describing and understanding the phenomena from the participant's point of view (Leedy and Ormrod, 2005).

The researcher employed experimental and descriptive methods respectively under qualitative research for the study. Wallen and McGraw (1994), opined that ‘in experimental research, different treatments are established and their effects are studied. The outcome led to clear-cut interpretations and appropriate intervention. The general procedure is that one or more independent variables are manipulated to determine their effect on a dependent variable’. By the end of these manipulations, new initiative will be revealed.

Descriptive research on the other hand, describes data and characteristics about the population or phenomenon being studied. Descriptive research therefore answers the questions who, what, where, when and how (Wallen and McGraw, 1994).

The idea of selecting descriptive research method was that, the procedures employed for carrying out the experiment needed to be described chronologically to produce a very clear and detailed account of all the occurrences and conditions pertaining to the experiment. The researcher therefore recorded, described, analysed and interpreted the findings, drew conclusions and came up with recommendations.

3.3 Library Research

Library research is the basis by which a researcher develops the writing of a scholarly thesis. It provides the majority of the secondary data needed and the internet search engines.

Below are the libraries visited to acquire the secondary data essential to the research.

- KNUST Libraries
- University of Education Library, Winneba.
- The Internet

3.4 Population and Sampling Design for the Study

According to Wallen and McGraw (1994), population is the group of interest to the researcher, the group to whom the researcher would like to generalise the results of the study. Leedy and Ormrod (2005), also stated that qualitative researchers draw their data from many sources, not only from a variety of people, but perhaps also from objects, textual materials, audio-visual and electronic records. In this case it is not only people that are considered as the population but other materials as well.

Sample on the other hand is a part drawn from a larger whole. Almost always a sample is taken in order to learn something about the aggregate (the population) from which it is drawn. Leedy and Ormrod (2005), also have the view that, the particular entities a researcher selects is what is termed the sample, whereas the process of the selection is the sampling. Leedy and Ormrod (2005) continue to explain that, in purposive sampling, people or other units are chosen, as the name implies, for a particular purpose. The researcher therefore relied on purposive sampling technique to conduct the study. In the light of the above, the researcher identified the following as the population relevant to the study.

3.4.1 Accessible Population

First year Visual Art students of Winneba Senior High School, Winneba, out of which Form 1A (34 students) and 1B (36 students) were used as respondents.

3.5 Data Collection Instruments

In this study, quasi-participant observation and Interview were the main instruments employed to collect data. This approach was employed because in conducting a qualitative research a researcher uses either a single instrument or a triangulation means of collecting data in most cases. Leedy and Ormrod (2005) are of the view that researchers normally make use of multiple forms of data in any single study through observation, interview, written literature, audio-visual materials, electronic documents (e-mail, websites).

The researcher acted mainly as a passive observer due to the fact that the ILS needs a Learner Based Environment for the study, hence the teacher has minimal role to play in the learning environment.

3.6 Types of Data

3.6.1 Sources of Primary Data

Data was gathered from the activities performed during the cause of the experiment to identify:

- ✓ The role Interactive Learning Systems (ILS) would play in the teaching and learning of the Elements of Basic Design.

- ✓ The advantages and disadvantages of an Interactive Learning Systems against the traditional Textbook and Lecture Method of teaching in our High Schools in Ghana.
- ✓ The roles of both Teachers and Learners in the Interactive Learning Environment relating to Basic Design at SHS.

These processes were necessitated as a result of some critical observations made by the researcher as an Art teacher.

3.6.2 Sources of Secondary Data

Books, articles and compact disc that were essential in the execution of this work from various libraries and sources from the cyberspace served as the source of Secondary data for the study. The data collected were assembled, synthesized and critically analyzed with charts, figures and plates.

3.7 Administration of the Instruments

The first instrument used in this study was quasi – observation as a data gathering method. The researcher observed critically the way students were using the Interactive Learning System in their basic Graphic Design Lessons (Elements of Basic Design).

Secondly, students were interviewed about the lessons they had studied, using the Interactive Learning System. The students shared their views with the researcher about how interesting and involving the lessons were.

3.8 Data Collection Procedures

Primary data collection for this study focused mainly on designing an Interactive Learning System in reference to the topic Elements and Principles of Design in the Graphic Design syllabus and updating this work on a compact disc for use in learning Visual Art in our Senior High Schools. The researcher was the key instrument of data collection by means of personal interviews, field notes, 'conversations', and observing students use the ILS to gather data.

3.9 Step-by-step procedure of the ILS Development

According to Johnson (2000), these are the elements to consider when designing an interface for ILS.

- i. Background Colour
- ii. Buttons (control buttons and metaphor visual buttons)
- iii. Images
- iv. Text (body text, headlines, section heads, etc)
- v. Video (if included in the project)
- vi. Sound
- vii. Animation (including Video)
- viii. The dimensions of the screen or window

3.9.1 Background Colour

Colour is considered one of the most significant design tools for communicating to an audience. On a biological level, colours appeal to our survival instincts. The researcher as an interface designer has a greater challenge to harness the power of colour not only to enhance the work's visual appeal, but also to make interfaces easier for our audience to use.

For this reason choosing colour for academic purpose was done with maximum care. Very simple tones of black, blue, green and brown were used for the background because of their ability to attract and enhance readability. Figure 1 shows the colours used for the background design. These are tones of black, blue, green and brown.



Fig.1: Colours used for the background design

3.9.2 Buttons

Buttons are keys designed to making navigations possible from one slide to the other. These buttons also create interactivity between still - designed works. They must also be

placed where audience or learners can clearly see. In making the buttons to be seen easily and clearly, the researcher used the colours blue, red and white for the in-texts.

Additionally, the researcher used the hand- cursor symbol to prompt learners. When the hand-cursor is seen, it simply means it can be clicked for an action to follow, depending on the task assigned to that button. Figure 2 displays the various buttons used to design the ILS.



Fig.2:Buttons used for the ILS Design

3.9.3 Images

At the Senior High School level, Images created to be used for any academic purpose must be clear and straightforward to be understood by learners. If for some reason that

image would serve another purpose for which reason it is placed there, it must be explained. They must also be in Joint Photographic Experts Group (JPEG) formats, the reason being that, Joint Photographic Expert Groups (JPEG) are very light in size compared to other picture formats. The figure 3 below shows examples of images used for the ILS.

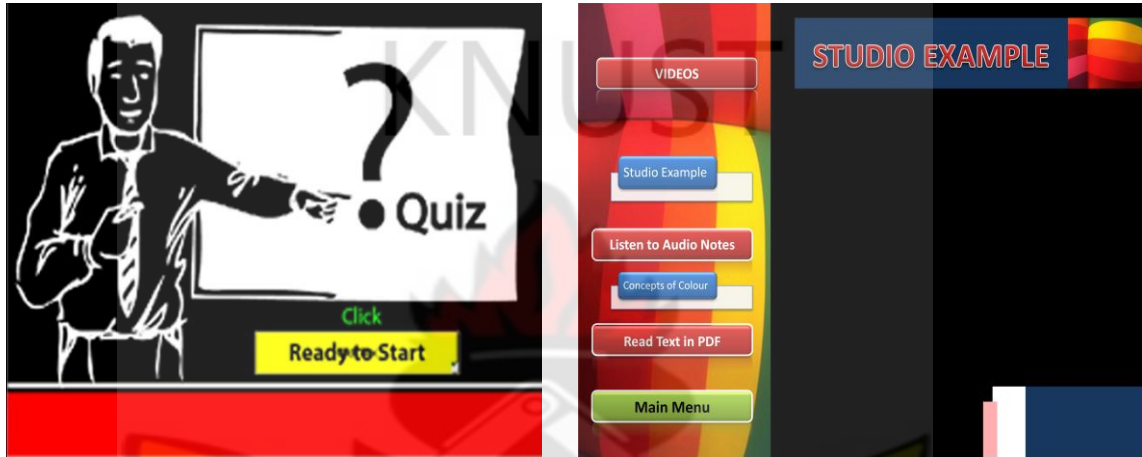


Fig.3: Example of Images used for the ILS

3.9.4 Text (body text, headlines, section heads)

For the purpose of this study limited and very simple common text types were used in designing this Interactive Learning System. Two font types were used; Calibri (Body) and Times New Roman.

Calibri: is a 'san-serif' font mainly used for the designing of the project because it is very easy to read both from far and near. An example of the type of font used mainly for this project is provided below.

The Quick Brown Fox Jumps Over
The Lazy Dog.

Times New Roman: to break the monotony of using **Calibri** (Body) throughout, the Times New Roman was also employed to bring some variety in the presentation of textual materials in the project work. This font was mainly used for the buttons only. An example of the type of font used mainly for this project is provided below.

The Quick Brown Fox Jumps Over The Lazy Dog.

3.9.5 Videos and Animations

The videos and animations used in this project are clear, simple and devoid of flashy colours and effects to make the learner undisrupted. Animation was employed in certain parts of the project (text especially) to bring some dynamism and life into the stillness in the objects in the project.

3.9.6 Sound

The sound produced for this project is an MP3 format. The recording was done in a studio by two students. The MP3 format was chosen because of its light-weight and ability to be loaded faster when launched in a media player. Additionally, MP3s can be played with a vast range of media players.

3.9.7 The Dimensions of the Screen or Windows

This learning system was designed taking into consideration the fact that some learners and audience will use different platforms (Apple Macintosh and Windows) in accessing

the ILS. For that reason, texts were made very eligible and the videos also clear and simple to view in both Mac and Windows platforms.

3.9.8 Storyboard

A storyboard is a simple graphical way to get clear, creative intensions of a software developer by the way slides are developed and their interactivity. It gives the layman a rough idea of presentation of the final work to be produced visually in a quick manner. Storyboards in their initial phases can be nothing more than scribbles or sketches.

From the storyboard stage, ideas are developed more and more into details until the work is developed into a presentable work piece that everybody interested can understand. The figure 4 below shows an example of a storyboard.

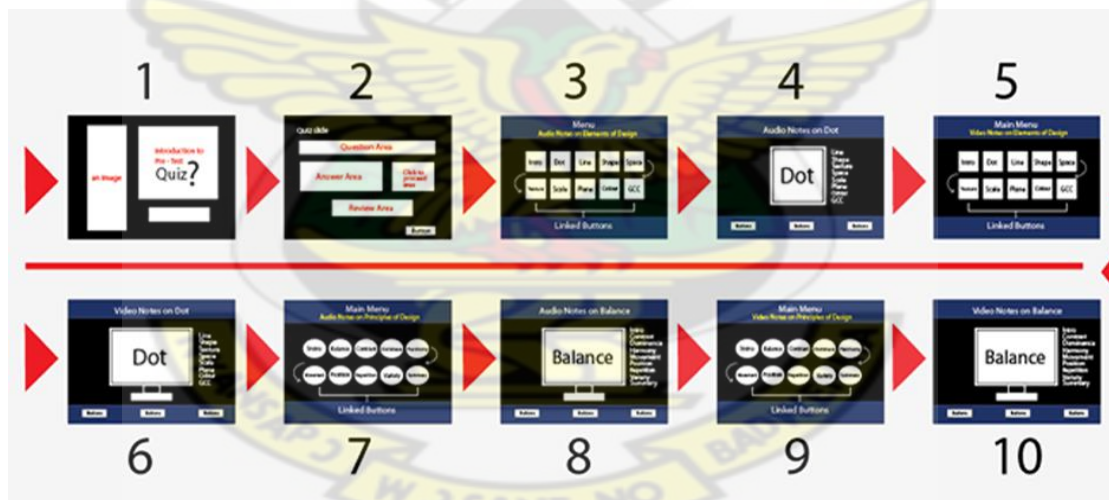


Fig.4: The Storyboard

3.9.9 Grid System

The research was done through the following stages;

- A Grid System that sets rules for all the media elements was developed.
- All the elements (images, type, video, etc.) were made to adhere to the grid system.
- All elements were aligned to the same location from page to page and section to section, to enhance the interactivity of the ILS.
- Key parts of each element was aligned to the gridline (top, left, right, bottom, and center)

3.9.10 Design, Look and Feel, and Style Consistency

- A visual look-and-feel (style) for the project was developed and kept it consistent.
- Styles were introduced using basic colours, images, shapes, text type, and page layout.
- Layout screens: There were control buttons on each screen. The buttons were close to each other to avoid learners being frustrated by moving their eyes all around the slide to find the new location of buttons and other controls.

3.9.11 Colour

Colour can be a great design element but can be overwhelming at times. In print, the addition of colours cost more. On a computer screen, there is no extra cost, only the possibility of a larger file size. The researcher thus:

- Developed a colour scheme for the entire project.

- Used the same colours for logically related and like items.
- Used different colours to differentiate between sections.
- Chose colours to enhance the texts readability.
- Chose colours for text and background which had contrast of value.

3.9.12 Hierarchy:

Additionally, the study was designed such that the lessons would be clear and logically sequenced in the presentation and navigations;

- Lessons were arranged according to their hierarchical presentation in the syllabus. The Elements of Design would precede the Principles to make the lessons understandable to learners.
- Both video and audio lessons were based on learning presented to learners hierarchically to bring out the differences in the Elements of Basic Design.

3.9.13 Font Size

- Font sizes varied based on the monitor resolution settings of the learner's computer.
- Some audiences require larger font size (kids, aged).
- Some applications require larger font size (dim lighting, quick interaction).
- If the font size is increased, check the line length, character count to make sure it is still an appropriate amount for the audience.

3.9.14 Contrast, Flow and Motion

About tracking the viewer's eye, the following questions were considered before designing the ILS.

- Where does the eye go first on the page?
- Where does it move to second?
- Does the eye go to the center of the page?
- Does the eye go to the area with the most contrast?
- Squint and see which area has the most contrast on the page.
- Does the eye scan the page left to right, top to bottom and right to left?

3.10 Types of Software used in Producing the ILS.

Software, IT tools, materials and equipment play integral role in the type of production under consideration. It is therefore important to describe each of the software used for the purpose of this study. There are several software that can be used to design an Interactive Learning System but in the case of Basic Design Element. Adobe Captivate, Photoshop, Illustrator and Microsoft PowerPoint were used.

3.10.1 Brief Description of these Software

Adobe Captivate: This software is an interactive learning software which is basically used to design interactive learning materials for both academic and industrial purposes. As part of its features, there is a question pool which allows a designer to quiz and test the audiences before and after a learning exercise. Captivate has the capacity to grade the learner into percentage for the sake of evaluation.

Captivate is also used for many on-line learning and quizzing these days because of its user friendliness. Figure 5 displays the Graphical User Interface of Adobe Captivate 5.

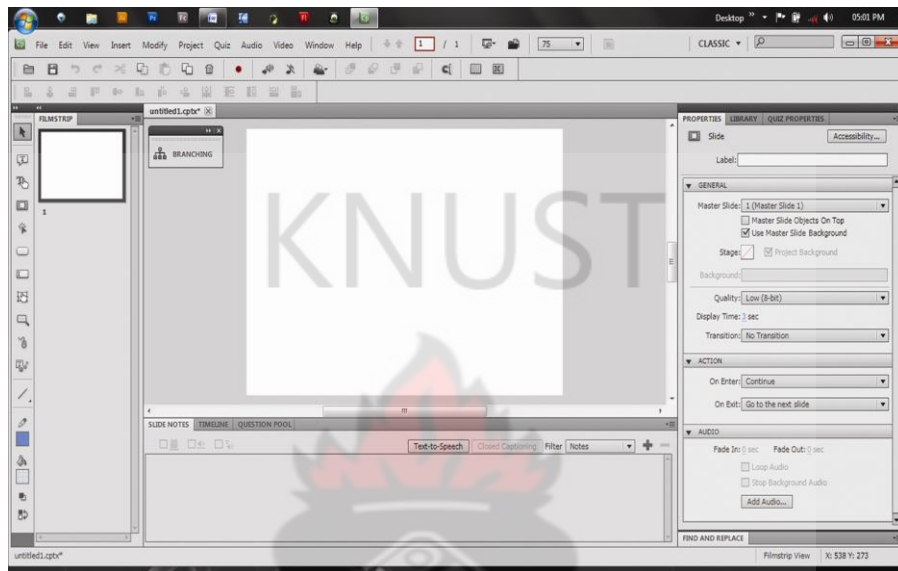


Fig.5: Adobe Captivate Interface

Adobe Illustrator: It is primarily a vector based graphic manipulation software. A vector graphics editor is a computer programme that allows users to compose and edit vector graphics images interactively on a computer and save them in one of many popular vector graphics formats, such as Ai, EPS, PDF, WMF, SVG, or VML.

It is used to create images that are small in file size, but can be resized to any dimension while still maintaining print quality. Some common uses for Illustrator are for logos, illustrations, layouts designs, advertisements, billboards, signage, brochures, business cards, web design, and many others. Illustrator can be used for just about anything outside of photographic images. Figure 6 shows the Graphical User Interface of Adobe Illustrator CS5.

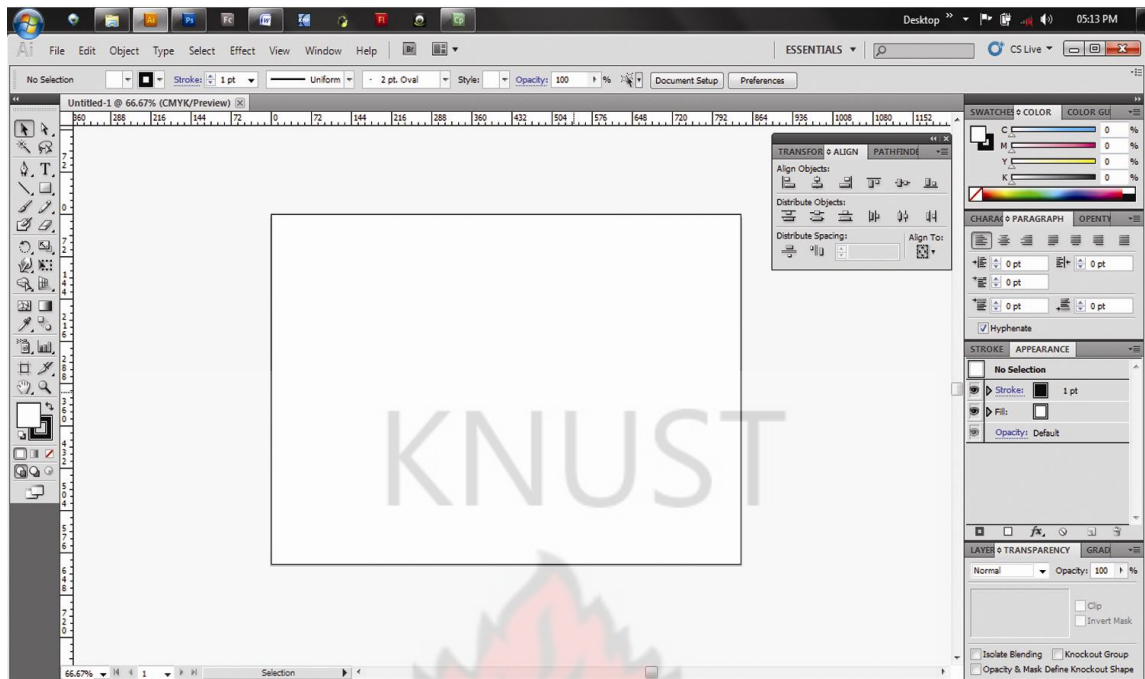


Fig.6: Adobe Illustrator Interface

Adobe Photoshop: This is a software that creates graphics as bit map-images stored as a collection of pixels (dots) rather than as discrete lines, curves, and other such shapes.

Adobe Photoshop can also be used for more than just painting or photo editing and design. Photoshop a wide range of tools available to painters, illustrators, and plain doodlers. Its tools give the users the freedom to express themselves and create interesting picture. Figure 7 shows the Graphical User Interface of Adobe Photoshop CS5.

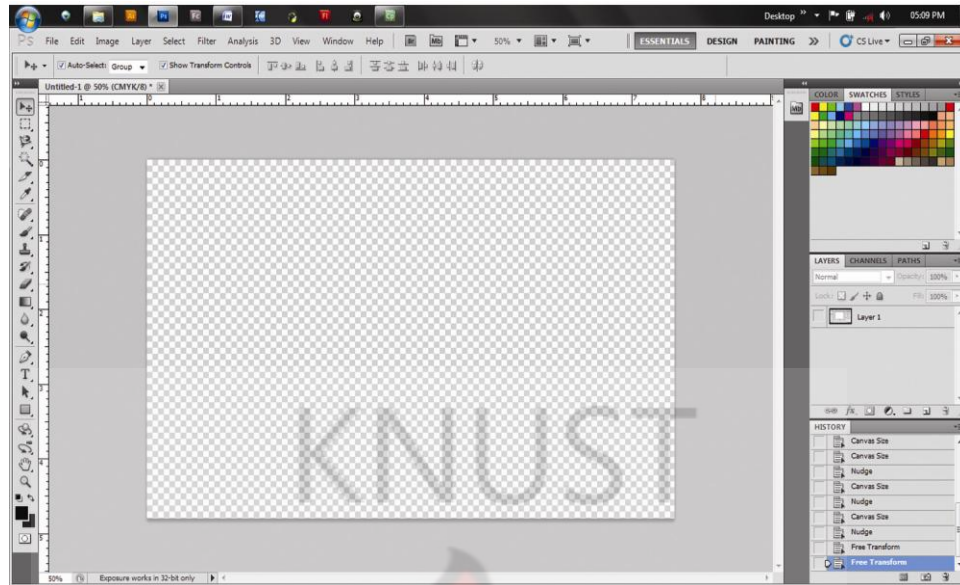


Fig.7: Adobe Photoshop Interface

Microsoft PowerPoint:

PowerPoint is a complete presentation graphics package. It gives everything one needs to produce a professional-looking presentation. PowerPoint offers word processing, outlining, drawing, graphing, and presentation management tools all designed to be easy to use and learn. Below is the Microsoft PowerPoint Interface. Figure 8 shows the Graphical User Interface of Microsoft PowerPoint 2007.

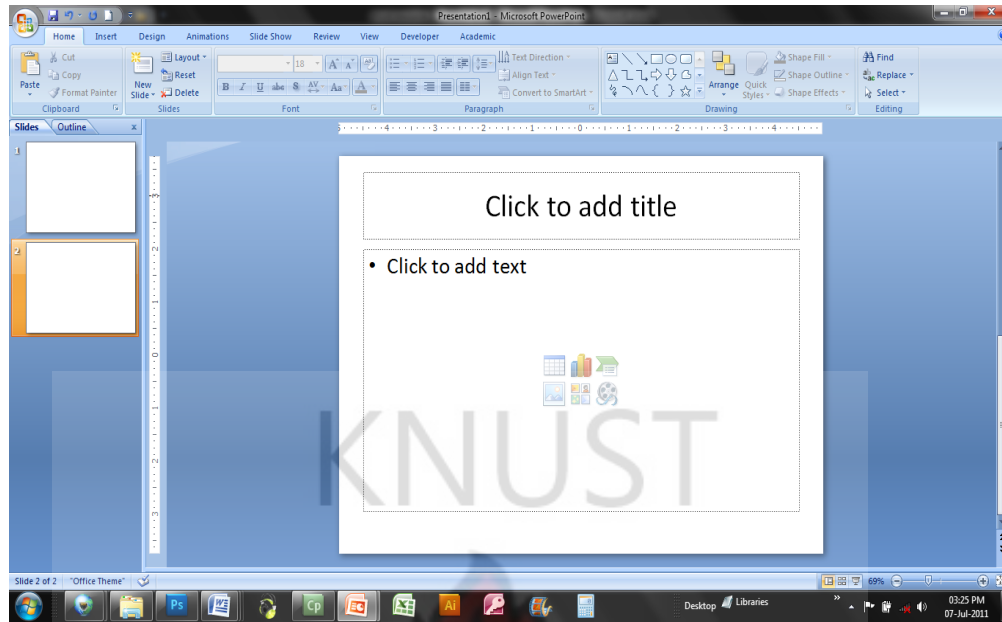


Fig.8: Microsoft PowerPoint Interface

3.11 Design and Production Stages

To create the design successfully, designed samples of the Interactive Learning System interfaces were selected from cyberspace and studied critically to make them workable; they were modified to suit the tasks.

Another important thing to bear in mind when designing such interfaces were their easy navigation. The production of the ILS was started by making preliminary or thumbnail sketches. The appropriate ones were chosen and with the aid of software such as Adobe Illustrator, Photoshop, Captivate and Microsoft PowerPoint which were mentioned and explained earlier, the designs were executed as intended.

3.12 Template Development

Figures 9, 10, 11 and 12 are examples of templates created before the original execution of the work. Figures 9, 10 and 11 was executed using the Adobe Flash software, while figure 12 was executed using Microsoft Office PowerPoint 2007.

Brief Description of Templates

Figures 9, 10 and 11: are templates designs with Adobe Captivate. **Adobe Captivate** is an electronic learning tool for Microsoft Windows, and can be used to author software demonstrations, software simulations, branched scenarios, and randomized quizzes in shockwave format, (.swf). It can also convert Adobe Captivate generated .swf to an Audio-Video Interleaved format, (.avi), which can be uploaded to video hosting websites. It can also be used for screen casts, podcasts, and the conversion of Microsoft PowerPoint presentations to the Adobe Flash format.

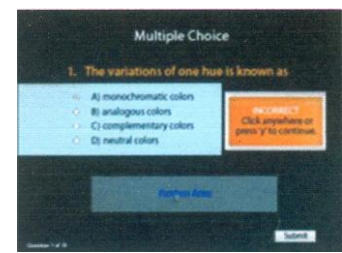
Figure 12: is a templates design with Microsoft PowerPoint. **Microsoft PowerPoint**, usually just called **PowerPoint**, is a proprietary commercial presentation program developed by Microsoft Corporation. It is part of the Microsoft Office suite, and runs on Microsoft Windows and Apple's Mac OS X operating system.



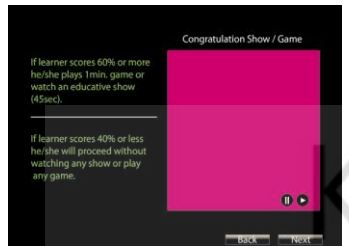
Index Page



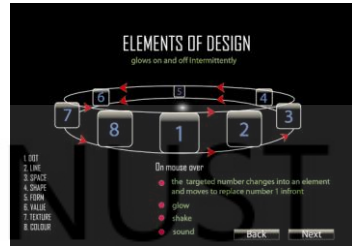
Introductory Page



Pre - Test Page



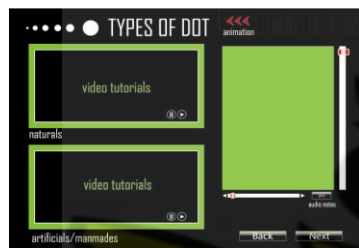
Pre-Test Result Page



Menu



Lesson Page 1



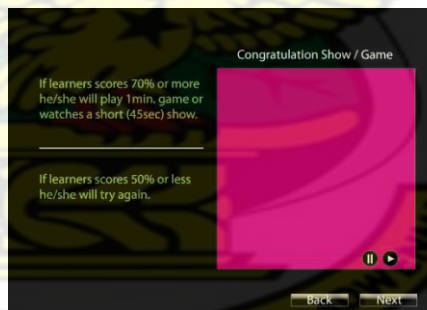
Lesson Page 2



Activity Page



Post Test 1



Quiz 1 Result Page

Fig.9: The First set of Template Designed by the Researcher.



Index Page



Introductory Page



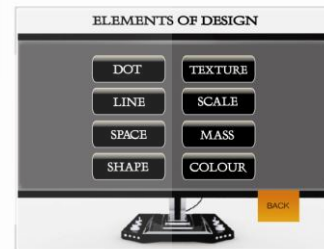
Pre - Test Page



Pre-Test Result Page



Main Menu



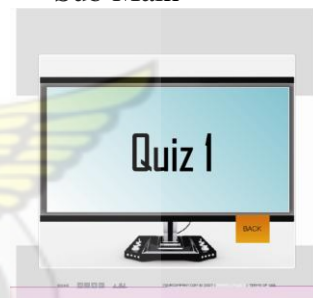
Sub Main



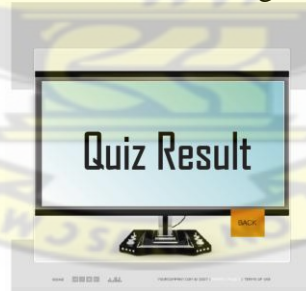
Audio Lesson Page



Video Lesson Page



Post Test 1

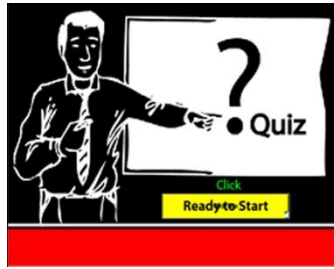


Quiz 1 Result Page

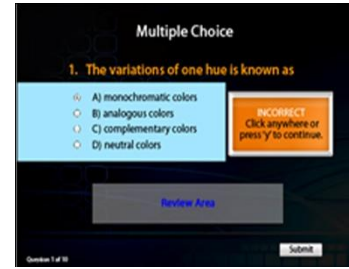
Fig.10: The Second set of Template Designed by the Researcher.



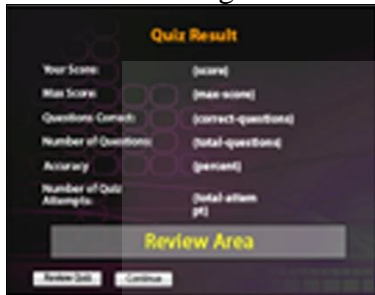
Index Page



Intro to Pre-Test Page



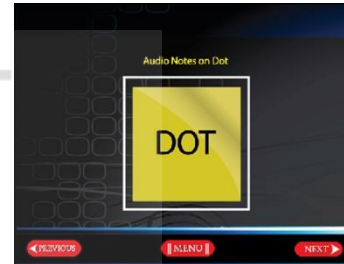
Pre - Test Page



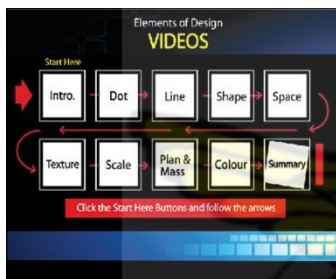
Pre-Test Result Page



Menu, Elements of Design



Audio Notes Page



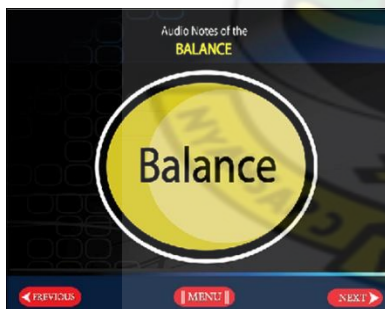
Menu, Elements of Design



Video Notes Page



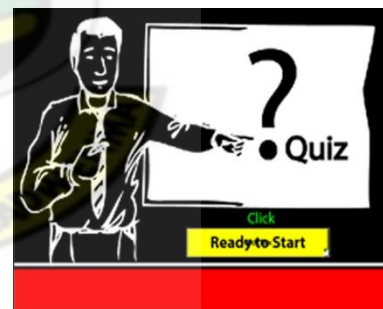
Menu, Principles of Design



Audio Notes Page



Menu, Elements of Design

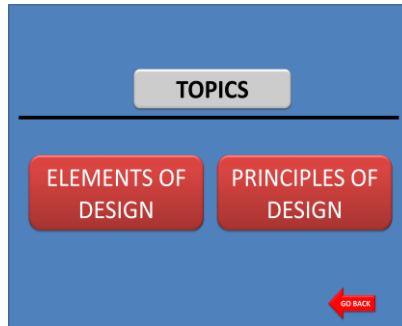


Intro to Post -Test

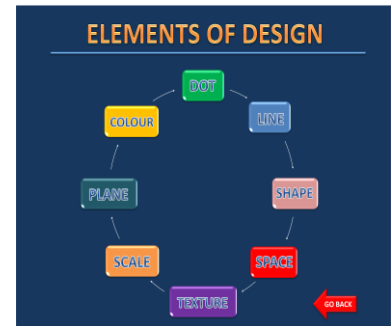
Fig.11: The Third set of Template Designed by the Researcher.



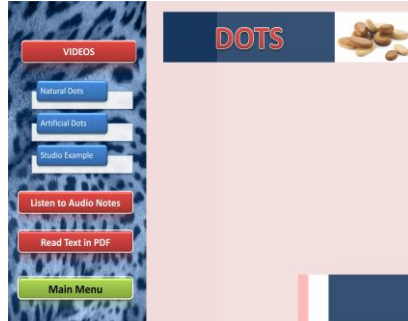
Introduction Page



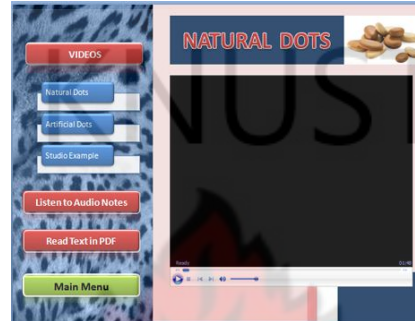
Title Page



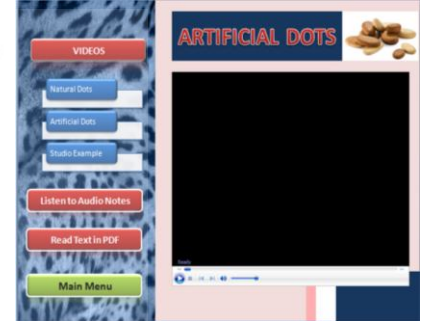
Main Menu



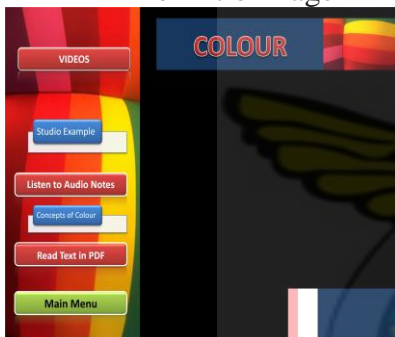
Definition Page



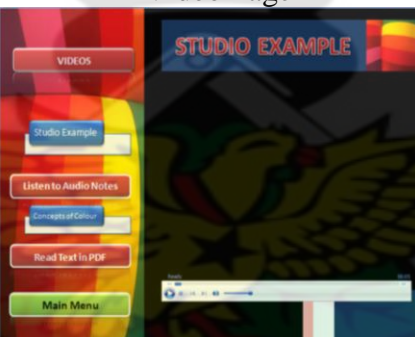
Video Page



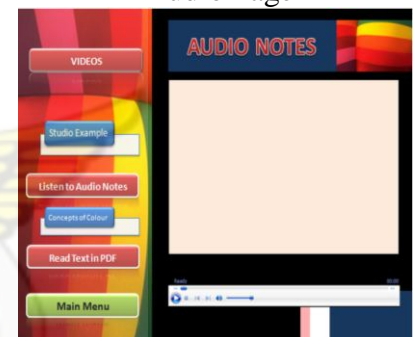
Audio Page



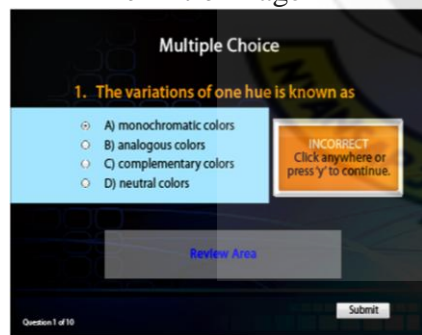
Definition Page



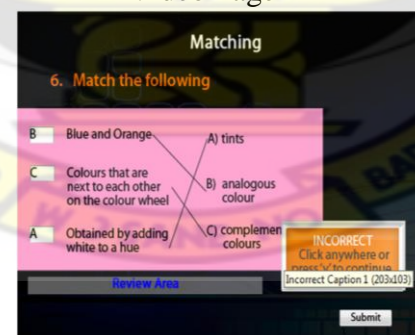
Video Page



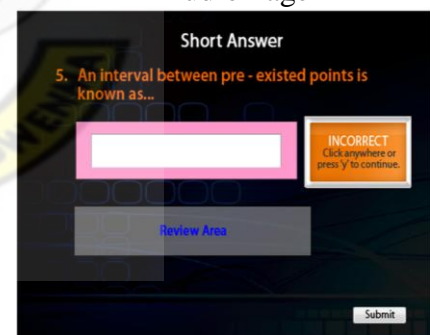
Audio Page



Multiple Choice Page



Matching Page



Short Answer Page

Fig.12: The Final, Preferred set of Template Design used by the Researcher.

3.13 Interactive compact disc design and authoring

A visual sketch of the ILS (Graphical User Interface) was made; by outlining the menu page, the linking pages, and navigating through the pages. This stage of the design was a major concern; this programme may be daunting if the navigation is not done correctly throughout the entire pages to enable the users find their way clearly to and fro.

Secondly, the basic reason for choosing to publish an interactive learning system on a compact disc rather than creating a website was to make the resource easy to control in its delivery and more accessible to students. Some of whom may have inadequate computer skill for effective use of the compact disc, others might lack good internet connectivity to download and install flash and multimedia players.

The software on the compact disc can be copied or downloaded onto a personal computer. When the software is downloaded onto computers in the laboratory, in the case of visual art students, there will not be the need for students to run a live CD. One compact disc can serve an entire class notwithstanding the number of students or the number of computers available.

3.14 Problem Definition and Clarification

The need to thoroughly plan before any programme cannot be overemphasized. In the case of this project, the first and major hurdle was to embed a SWF file into the PowerPoint project. This SWF file was a question pool designed and published in Adobe

Captivate and imported into Microsoft PowerPoint. The SWF file could not be embedded due to PowerPoint's set parameters which make it not to accept any SWF.

The possible way was to make the SWF file pay externally and backed by Visual Basics coding to make the Pre-Test interface work properly. Additionally, learners will see the interface in Fig. 13 when they click Start Pre-Test.

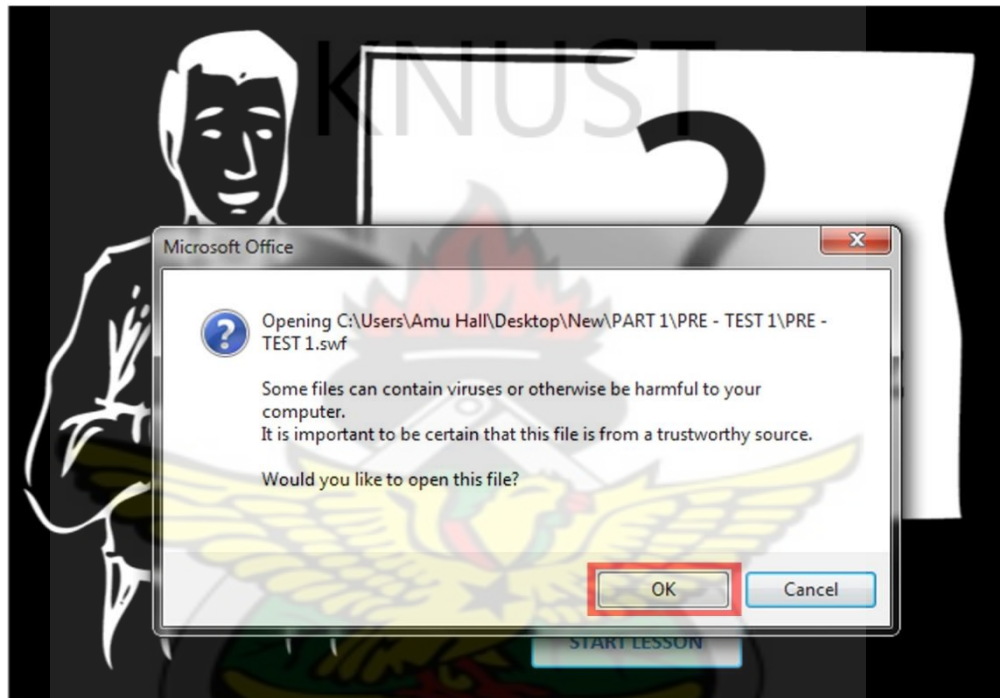


Fig.13: Start Pre-Test Prompts in the ILS
(Learner Must Press the OK Button to Proceed)

Anytime learners are prompted with this dialogue box, they are advised to press the “OK” button to proceed to the next stage if otherwise the system will “NOT ALLOW” access to the external SWF file. This was an insurmountable task for the researcher because Microsoft Office's parameter are unchangable. This is why learners are advised by the researcher and as the ILS developer to click the “OK” button so they can run the software smoothly.

These are the breakdowns of the project made by the researcher;

- Creating or designing the User Interface
- Creating interactivity
- Adding voiceover and video footage

3.15 Creating the Graphical User Interface

The complete set of forms and controls used in a programme is called the Programme User Interface. The user interface includes all the menus, buttons, and pictures that users see when they operate the programme. With a concluded layout or sketch of how the user interface will look like and the controls that will be used by the users and all its accompaniments are shown in Fig.14 from design stage in Microsoft PowerPoint. The entire designing work was made in Microsoft PowerPoint 2007.

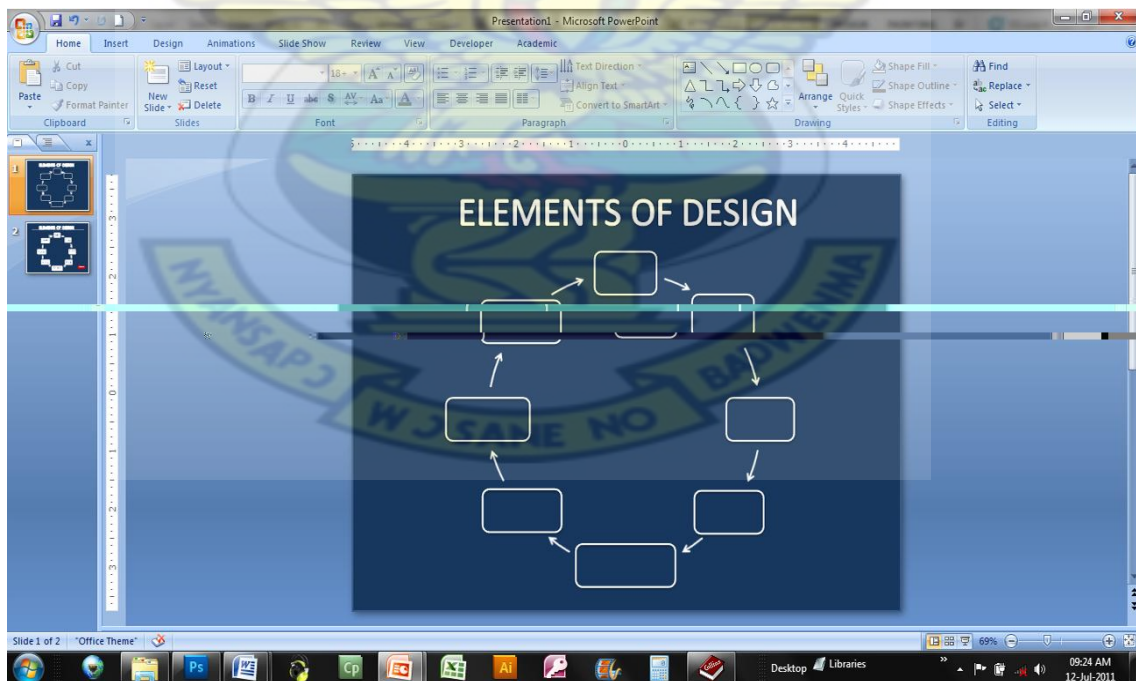


Fig.14: Stage 1 of the Design Stages in Microsoft PowerPoint View

Stage 1, consists of a blue- black background and a white outlined, rounded edged rectangle shape designed for the buttons. White curved arrows are there to also show the way learners are to go about the learning activities and also to introduce hierarchy in the designed interface.

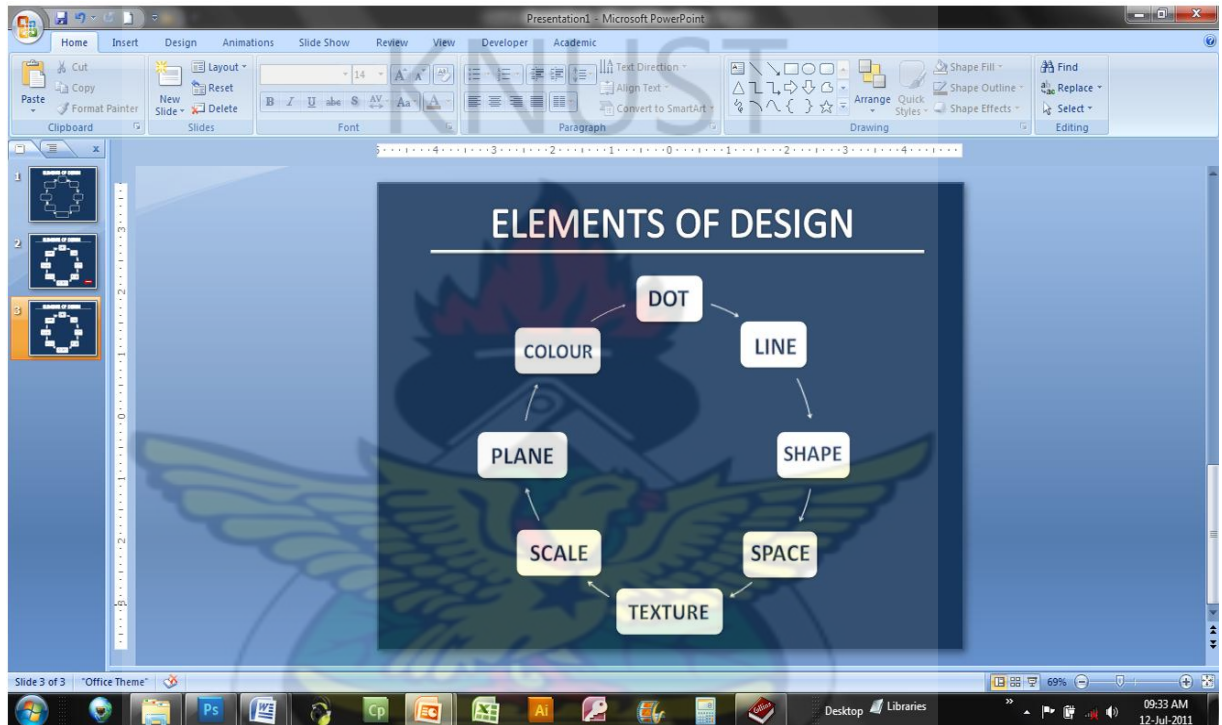


Fig.15: Stage 2 of the Design Stages in Microsoft PowerPoint View

At this stage, white colour was used to fill the rounded edged rectangle shape so that they will be easily identifiable during the early designing stages. In addition, text was introduced to know the placement or spots of all the designed elements and to also emphasize the hierarchy of this learning experience. Movement should be from dot to line, line to shape, shape to space till the last element which is colour.

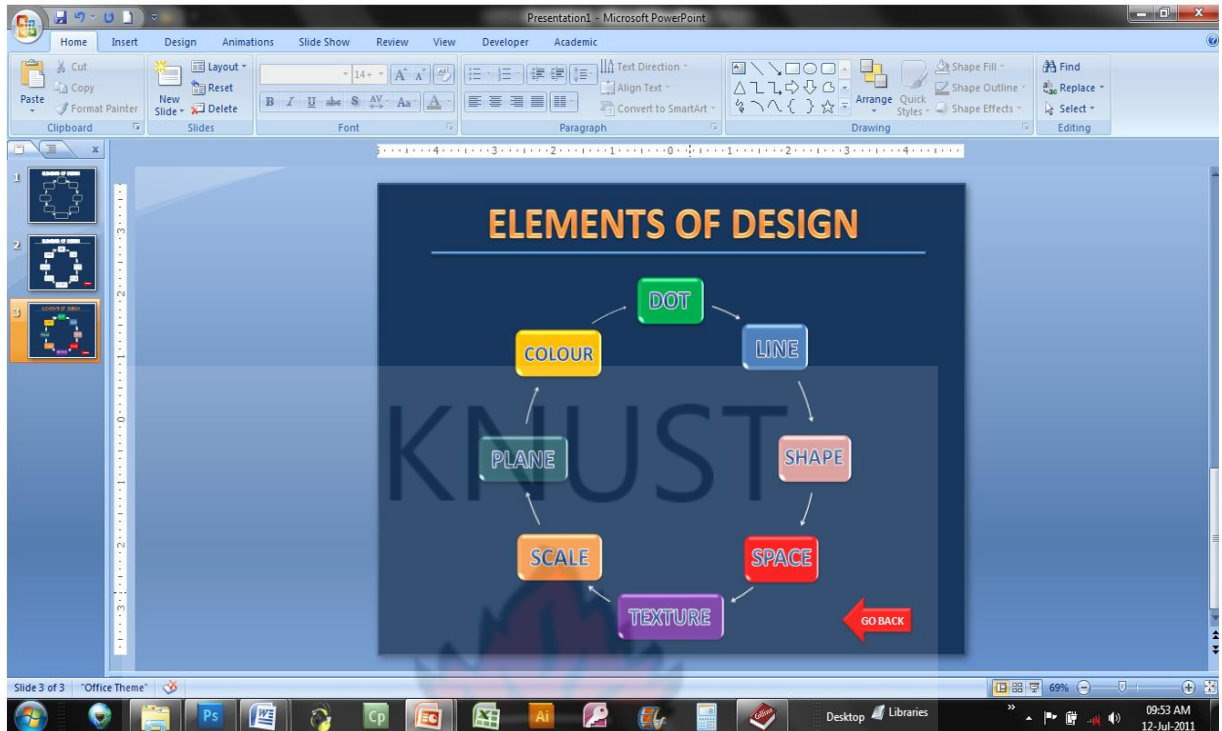


Fig.16: Stage 3 of the Design Stages in Microsoft PowerPoint View

Bright colours were introduced into the design to make it look colourful and attractive to the eye. A white arrow that forms a circular shape around the buttons are there to direct learners as to how they are to move when using this ILS. The left arrow shaped coloured red with the inscription “GO BACK” at the down right corner is there to indicate that learners can go back to the previous page.

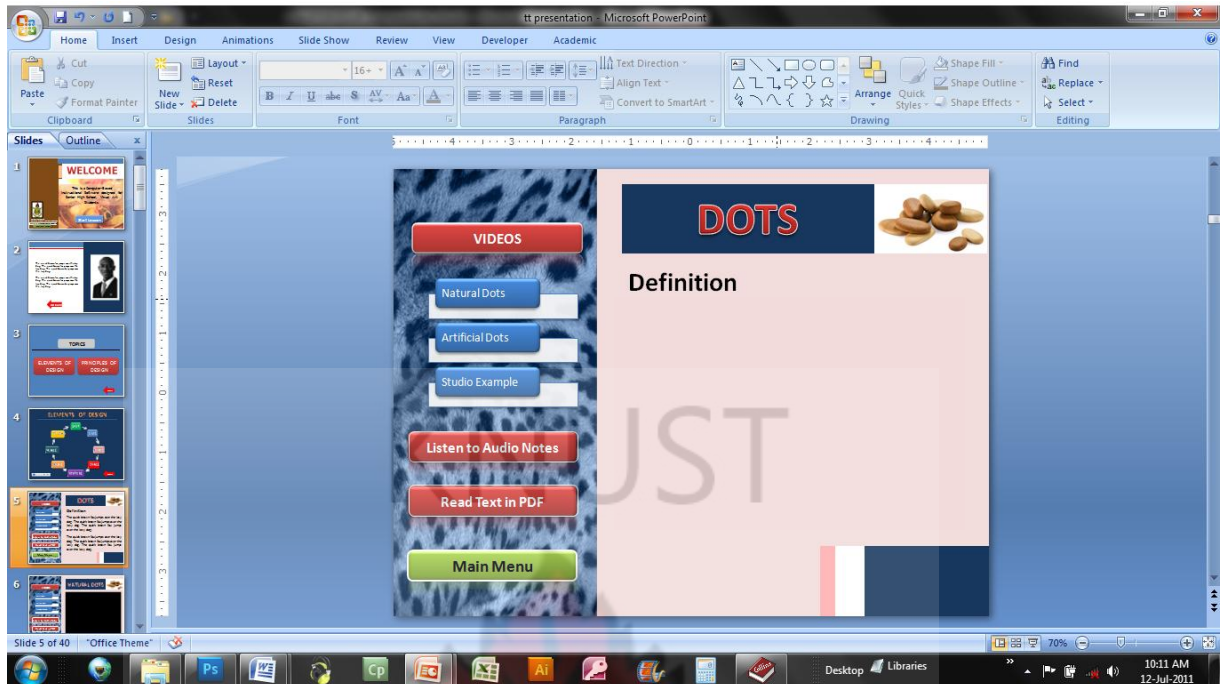


Fig.17: Stage 4 of the design stages in Microsoft PowerPoint View

In the Figure 17, the graphical user interface background of a type of dot and text to define dot, buttons are on the left hand side to navigate between the text, video and audio sides of the element being discussed.

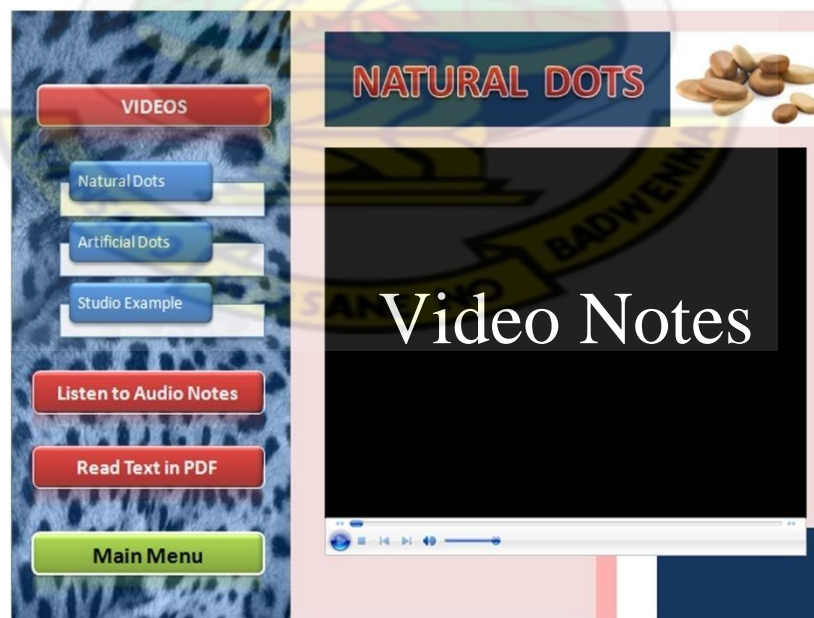


Fig.18: The Video Interface in Microsoft PowerPoint View

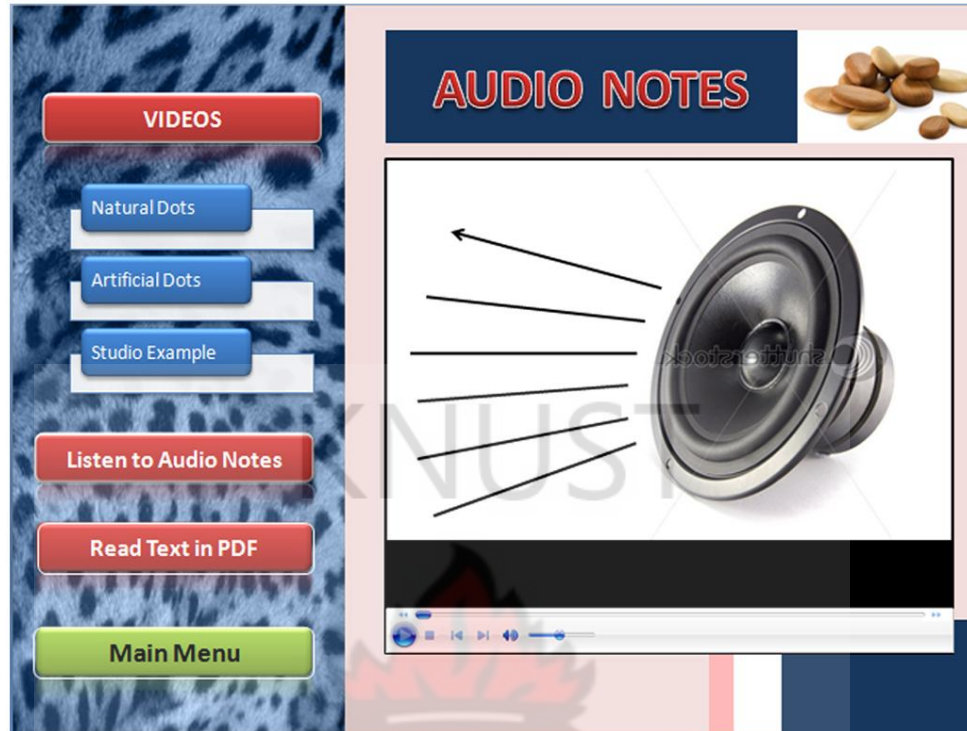


Fig.19: The Audio Interface in Microsoft PowerPoint View

3.16 Creating Interactivity

Interactivity is contextually used here to simply mean the ability to move from one page to the other without any hindrance. By just clicking on an assigned button the user gets to the desired link. This term can also mean linking pages with buttons and other acceptable objects that can trigger movement from one page to the other.

The figure 20 below displays what buttons were assigned or linked to what pages.

If any of these buttons is clicked, it shows or triggers the action the arrow is pointed at.

On the Videos Slide



Fig.20: The Buttons with their Linked Pages

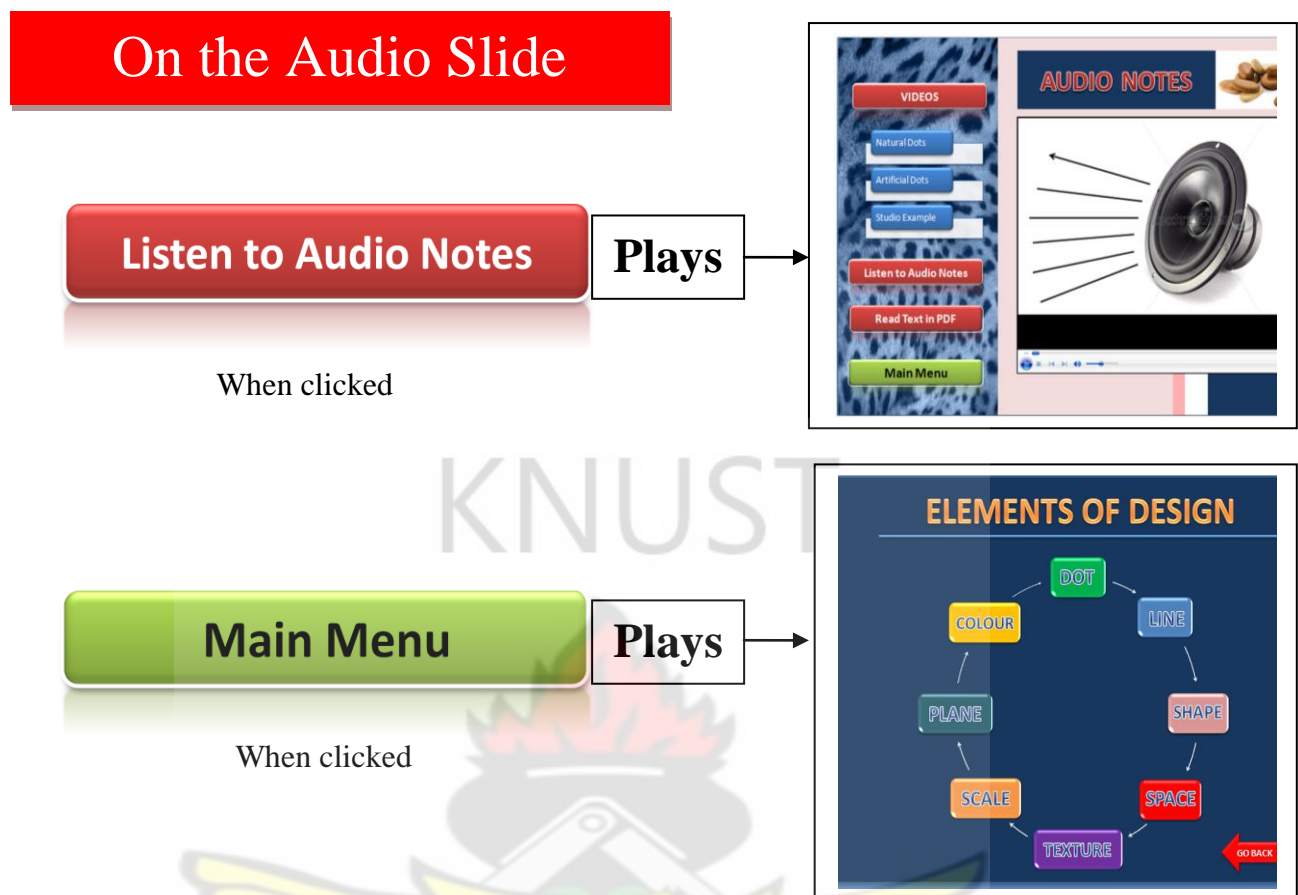


Fig.21: The Buttons with their linked pages and audio pages

3.17 Preparation and Importation of Voice and Video Footages in Microsoft PowerPoint

Getting the voice and video recorded was a daunting but interesting task. The scripts were prepared in relation to the guidelines in the visual art syllabus and some approved textbooks from the Visual Art teachers in the Winneba Senior High School. The voiceover recordings were successful and the editing was done within the expected time frame.

With the voice-over recording, two students from Winneba Senior High School were trained and given the script to practice within two weeks.

CHAPTER FOUR

DISCUSSION AND PRESENTATION OF RESULTS

4.0 Overview

This chapter describes the nature, scope and content of the Interactive Learning System (ILS) based on the topic “Basis Elements of Design” in the syllabus used in the Senior High Schools in Ghana. The chapter will also talk about how this ILS was used in teaching in comparison with the existing lecture and textbook method of teaching. The results will also be discussed into details and recommendations made.

The ILS produced on the compact disc (CD) is virtually self-paced study medium to run on a personal computer. It further gives an account of how pictures, sound and videos can be integrated to form one interesting interactive learning experience for visual art students in our Senior High Schools in Ghana.

4.1 Teaching with the Interactive Learning System and Evaluating the Lesson

Lesson Planning: A key aspect of effective teaching is having a plan for what will happen in the classroom each day. Creating such a plan involves setting realistic goals, deciding how to incorporate required materials (course textbooks) and other materials, and developing activities that will promote learning. (Uhl Chamot 2007:1).

The researcher taught two lessons “Basic Elements of Design” in each class (Form 1A and 1B) on different days. The first lessons for the classes were pre-intervention while the second was post-intervention.

Table 4.1:compares the performances of the students in both classes at the pre-intervention stage.

Marks	Grade	Form 1A	Form 1B	Interpretation
80 - 100	A	0	0	Excellent
70 - 79	B	0	0	Very Good
60 - 69	C	4	2	Good
50 - 59	D	9	12	Fairly Good
40 - 49	E	14	18	Fail
0 - 39	F	5	4	Fail

Table 4.1: Pre-intervention Test Results of Form 1A and 1B students

The total number of students in Form 1A was 32 and 36 in form 1B. Both classes were taught and evaluated by the pen and paper method of assessment. The lesson took 90 minutes which is two periods. By the end of the lesson students were evaluated by giving them class exercise scored over 100%.

Out of the total number of 32 students in Form 1A in attendance that day, no student had between the range of 79% and 100%. Rather, four students had scores between the range of 60% - 69% being above average; nine student scored 50% - 59% which is average. A total of 14 and five students had between 40% - 49% and zero and 0% - 39%

respectively, representing below average.

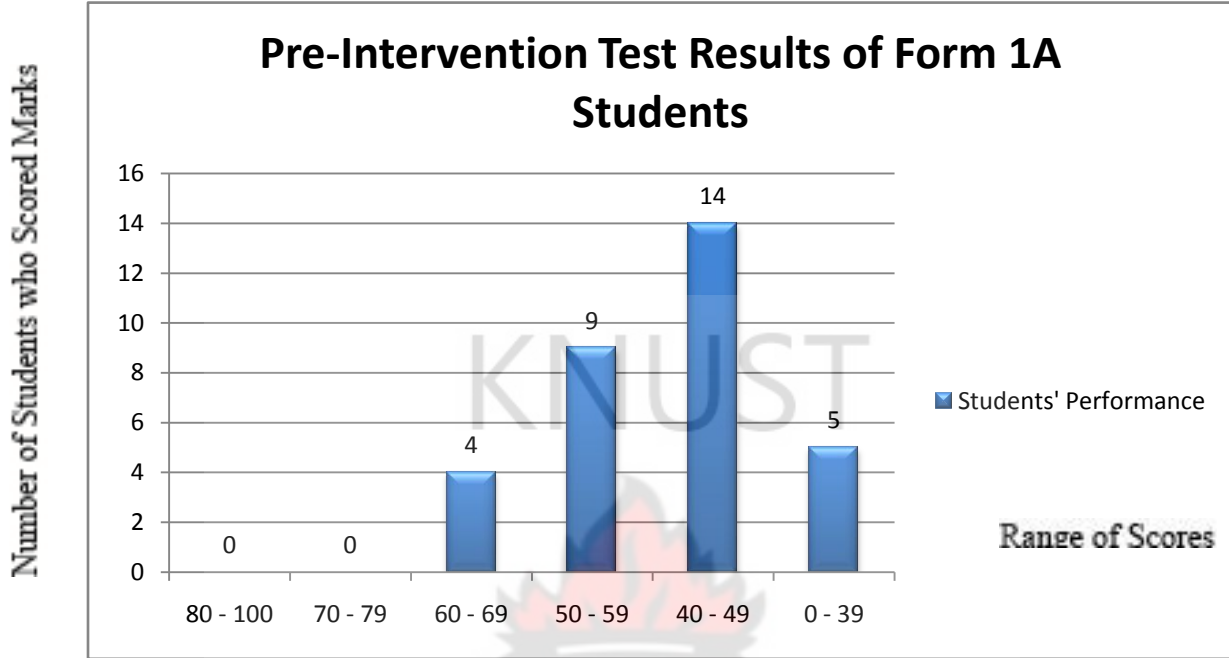


Fig. 22: A Chart of Pre-Intervention Performance of Form 1A students

In Form 1B, a total of 36 students were in attendance that day. Here again, no student had between the range of 79% and 100%. Two had between the range of 60% - 69%, and twelve scored between 50% - 59% which is average. Fourteen and five students had between 40% - 49%, and 0% - 39% respectively, representing below average.

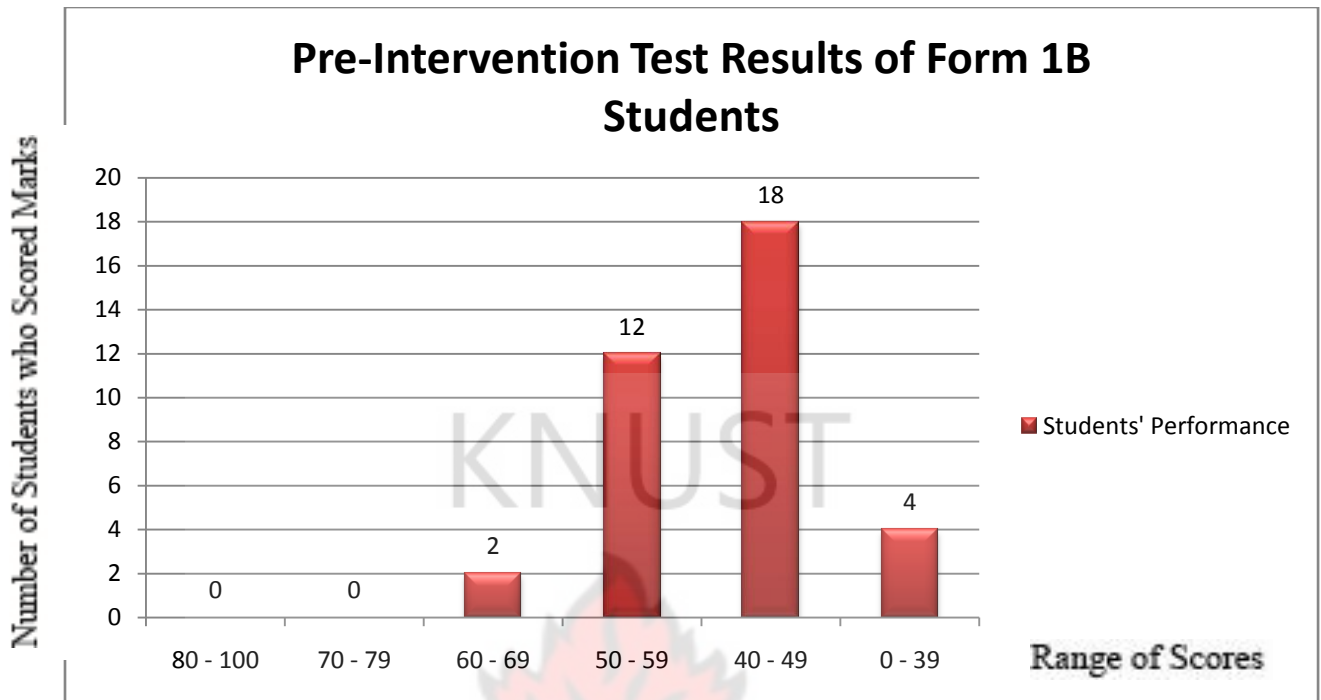


Fig. 23: A Chart of Pre-Intervention Performance of Form 1B students

The researcher implemented the intervention by teaching one class (form 1B) with the ILS Software. Preparations were made to use the ICT laboratory for the lesson. For this reason, the Interactive Learning System was installed onto a computer and projected onto a surface with the researcher in control as the a teacher.

After listening and watching the video footage (for example: after listening and watching videos footage of a dot as an element of design), students were allowed to make contributions or ask questions about that section before moving to the next level of the lesson.

After going through all the elements of design using the ILS, the researcher evaluated the lesson by quizzing students. Table 4.2 below shows the marks obtained by students after the intervention.

The intervention for Form 1A was a re-teaching of the lesson with the traditional textbook and lecture method (with chalkboard demonstration). This was to enable the researcher compare the performances of students who were taught with the ILS and their colleagues who were taught with the traditional textbook and lecture method.

After implementing the intervention, the researcher conducting a post-intervention test to find out and compare the performances of the two classes. The table 4.2 compares the results of the pre-intervention and post-intervention test of Form 1A.

Table 4.2: Pre-intervention and Post-intervention Test Results of Form 1A students

Marks Obtained (%)	Grade	Pre-Intervention	Post-Intervention	Interpretation
80 - 100	A	0	0	Excellent
70 - 79	B	0	4	Very Good
60 - 69	C	4	7	Good
50 - 59	D	9	12	Average
40 - 49	E	14	9	Fail
0 - 39	F	5	0	Fail

From Table 4.2 above, no student had between 80% – 100% in both the pre – intervention and the post-intervention tests. Again, no student scored between 70% - 79% in the pre-intervention, but four scored between 70% - 79% in the post-intervention tests. Four in the pre-intervention and seven students during the post-intervention had 60% -

69%. The Table also shows that nine students in the pre-intervention and 12 students in the post-intervention had between 50% - 59% which is average performance. Fourteen scored 40% - 49%, representing below average, in the pre-intervention, and nine fell in the same range for the post-intervention. However, five students had less than 0% - 39% in the pre-intervention, but none was in that range after the post-intervention.

A comparison of pre and post-intervention results of Form 1A

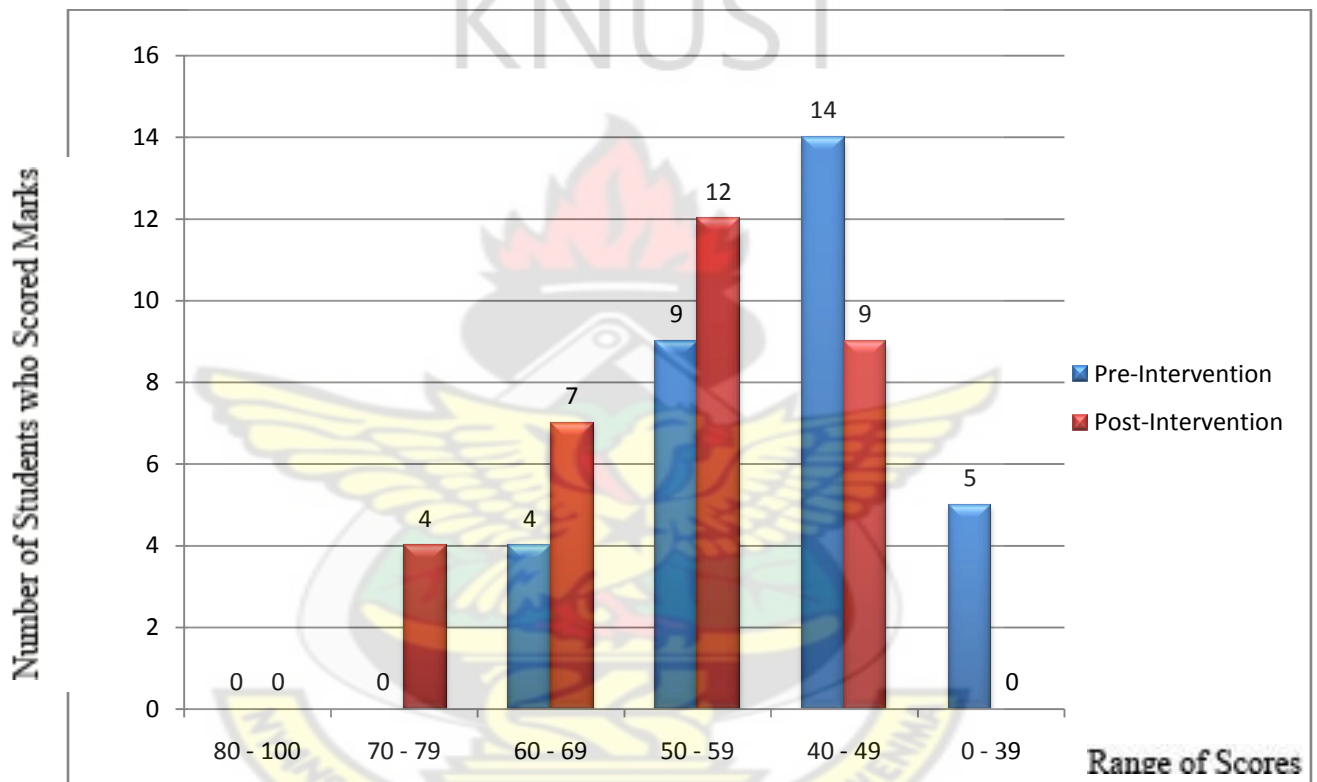


Fig. 24: A Comparison of the Performance of Form 1A Students in pre and Post-intervention Results

Table 4.3: Pre-intervention and Post-intervention Test Results of Form 1B students

Marks Obtained (%)	Grade	Pre-Intervention	Post-Intervention	Interpretation
80 - 100	A	0	3	Excellent
70 - 79	B	0	9	Very Good
60 - 69	C	2	7	Good
50 - 59	D	12	7	Average
40 - 49	E	18	10	Fail
0 - 39	F	4	0	Fail

From Table 4.3 above, no student had between 80% – 100% in the pre-intervention test, but Three scored between 80% – 100% in the post-intervention. Zero and Nine scored between 70% - 79% in the pre-intervention and post-intervention tests respectively, while two in the pre-intervention and seven students during the post-intervention had between 60% - 69%. The table also shows that 12 students in the pre-intervention and seven students in the post-intervention had between 50% - 59% which is average. Eighteen and ten scored between 40% - 49% in the pre-intervention and post-intervention respectively, representing below average. Four students scored between 0% - 39% during the pre-intervention, but no student obtained a score less than 40% in the post-intervention test.

A comparison of pre and post-intervention results of Form 1B

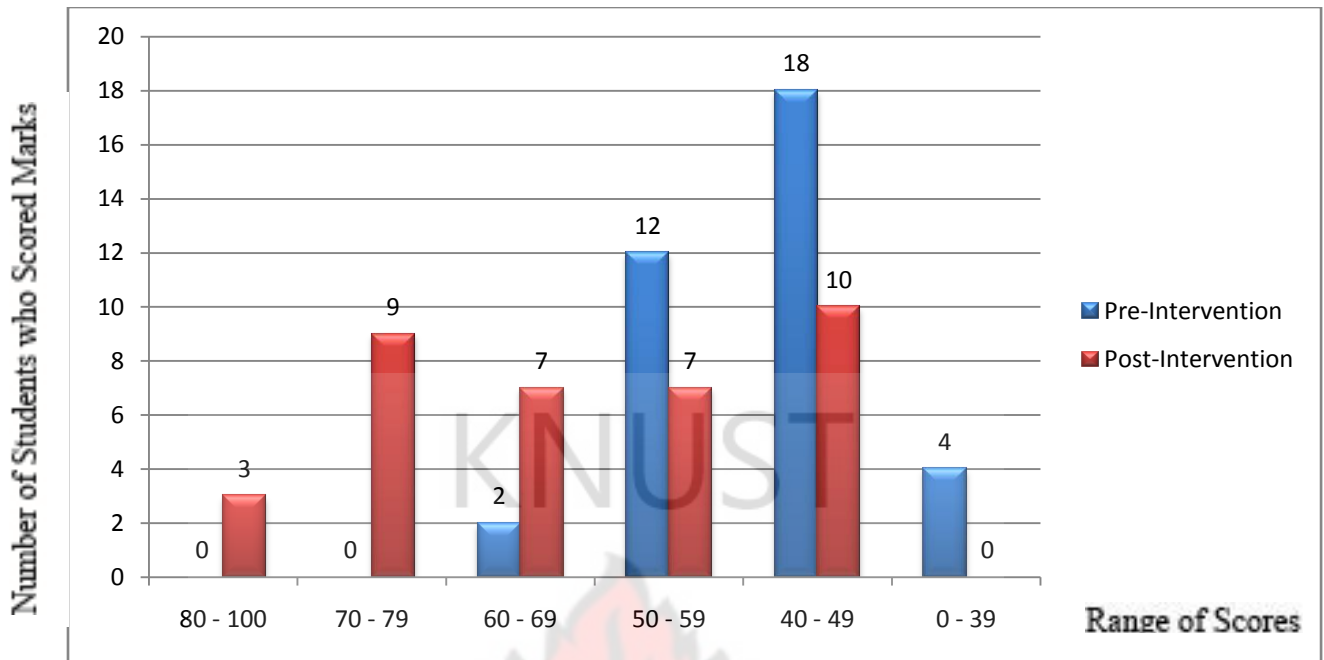


Fig. 25: A Comparison of the Performance of Form 1B Students in Pre and Post-intervention results

4.6 Analysis and Interpretation of Results

Analysis of Test Results

The result from the figure 4.4 above indicates the performance of Form 1A during the pre and post intervention stages. From the figure, the researcher observed that after the intervention, 11 students, representing 34.4% had improved upon their pre-intervention performance in the above average range 60% – 100%. Twelve students had also improved upon their pre-intervention performance in the average range 50% - 59%, representing 37.5%. Also the number of students in the below average range 0% - 49% had fallen from 19 representing 59.4% to nine representing 28.1%.

Comparison of Pre and Post-Intervention performance of Form 1A

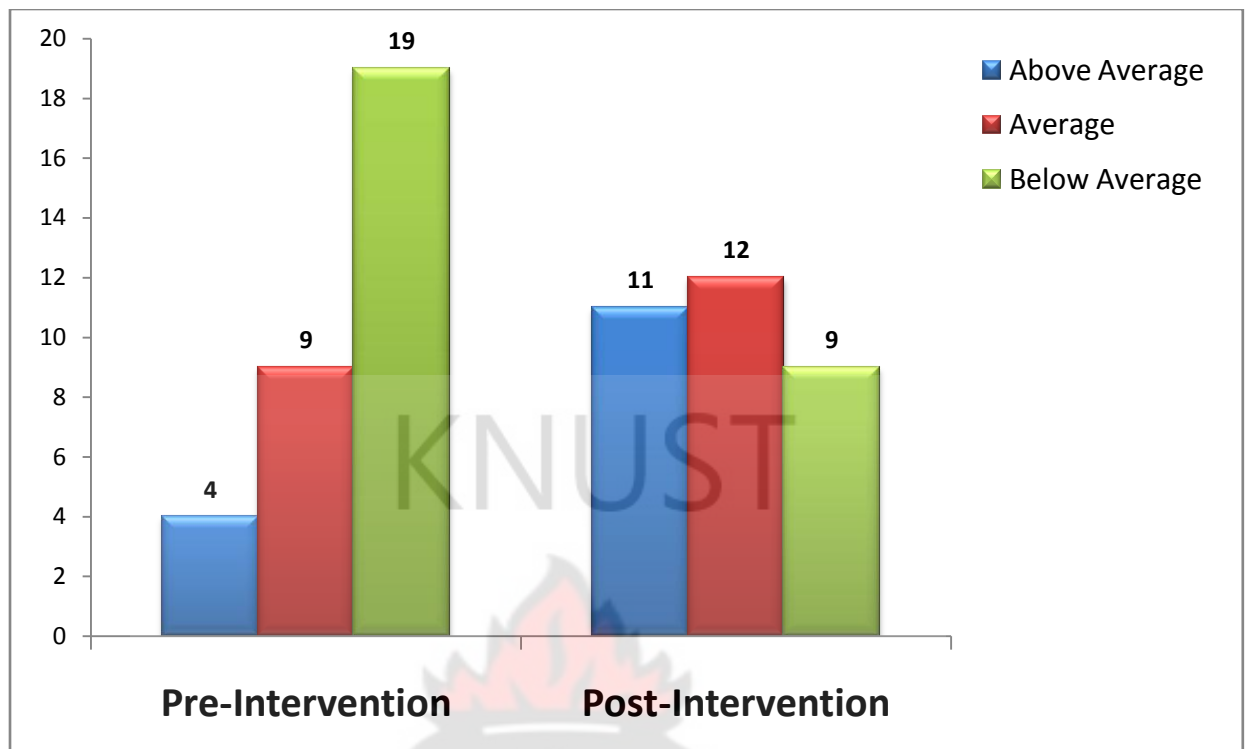


Fig. 26: A comparison of the performance of Form 1A students in pre and post-intervention results

However, the researcher observed that there was some degree of variance in the results obtained from Form 1B. This class was taught with the ILS designed for the same lesson. Below is the analysis of the test results.

From Figure 4.5, the researcher noted that 19 students, representing 52.8% had improved upon their pre-intervention performance in the above average range 60% – 100%. Seven students had also improved upon their pre-intervention performance in the average range 50% - 59%, representing 19.4%. Also the number of students in the below average range 0% - 49% had reduced from 22 representing 61.1% to Ten representing 27.8%

Comparison of Pre and Post-Intervention performance of Form 1B

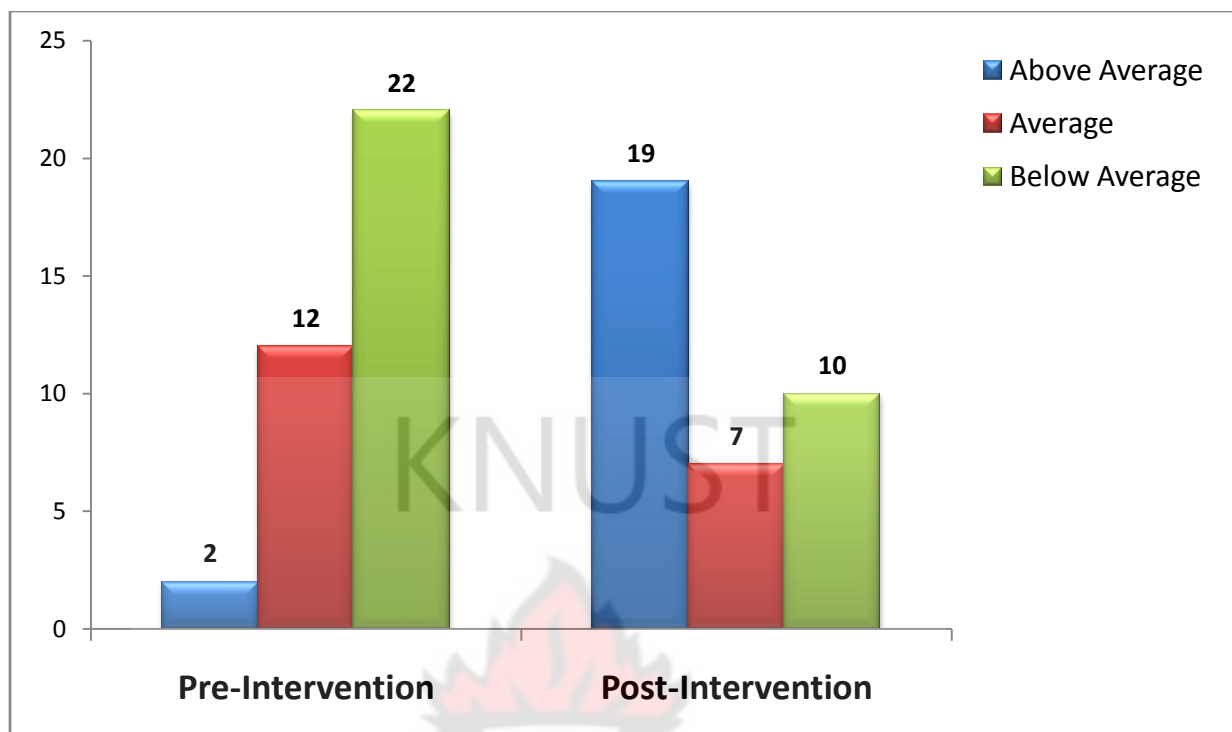


Fig. 27: A comparison of the performance of Form 1B students in pre and post-intervention results

4.7 Interpretation of Test Results

In Form 1A, the researcher taught the Basic Design lesson by the Traditional Textbook and Lecture method and the results are shown above. The Pre – Intervention stage proved that, four students were above average, nine students in the average and 19 students below average. This results shows that there is the need for an intervention to arrest this problem.

To arrest the problem in Form 1A, a post – intervention lesson was taught using the same traditional textbook and lecture method and the results was that, there has been improvement in students' performance. The number of students in the previous lesson who has average rose from four to 11 students, the average score increased from nine to

12 and nineteen 19 reduced to nine for the below average score. The result above is represented in figure 4.5

In contrast, Form 1B was taught the same Basic Design lesson by the traditional textbook and lecture method and the results are shown in Figure 4.6 above. In the pre – intervention stage that, two students were above average, 12 students in the average and 22 students below average. This results shows that there was a problem which needs to be solved.

In arresting the problem of Form 1B students', a post – intervention lesson was taught using the Interactive Learning System (ILS) and the results showed that students' performance improved immensely. The number of students in the previous lesson who had above average score rose from two to 19 students, the average score reduced from 12 to 7 and twenty – two reduced to ten for the below average score.

Out of 36 students in the class (1B), the post intervention result indicates that 12 students progressed from below average range as compared to the pre – intervention results. A total of five students also progressed from the average range. Again, the results show that 17 students, representing 47.2% of the entire class progressed to above average from pre–intervention to post intervention.

The researcher observed from the results that the use of Interactive Learning System will help students improve upon their understanding and performance during evaluation of the Basic Design Elements.

4.8 Conclusions

Based on the data collected and analyzed, it was revealed that the inability of Visual Art students to perform well in the teaching of Basic Design is due to their teachers not using teaching and learning materials such as Interactive Learning Systems. This problem is surmountable with the right interventions and strategies of teaching.

Students' inability to identify and explain the Basic Design Elements were due to poor teaching methods. This simply implies that most teachers of Art do not design effective methods for teaching the subject.

In addition, lack of tools, materials and equipments for learning with reference in computer based learning are not available. This affects students greatly in their learning in general which tend to affect their ability to perform creditably.

The intervention helped tremendously in restoring confidence and interest which boost their performance in learning the basics of design (Elements of Design). In all, there was great improvement in the students' performance after they were taken through the planned intervention to turn up their interests in learning.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 SUMMARY

This concluding chapter of the studies made some recommendations and suggestions for consideration by our policy makers, school administrators, teachers and students.

The study is about the development and introduction of an Interactive Learning System for the teaching and learning of Basic Design in our Senior High Schools. It also discusses the role of ILS in the teaching of Basic Design as well as the benefits and challenges associated with its usage. The roles of both teachers and learners in making this ILS learning environment work effectively are also stated.

Problems that must engage the attention of educational stakeholders include the following:

- Students trying to imagine and create mental pictures of what has been said or taught which lead to possible distortion could be corrected using the ILS.
- The problem of Graphic Design teachers in the Senior High Schools teaching most lessons in abstraction.
- Teaching without learning materials makes the understanding of the subject matter rather difficult.
- When the ICT infrastructural Challenges are addressed, the use of ILS would improve students' performances, according to the study.

- In maintaining the ICT infrastructure, there is the need for strong financial backing from financial administrator and stakeholder to help improve the educational structures in Ghana.
- There is also the need to employ very competent technical support specialists to manage the ICT Infrastructure to improve learning in our schools.

If these aforementioned points are considered, evaluated and implemented by our policy makers, school administrators, teachers and learners, teaching and learning will not be considered as a punished but rather fun. Teachers on the other hand will save themselves from the creation of mental imagery for students when teaching.



5.1 CONCLUSION

Based on the outcome of the study and from the findings obtained from responses provided by the sampled population, the following conclusions were made:

- The problem of students' inability to perform creditably in the Basic Design Lessons was largely due to poor teaching methodology and approach to teaching by the Visual Art teachers in the sampled school. Therefore, Interactive Learning Systems should be introduced in the SHS to make teaching and learning an easier activity for both teachers and learners. This will improve students' performance in Basic Design Lessons.
- Lack of proper logistics and support by the Ministry of Education. Proper logistics should be provided to schools to make teaching and learning an interest activity for both teachers and learners.
- Inadequate technical support specialist tells on computer based learning. Enough and competent technical support specialist should be provided by the Ministry of Education to give adequate support to teachers.

5.2 RECOMMENDATIONS

The problems identified by the study and the implications can be addressed by putting these recommendations into practice:

- Teachers should employ various dynamics in their teaching methods. They should also use appropriate ILS to teach their lessons. This will make their lessons more enjoyable and understandable.
- The Government, through its specialized agencies of Education, like the Ghana Education Service and others must formulate policies which will provide adequate resources and infrastructure to support the integration for Interactive Learning Systems at all levels of Education in Ghana.
- Teachers must be encouraged to attend workshops and seminars in computer based learning to enhance their lesson preparations and delivery organised by the Ministry of Education.
- ILS programmers and producers should be employed and funded by the Government to produce more ILS for various subject areas for all educational levels in Ghana.
- The Government through the Ministry of Education should subsidize ILS materials, or make them free for students to learn both at home and school.
- The Government through the Ministry of Education should subsidize the prizes of Computers and Laptops for parents to be able to afford these machines for their wards to learn with, to improve students' classroom participation.

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