UNIVERSITY OF EDUCATION, WINNEBA

MULTIMEDIA COURSEWARE FOR TEACHING THE VISUAL ART COMPONENT OF THE CREATIVE ARTS IN GHANAIAN BASIC SCHOOLS

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JUNE, 2018

DECLARATION

STUDENT'S DECLARATION

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

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

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Si autem non fuerit Domino, quo me esse?

If it hadn't been you Lord, where will I have been?

TQNV
UEW
June, 2018

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ABSTRACT

The teaching of Creative Arts in Ghanaian Basic Schools is faced with numerous challenges which negatively affect lesson preparation and delivery. This study was conducted to find out the availability of approved and relevant Creative Arts curriculum content for use in the design and development of a user-friendly Multimedia Courseware for Teaching Creative Arts in Ghanaian Basic Schools. Qualitative Research Methodology and Art-Based Research Design approaches were employed for the study. The study employed a purposive sampling technique to select twenty-one respondents out of an accessible population of one hundred and twenty-six. Data gathered from the pre-production investigations provided the basis for a rigorous studio work which resulted in an attractive and user-friendly multimedia courseware for the teaching of Creative Arts in Ghanaian Basic Schools. The creation of multimedia courseware followed systematic studio practices which involved a careful deployment of various technological equipment, relevant software and a skillful crew. The study revealed that, when relevant and approved contents are used to design and develop a user-friendly multimedia courseware for Creative Arts teachers, they will acquire the relevant knowledge and skills useful for the preparation and delivery of lessons with much ease and confidence. This implies that Creative Arts teachers' effective performances are largely dependent on the kind of training they acquire and the availability of relevant and approved course contents. Finally, suggestions and recommendations have been made to train and also design Creative Arts courses to enhance the teaching and learning of Creative Arts in Ghanaian Basic Schools.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

This study originates from an interest in how the use of technology is propelling teaching and learning activities worldwide. Teaching and learning is art and science which demands very creative activities to make it enjoyable for everyone. With the advent of technology, teaching and learning today has become so diversified that, many lessons could be taught virtually through distance learning platforms, with teaching and learning resources becoming up-loadable and installable unto mobile devices for easy access and retrieval. Feat such as this have made the use of technology one of the best ways by which knowledge can be disseminated world-wide, thereby making the use of technology such as mobile applications important means of boosting the interest of both teachers and students in teaching and learning.

In this regard, the use of mobile phones and other handheld devices like tablets are gaining so much prominence in academic circles and therefore calling for continuous investigations that would result in further development of relevant multimedia courseware and other technological tools for teaching and learning. This will create a healthy and interesting classroom environment for teaching and learning.

There are several advantages in using technologies like mobile applications and websites via the internet in lesson delivery. In Ghana, many people use mobile phones for several online activities. This is confirmed by the results of a survey by Citifm an

Accra based radio station which showed that 51% of Ghanaian and 47% of Nigerian mobile phone users use their phones to access the internet (Citifm Online, 2015, para 3). Similarly, a survey by The Africa Report (2016) reported that as of the year 2015, the number of mobile data subscribers rose from about 17.73 million to 18.03 million, an access rate of 65.74 percent. These reports underscore the fact that, there is a significant increase in the use of mobile phones for accessing internet content (Ferry, 2009).

With this exposé in mind, coupled with the fact that many teachers rely on the internet and its resources to prepare for their lessons (Zakaria, Fordjour & Afriyie, 2015), the designing and development of a courseware is always appropriate and worthwhile. This also gives relevance to the assumption that, an interactive multimedia courseware for basic school teachers can reduce or eliminate most of the problems (such as omissions and abstractions) associated with the teaching of some subjects in Ghanaian Basic Schools like Creative Arts, which seems to have suffered a lot of pedagogical misinterpretations in the hands of "untrained" teachers since its inception.

Creative Arts is a course introduced into the basic school curriculum in the 2007/2008 academic year by the Anamuah-Mensah Educational Reform Committee of 2007. From Basic School 1 to 6 this subject is known as Creative Arts and Basic Design Technology from Junior High School 1 to 3. The Creative Arts curriculum includes Visual Arts (drawing, weaving, carving, modeling, casting and sewing), Performing Arts (Music, Dance and Drama) and Literary Arts (Poetry, Recitals). According to the Curriculum Research and Development Division [CRDD] of Ghana (2007), Creative Arts in the primary school curriculum is meant to transmit, promote and preserve the

culture of the nation, since Art serves as a means for record keeping. These records will help the nation maintain its cultural values. The course is also intended to develop children's creative capacities and enable them express themselves freely.

Preliminary investigations by the researcher over a period of two years revealed that, most of the contact hours meant for Creative Arts are used for other purposes instead of teaching and learning. The contact hours are converted into activities such as copying of notes for other subject areas. Teachers also consider those contact periods as periods for resting or marking exercise books, etc. Most often, pupils in Basic School 1 to 3, are made to take some siesta, just to allow the teacher some chance to have some rest too. Interactions with some basic school teachers revealed that, they are faced with a number of difficulties with regards to the teaching of Creative Arts as a subject. According to some of these teachers, Creative Arts is a new course which demands a lot of skills training to be able to teach effectively. Some even share the view that, the various Education Directorates should organize workshops, seminars and interactions for them in order to understand the concept of teaching Creative Arts. Also, there are issues about the acquisition of textbooks, tools and materials which teachers often provide for their various classes by themselves. Additionally, some terminologies used in their textbooks are not reader-friendly which make teaching the subject difficult for teachers. There are also complaints about getting the appropriate tools and materials for the teaching and learning of the subject.

These and many other issues attest to the reality that, there is an urgent need to address the difficulties teachers face in teaching Creative Arts as a course of study in Ghanaian Basic Schools. Designing an instructional media for teaching Creative Arts, which will

be technology-driven could create an important avenue for the teaching of Creative Arts in Basic Schools. A multimedia courseware will aid Creative Arts teachers to gain appreciable knowledge and skills in order to teach the subject effectively.

1.1 Statement of the Problem

In recent years there has been growing concern about the fact that most teachers do not know or understand the subjects they teach. This observation applies largely to the teaching of skill-based subjects like Creative Arts in Ghanaian Basic Schools. Studies by Nilson, Fetherston, McMurray and Fetherston (2013) have revealed that many of the Creative Arts teachers in the world lack the requisite skills and the understanding, knowledge and confidence to teach the subject simply because they are generalist teachers. Alter, Hays and O'Hara (2009) further affirmed that when it comes to the teaching and learning of Creative Arts in the primary schools, generalist teachers are compelled to teach what they do not know and are not comfortable with. Creative Arts in Ghana from its inception is handicapped to the extent that generalist teachers are trained from the Colleges of Education to teach all subjects in the basic schools except Creative Arts.

Considering the potentials and prospects of Creative Arts in the development of the child, there is the need to give it the needed attention from its very core the curriculum for Colleges of Education in Ghana. Several investigations made by the researcher over his period of study indicated that, Colleges of Education in Ghana do not teach Creative Arts exclusively as a subject of study as part of their curriculum. This technically means that, there are no teachers specifically trained as Creative Arts teachers for our

basic schools in spite of the claim by the Ghana Education Service [GES] (2012) that, teacher education in Ghana was planned to equip the basic school teacher for all basic school subjects (Ghanaian Language, English Language, Basic Mathematical, Integrated Science, Citizenship Education, Religious & Moral Education, Music & Dance, Physical Education and Creative Arts). Contrary to this claim, many schools in Ghana depend mostly on generalist teachers for Creative Arts instruction at the basic school level, with very little known about their preparation before teaching, and what they actually do in the classroom. However, the multifaceted nature of the Creative Arts makes it difficult for generalist teachers to teach this subject in the basic schools, as they consider the subject as an additional work load. Also, the lack of technical understanding of the Creative Arts contents and subject matter by generalist teachers appears to contribute to their ineffectiveness in teacher the subject in Ghanaian Basic Schools.

The teaching of Creative Arts needs simple and yet very interesting pedagogies as its vehicle to making lessons successful. This makes it imperative for generalist teacher to acquire hands-on strategies or methodologies that would make their lesson delivery simple, interesting and understandable, in a manner that improves upon their teaching. This will also make them adhere to John Dewey's belief that, "If we teach today as we taught yesterday we rob our children of tomorrow" (cited in Transforming Teacher Education and Learning, 2016). In the opinion of this researcher, making Creative Arts lesson delivery simple, interesting and understandable for generalist teachers, requires a technological approach since using multimedia gives more information, saves time and boosts creativity in learners. This statement is confirmed by Wang (2010) who

opined that, it is true that multimedia has many advantages in teaching, such as offering more information, saving more time, stimulating students' imagination and creativity.

In spite of the current development in the use of multimedia and interactive courseware for teaching and learning, it seems from the practice, observation, experience, and preliminary investigations over a period, multimedia courseware for Creative Arts is yet to gain recognition in our Ghanaian Basic Schools. Producing a comprehensive multimedia courseware which covers the appropriate and recommended subject matter or content (Graphic Design, Ceramics, Sculpture, Painting, Sewing) can assist these Creative Arts teachers to gather information, stimulate the imagination and creativity in their lesson preparation and delivery. Whereas the usefulness of multimedia courseware for teaching cannot be understated, poorly designed user-interfaces can make the use of such courseware very difficult and demotivating.

It is therefore imperative to design and develop a user-friendly and easy to navigate multimedia courseware which has no usability issues (Mishra, 2013) as a tool to assist Ghanaian Creative Arts teachers to acquire the knowledge and skills they were not privy to during their training in the Colleges of Education. It is in view of this observation, coupled with the researcher's desire to equip generalist teachers in Ghanaian Basic Schools with the necessary knowledge, skills and confidence for teaching the creative arts that a study on the design, development and use of multimedia courseware for the teaching of Creative Arts is seen as a positive step towards addressing the problem generalist teachers face in teaching Creative Arts in Ghanaian Basic Schools.

1.2 Purpose of the Study

This study sought to aid basic school teachers to;

- Acquire a self-paced one-on-one multimedia tutorial on how to teach Creative Arts using a multimedia courseware.
- Enhance knowledge and assurance about the relevance of innovation and improvisation in Creative Arts Lessons.
- Acquire the knowledge, skills, and confidence to teach the subject to make meaning from current technologies.

1.3 Objectives

The objectives of the study were:

1. To identify the major thematic contents of the visual art aspects in the Creative Arts syllabus appropriate for the development of the courseware.
2. To design a Graphical User Interface for the Creative Arts courseware.
3. To develop Multimedia Courseware for the teaching and learning of Creative Arts.
4. To test the use of the Creative Arts courseware by basic school teachers.

1.4 Research Questions

1. What thematic contents of the visual art aspects of the Creative Arts syllabus are available and appropriate for the development of the Courseware?
2. What vital considerations are necessary for designing a Graphical User Interface for a Courseware?
3. What processes are involved in designing and developing a Courseware?
4. How will the Courseware usage affect teaching and learning of Creative Arts in Ghanaian Basic Schools?

1.5 Significance of the Study

This study will contribute to the skillful development of activities for teaching Creative Arts in our Basic Schools. The study will bring the benefits that Creative Art activities offer children and how to help teachers to effectively handle the subject to inculcate creative thinking and acceptable norms into pupils.

1. The multimedia courseware will make teaching and learning more interesting and realistic.
2. It will also introduce a new approach for teaching and learning Creative Arts.
3. This study will arouse teachers' interest in teaching the subject (Creative Arts).
4. The multimedia courseware will also be a guide for basic school teachers.
5. It will be a reference material for further research.

1.6 Delimitation

This study is limited to:

Creative Arts teachers in the basic schools, from classes one (1) to three (3). Basic school in Ghana starts from Pre-school, Primary and Junior High School (together known as Basic School). With regards to these aforementioned points, Creative Arts is taught in the Primary School (classes 1 to 6). This is the reason why the research is focused on primary school teachers.

This study is focused on designing and developing a multimedia courseware for classes 1, 2 and 3. Classes 1, 2 and 3 are collectively known as lower primary classes for a Basic School. The project was hinged on the lower primary classes based on three reasons;

1. Lower Primary forms one of the most important foundations of schooling and therefore requires very positive creative attitudes and skills for future endeavours.
2. The task of designing and developing a comprehensive multimedia courseware from classes 1 to 6 is not achievable based on the period for operation. Therefore, the study was focused on classes 1 to 3 only which contain 58 distinct videos with the least video duration of about 35minutes.

3. Both lower and upper primary school teachers can share ideas because lessons at both levels are similar in terms of both structure and procedure such that, knowledge can be transferred from one class to the other.

Visual Art aspect of the Creative Arts Syllabus is the area of interest to the researcher. The Creative Arts curriculum includes Visual Arts (drawing, weaving, carving, modeling, casting and sewing), Performing Arts (Music, Dance and Drama) and Literary Arts (Poetry, Recitals).

Seven Basic Schools (four public and three private schools) in the Effutu Municipality were engaged for this study. These schools were used based on proximity to the researcher.

1.7 Limitations

The researcher encountered some challenges in the process of conducting this study. Among these challenges were the issue of time constraints. Because the researcher was also engaged with professional assignments and activities at the same time when the study was in progress, there were some difficulties making time for the research. Also, getting relevant information for the literature review, especially from internet sources, presented some challenges, as there was no multimedia courseware developed for the teaching of creative arts, at the time of this study. Again, there were some difficulties with the audio recording system, which created some of background noise in the video. Notwithstanding all these challenges, the outcome of the study was not significantly affected.

1.8 Definition of Terms

- Aesthetics: the study or theory of beauty
- Design: to create a work of art by combining elements of art into a planned whole.
- Drawing: the act of making marks on a surface so as to create an image.
- Creativity: the ability to make or design something new.
- Pattern: a principle of design where an element or combinations of elements are repeated in a planned way.
- Generalist Teachers: all basic school teachers without professional training in the teaching of Creative Arts.

1.9 Abbreviations

- GUI: Graphical User Interface
- MoE: Ministry of Education
- CoE: Colleges of Education
- CSS: Cascading Style Sheet
- CAC: Creative Arts Courseware
- CRDD: Curriculum Research and Development Division
- TSCA: Ghana Teaching Syllabus for Creative Arts
- UNESCO: United Nations Educational, Scientific and Cultural Organization
- UNICEF: United Nations International Children's Emergency Fund
- CD: Compact Disc
- DVD: Digital Versatile Disc

- CD-ROM: Compact Disc Read-Only Memory

1.10 Organization of the rest of the study

The thesis was organized as follows:

Chapter One focused on the preliminary stages of the research, including the Background of the Study, Problems Statement, Objectives of the Study, Research Questions, Delimitation, Limitation, Definition of Terms, Abbreviations and the Significance of the Study.

The second chapter also focused on the review of related literature covering both theoretical and empirical aspects of the research. At this stage of the study, very relevant literature sought from scholarly materials of various kinds to support and make clear some points discussed in the study.

In chapter three, the research methodology was presented, with emphasis on research design, population of the study, sampling, data collection instruments, and data analysis. It also included the type of data, administration of instruments, data collection procedures that helped to make this study complete.

Chapter four dealt with presentation and discussion of findings from data collected for the study. The chronological step-by-step processes of producing the actual work of art was also outlined here. Photographic evidence at appropriate stages were made known to enhance the discussion.

Finally, chapter five presented the conclusion of the study, with summary and recommendations for implementation. It will also highlight the contributions that the study could make to knowledge, and suggestions for further studies.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Overview

This chapter reviewed and discussed the relevant literature related to Developing Multimedia Courseware for Creative Arts Teachers in Ghanaian Basic Schools. For the purpose of the study, this literature review was organized around the following subheadings:

- What is a Courseware
- What is Multimedia Courseware
- Relevance of Courseware in Education
- Significance of Multimedia Courseware in Art Education
- The Design Processes
- Graphical User Interfaces
- Considerations for designing GUI
- Pedagogic Principles for Courseware Development
- Multimedia Principles
- The Creative Arts
- The Rationale for Creative Arts
- Creative Arts Syllabus for teaching in Ghanaian Primary Schools
- Primary School Teachers (Colleges of Education / Syllabus)
- The uniqueness of Primary School Teaching
- Teaching of Creative Arts in Ghanaian Basic Schools
- Methods, Techniques and Strategies of Teaching

2.1 What is a Courseware?

In recent years, teachers use courseware to teach very complex lessons to their students. These courseware can be computer assisted or aided. Many courseware are built with very interesting and user-friendly elements to deliver contents that assist students to understand abstract concepts. In many circles, courseware are educational materials used for training, teaching, learning and reinforcing concepts that have been learnt already. Courseware are designed to be accessed using computers and other electronic devices like tablets and phones. They are developed for teachers and learners as tutorials by content developers and they cover a wide range of knowledge areas, from very basic phenomenon to very complex ones. According to Inyiama, Anozie, Okezie and Nwazor (2011), courseware is a term that combines the words *course* with *software*. Its meaning originally was used to describe additional educational material intended as tutorials for learners, usually packaged for use with a computer.

The purpose of a courseware is to present learners with soft format educational materials to aid learning both in and outside the classroom. Soft format materials are sometimes converted into multimedia format to further enhance the traditional classroom education experience. This way of learning is powered by tools such as computers, smartphones, tablets and other similar handheld devices to enrich, prepare, and assist students both in and out of their classroom. Courseware are designed for learners who enroll for traditional classroom education, and is accessible in the school, home or at work via the Internet, Intranet or Compact Disc (CD), sometimes with authorization codes.

In courseware production, courseware authoring software such as Adobe Captivate, Adobe Presenter, and Advanced eLearning Builder are needed for the courseware design. The software (courseware) is then published on the web (Internet or Intranet) and CDs, from where it can be accessed by the appropriate user (Tang, Erkavum, & Cao, 2000). The courseware authoring software are used to design and develop courseware using very relevant course content derived from appropriate syllabi. Designing and developing online courseware demands that very relevant and approved contents are used, since learners who will use the courseware will be assessed both in a formative and summative manner at certain points of their studies. Relevant contents form the backbone for engaging an effective courseware.

Appropriate syllabi are key in all educational cycles, as is confirmed by Parkes and Harris (2002), stating that syllabi serve three major roles: thus, the syllabus as a contract, the syllabus as a permanent record, and the syllabus as a learning tool. Syllabi are useful for students and instructors alike because in the case of the student it makes clear what the rules are (Pastorino 1999; Smith & Razzouk 1993).

According to Siglar (2003), there are five types of computer assisted instructions, namely Tutorials, Drills, Instructional games, Simulations and Tests. These types of computer-assisted instructions or courseware are designed and developed for very distinct purposes. When using computer assisted instructions, the computer can assist the instructor in implementing any or all of the four essential phases of instruction: presenting information, guiding the student, providing student practice and assessing student learning.

2.1.1 Tutorial Courseware

The main purpose of a tutorial courseware is to present information and guide to target students or learners. Tutorials strive to provide sequenced, interactive material to learners. The learners are engaged in direct and continual two-way communication with the computer (i.e., using an active participant approach). A tutorial is ideal for presenting new material, allowing students to progress at their own pace, and reviewing previously learned subjects (Siglar, 2003). In other circles, a tutorial can be considered as a method of transferring knowledge to specific audience or end-users and may also be used as part of a learning process. A tutorial courseware is more interactive and specific than a book or a lecture. A tutorial seeks to teach by example, and supply information to complete a specific task (Dawane, Pandit, Dhande, Sahasrabudhe, Karandikar, 2014). According to Khosrow (2002), there are several considerations for producing a tutorial such as; choosing the right media (e.g. audio, video, web, email, combinations), what platform is needed to deliver the tutorial, and using interactivity and examples to make tutorial more effective.

A tutorial courseware developer can design a tutorial in a linear fashion (like a book) or with divisions that allows students to control the lesson based on their preferences. Regardless of the type of design, tutorials should include embedded questions and remediation loops to ensure learners master material before moving on to more difficult concepts (Siglar, 2003). Scholars and experts in designing and developing tutorials suggest that tutorials can facilitate learning better than a teacher because of the one-to-one learning. In many study areas, studying using tutorials permit students to learn at an individualized assimilation rate. When incorporating tutorial into lessons, one has to make sure that it matches the objectives, goals, and approved content the that level

of education it is meant for. Tutorials are often combined with other types of computer assisted instruction to make lessons more enjoyable and self-participatory.

There are several advantages of tutorial courseware which are as follows; tutorial courseware users are able to stop for breaks and to repeat sections as needed, learning through visual communication is easier than learning through just oral communication, learners are motivated to work hard when learning with tutorials since they acquire hands-on knowledge and skills. Despite the advantages of tutorial courseware, there are some very few disadvantages. Disadvantages like learners have little or no chance of asking questions for further clarification but rather have to repeat tutorials for understanding, some novices takes longer to learn via tutorial than via classroom setting.

2.1.2 Considerations for Tutorials

In designing tutorials, the following points must be considered.

- Must contain interactivity and very simple examples to make tutorial effective and interesting for learners.
- Choosing the right media: audio, video, web, email, combinations is key to a successful tutorial development.
- Provide clear outline and divide topics into modules for learners
- What level of user should you aim at?
- The producers should create tutorials using familiar examples
- Use team to create tutorial for a faster completion rate

2.1.3 Drill and Practice Courseware

Drills provide students the opportunity to practice over and over again. Computer-based drills can take the practice previously found in workbooks and flash cards to a higher level. When used in conjunction with other computer-assisted instruction, (usually a tutorial), drills are not intended to teach new material. Drills are designed to give students the opportunity to practice what they've already learned (Doering & Velestsianos, 2009). Scholars like Garofolo and Sharp (2003) argue that, using drill software can determine the proper level of difficulty based on student ability, ensure completion, provide feedback to mistakes, suggest supplemental activities, and depending on its' design, record student results. Some drill software allows incorporation of randomly generated questions, interactive graphics, pacing and time measured responses, and student progress updates. According to Siglar (2003), many drills are used in subjects such as mathematics, spelling, grammar, and vocabulary, but they are suitable for practically all subjects that require the student to memorize facts.

According to Roblyer and Doering (2008) and Doering and Veletsianos (2009), drill-and-practice software provides exercises in which students work example items, usually one at a time, and receive feedback on their correctness. Providing feedback to learners vary depending on the software and it is also dependent on the learner's input or performance. Some programs simply present the next item if the student answers correctly. Different types of drill and practice are sometimes distinguished by how the program tailors the practice session to student needs (Merrill & Salisbury, 1984).

2.2 Types of Drills and Practice Courseware

Types of drill functions, described below, include flash card activities, branching drills, and extensive feedback activities.

2.2.1 Branching Drills Courseware

According to Doering and Veletsianos (2009), branching drills are more sophisticated form of drill and practice. In branching drills, the software moves students on to advanced questions after they get a number of questions correct at some predetermined mastery level; it may also send them back to lower levels if they answer a certain number wrong. Some programs automatically review questions that students get wrong before going on to other levels. Students may not realize that branching is happening, since the program may do it automatically without alerting them to this fact. Sometimes, however, the program may congratulate students on good progress before proceeding to the next level, or it may allow them to choose their next activities. More recently, educational software designers have attempted to use learners' cognitive status to decide what task learners should be presented with next (Salden, Paas, & van Merriënboer, 2006).

2.2.2 Extensive Feedback Courseware

In these drills, students get more than just correct or incorrect feedback. Some programs give detailed feedback on why the student got a problem wrong. This feedback is sometimes so thorough that the software function is often mistaken for a tutorial. However, the function of a drill is not instruction, but rather practice. Consequently, the integration strategies for drill and tutorial functions differ from each other in numerous ways.

Some advantages of the Drill and Practice courseware are they motivate learners, provide immediate feedback, student work at own pace and convince, and it also Increases acquisition and fluency of basic knowledge and skills. There are some disadvantages associated with the use of drills which include some Drill and Practice courseware usually lack high tech graphics and sound, can lead to boredom through content repetition, in some cases, Drill and Practice do not promote higher level thinking when content is not to the standards of the learner.

2.3 Instructional Games

Instructional games provide students a means to practice previously learned material or gain new information. Unlike drills, instructional games are competitive by design, pitching the student against the computer (or vise visa), another player, or time. Instructional games come in many varieties such as adventure, arcade, board, card or gambling, combat, logic, role-play, psychomotor, TV quiz, and Word games. When students know they will be playing a game, they expect an entertaining activity, because of the challenge of the competition and the potential for winning (Gee, 2004; Raessens & Goldstein, 2005; Squire, 2005, Giovanetto, Devane, & Durga, 2005).

The advantages of instructional games include: helps increase a child's memory retention capacity, improves computer and simulation fluency, helps acquire fast strategic thinking and problem-solving skills, develops hand-eye coordination, beneficial specifically for children with attention disorders, and also promotes skill-building. Some of the disadvantages of instructional games are related to the following: physical strain (e.g. long sitting habit), mental effects (e.g. can cause social isolation etc.), wastes time (i.e. when time limits are not set).

According to Salden, Paas, & van Merriënboer, (2006), in designing instructional games, the following points must be considered:

1. What kind of Platform will be appropriate (e.g. Windows, Android, Mac OSX, Linus, etc)
2. What moral, cultural values are embedded in the contents (e.g. use accepted storylines and familiar folklores)
3. Distribution or Dissemination Strategy (e.g. through the Internet, Appstores, CDs, etc.)
4. What is the impact of the Instructional Game (e.g. what will be the learners gain in using the game)?

2.4 Simulations

According to Regan and Sheppard (1996), using simulation as a way of learning presents information, guides the student, and provide student the chance to practice a skill. Simulations are unique in that; they give learners or users the chance to participate in a real-life decision-making situation. Often, they are an effective way of learning because they require problem-solving and decision-making. Also, they provide a non-threating safe learning environment. Students can easily work in groups to solve simulation problems. Knowledge or content is acquired easily once leaners are confronted with real-world situations.

Some of the advantages of using simulations are: users are helped in a variety of ways through simulated training. It helps in developing self-confidence among them learner. This technique helps in linking theory with practice of teaching. Learners are given the opportunity to study and analyze critical teaching problems. Simulated training

provides feedback to learners to modify their behaviour. It also helps in developing social skills like social manners and etiquettes among users. There is self-monitoring in simulated-training which reinforces desired behavior in learners and users. Again, it helps in developing efficiency in learners as a result of role-playing and also helps in the development of critical-thinkers.

There are some few disadvantages of simulations which include the following; In simulation, role-playing is done in artificial situations which are un-psychological and impracticable. Simulation is like socio-drama or sort of gaming, which reduces seriousness of learning. It requires the supervision of trained personnel to achieve set goals or targets. Simulation attempts to portray the real situations in a simple way, which are often very complex and difficult.

2..5 Tests

Test is a procedure intended to establish the quality, performance, or reliability of something, especially before it is taken into widespread use. A test is also taken to measures or check the quality, performance, or reliability of something, especially before putting it into practice. According to Bhatnager & Gill (2015), a test or examination (informally, exam or evaluation) is an assessment intended to measure a test-taker's knowledge, skill, aptitude, physical fitness, or classification in many other topics. It can also be administered verbally, on paper, on a computer, or in a confined area that requires a test taker to physically perform a set of skills. When computers are used in administering tests, learners are presented with the advantage of automatic scoring, randomly generated test items, testing at students' convenience, and cross reference of test items to learning objectives.

According to Kleeman (2012), the advantages of test include the following: testing identifies gaps in knowledge, testing causes students to learn more from the next study episode. It produces better organization of knowledge by helping the brain organize material in clusters to allow better retrieval and also to improve transfer of knowledge to new contexts. Testing improves metacognitive monitoring by giving students' scores or self-assessments. Testing prevents interference from prior material when learning new material. Testing provides feedback to instructors and lets them know what is learned or what is not. Frequent testing encourages students to study. While a number of advantages made the use of tests worthwhile, there are some disadvantages too. They include the following: encourage students to memorize terms and details. Provides unprepared students the opportunity to guess. Take time and skill to construct (especially good questions). Sometimes causes stress and anxiety

2.6 Characteristics of Courseware

According to Siglar (2003), when choosing or developing instructional courseware for a classroom, it is imperative that it matches the objectives of the course. Additionally, good instructional courseware has certain characteristics which should be noted when designing, selecting a courseware evaluation:

- Is the software easy to use?
- Do graphics and sound compliment the instruction?
- Does the student have adequate control over the lesson?
- Can the learner review previous information?
- Can the software be used in collaborative groups?

2.7 Advantages of Courseware

Computer based instructional courseware has been proven to benefit students in a variety of ways. A study by Kurelovic (2016) revealed that, when computer based instructional courseware is used appropriately in your classroom, it can:

1. Enhance student learning in terms of recall and time spent on instruction
2. Motivate students
3. Assist in developing teamwork skills
4. Provide allowances for the difference in students
5. Facilitate learning transfer to new situations

2.8 What is a Multimedia Courseware?

Multimedia courseware is the use of multiple media such as text, images, animation, audio, video and other related media clips in relation to time and space, to produce an instructional material using appropriate and approved course content into a course. Multimedia merges multiple levels of learning into an educational tool that allows for diversity in curricula presentation in almost all levels of education. The integration of these media in teaching assists teachers in blending subject matter with software engineering to produce an interactive system harnessing the benefits of a variety of elements and puts them together to create an interesting and user-friendly educational software. Often, a multimedia courseware is used to assist teachers to teach theoretical lessons in a practical fashion, to improve the understanding of concept that are learned. Multimedia is the exciting combination of computer hardware and software that allows you to integrate video, animation, audio, graphics, and test resources to develop effective presentations on an affordable desktop computer (Fenrich, 1997).

Furthermore, Ussher, Damoah, Ansong, Quarshie, Adjetey, Poakwah (2014) also state that, a Multimedia Courseware is an electronic learning material that could be an entire package with various lessons, tests, other material needed and it could be displayed in the form of text, video, sound, and various forms of animations.

2.9 Relevance of Multimedia Courseware in Education

Teaching and learning is an activity that demands full concentration to aid the understanding of what is being learnt. There are numerous factors that brings about the concentration and understanding of what is to be learnt. These conditions can be intrinsic and extrinsic. The intrinsic conditions are largely dependent on the psychological framework of the learner or student, which can also translate into the performance or behaviour of the learner or student during and after an instructional period. The extrinsic factors are normally dependent on the very things that accompany the teaching and learning activities either inside or outside the classroom.

Amongst the factors that impede students' learning extrinsically, teaching methodology is one huge factor that cannot be underestimated. Teaching methodology can make or unmake a lesson depending on the teacher's approach to that lesson. According to Tebabal and Kahssay (2011), the primary purpose of teaching at any level of education is to bring a fundamental change in the learner. This change would be manifested in the learner during the teaching activity. In teaching, some learners will have to picture and sometimes imagine what is being taught because there might be abstractions in the explanation of facts which somewhat gets complicated. In a biology class for example, how can a teacher explain how food nutrients get into our blood streams for absorption

into the various parts of the body without picture, videos and other similar media. This absorption process can be explained vividly using a multimedia approach (i.e. using colourful motion graphics with a relevant accompanying sound) for better expression and understanding.

There are several factors that enhance the significance of using multimedia in a teaching and learning environment. According to Hick (1997), the following are the benefits of using interactive multimedia courseware in teaching;

2.9.1 It improves learning

Many scholars over the years have agreed that, using interactive multimedia for teaching in the classroom payoff more than the textbook and lecture approach of teaching. It has been noted that, learners enjoy lessons with multimedia materials and therefore increase their learning. Najjar (1998) confirmed that learning was higher when information was presented via computer-based multimedia systems than traditional classroom lectures. To further argue out the essence of multimedia in learning, Joshi (2012) states that using of multimedia in classroom cannot be denied anymore. Using multimedia will make it possible for teachers to give more opportunities to their students to enjoy lessons. Teye (2012), noted that, using multimedia courseware can benefit both teachers and learners in three areas: teaching and learning, research, and service. The most commonly stated goal of multimedia courseware 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

The fundamental goal of all multimedia courseware is to improve teaching effectiveness in at least two ways;

i. 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. According to Taras (2003), it is widely recognized that feedback is an important part of the learning cycle, but both students and teachers frequently express disappointment and frustration in relation to the conduct of the feedback process. Although there might be disappointments and frustrations in presenting feedback, it is important that is not eschew from the learning process but must rather encouraged for a better class interaction and participation.

In addition, the teacher can also easily collect data on student demographics, attitudes, or behaviors to better assess the group characteristics of student needs. The learning needs of the students many vary from one person to the other, therefore it is pointless to consider tailoring instruction to each individual student, it is equally misguided to imagine that a single one-size-fits-all approach to teaching can meet the needs of every student (Felder & Brent, 2005). In considering the various needs of students, class instructors will be

privy to the differences which will further encourage him/her to find appropriate approaches needed, which therefore gives a better chance of meeting the diverse learning needs of all of their students.

2.9.2 It is interactive

Creating interactivity in a software is about the navigation of pages within or outside software. This is done by linking pages to other relevant pages to reveal its contents or elements. It can also be referred to as networking a page to another relevant page to display the contents which are hitherto hidden or unseen. Interactivity is one of the most important features of a learning system or software that cannot be downplayed because it has a very strong effect on the entire production of a system or courseware. Interactivity for a software can better be displayed at the fundamental stages of the software development cycle, by using the storyboard approach. A storyboard gives all the necessary navigation patterns or plans to be used in a yet to be developed or modified software.

Interactive Multimedia Courseware has a very strong positive effect on both teaching and learning. For example, Bosco (1986) reviewed 75 learning studies and found that learners learn faster and have better attitudes toward learning when using interactive multimedia courseware. Reeves (1999) explains interactivity as a learning environment that allows learners the luxury to perform meaningful activities such as navigating documents or pages, selecting relevant information, responding to questions using computer input devices such as a keyboard, mouse, touch screen, or voice command system, solving problems, completing challenging tasks, creating knowledge representations, collaborating with others, or otherwise engaging in meaningful

learning activities. When exploring in such an interactive learning environment, learners get motivated and exposed to knowledge in an unassuming manner which makes them assimilate what is learnt faster. For a learning system to be interactive for different types of learner, it will be necessary to take account of the end-users and it is not merely enough to give students access to different tools and learning environments (Bates and Leary, 2001).

2.9.3 It is flexible

Flexibility in a teaching and learning environment speeds up knowledge and skill acquisition. Knowledge and skills can be acquired easily and more efficiently when learners are given room to operate under little or no supervision. Learners gain more knowledge and skills when they are given very necessary precautions to follow and are allowed to study at their own pace. When course materials are converted into multimedia courseware, learners acquire knowledge and skills at their own pace which therefore makes studies easy and fun. Employing a multimedia approach with support from available platforms like reliable intra or internet networks and/or compact disc (CD) makes lesson accessible to learners both inside and outside the classroom which brings about flexibility in learning. Multimedia courseware can be accessed off or online from home, while travelling, at work, etc. which makes its distribution cover a wide range of learners who are both far and near.

2.9.4 It is modular

Multimedia courseware can be made modular so that, topics and sections of the courseware can stand alone to allow both teachers and learners to delve deep into areas they need to focus on whilst learning. Learners are also allowed to skip over topics or

areas they do not need and come back to them later when the need arises. In many courseware applications, options are included to allow customization for some specific features where one can choose modules and even edit the content in some fields to enhance the studies of that content. According to Ateyeh, Mulle and Lockemann (1998), applying modularity to courseware design does not only reduce the costs, but also allows the development of a high-quality reusable and configurable courseware.

2.9.5 It is Practical

Multimedia Courseware are capable of presenting true-life situations that learners often face in their day-to-day activities. Practical learners, learn best when they are faced with real situation or problems that have real life consequences. Situational stimulations, video stimulation or simple animations allow learners to learn-by-viewing, learners to learn-by-doing, learners to learn-by-coaching. All these styles of learning are effective methods for developing practical skills and increasing information retention in learners. Designing a multimedia courseware must have practical, visual in image and footages. These images will be beneficial for students to understand the knowledge and skills they are to acquire. The embodiment of the content should be lively, practical and interesting in order to propel the learning process and a multimedia courseware should also have practical applicability, that will be applied to the day-to-day learning by most learners (Fu, Menzies, & Shen, 2016).

2.9.6 Consistency

Often, multimedia courses are designed and developed with approved and relevant contents specifically tailored to meet the needs of a particular audience or learners. Courseware have a life span, after which its relevance is dependent on a content review

or system update. Until a courseware is updated or content reviewed, there is need for consistency in both aspects of the system (both courseware and content) for maximum user-performance. The skill and knowledge to be learnt from the content of the courseware should be relevant and beneficial to all users for the operational span. Inconsistencies in contents of courseware brings confusion and omissions in the minds of learners which therefore affect their outputs and performances. All learners learn the same principles and skills. Computer-based courseware typically forces instructional designers to better organize and structure learning materials, and this only can in learning advantage (Hick, 1997).

2.9.7 Engaging

Multimedia courseware with videos, audios and graphics, instant feedback, expert advice, and questions and answers platforms or fields keep learners interested with reinforced skills. Using such a multimedia courseware becomes very exciting and challenging. This excitement encourages learners to return to the program again and again. When learners become very interested in a learning activity, their performances increase from time-to-time which goes a long way to boost their confidence and mastery over the learnt subjects. Through continuous practice, learning is absorbed and integrated into daily performance (Bosco, 1986, Fletcher, 2000, Wren, 2008).

2.9.8 Students satisfaction

Students satisfaction and better performance are achieved using multimedia courseware. In a review of literature, Judson and Sawada (2002) opined that, Students perform better when their lessons are taught using multimedia or instructional technology. They attributed attentiveness and personal understanding to the use of

multimedia courseware (p.167). Judson and Sawada (2002) also stated, that the use of multimedia courseware make students more likely to attend class, press them to think more, promote them to listen more intently, and make them feel instructors know more about them as students.

2.9.9 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 which collects and analyses learner delivery and performance data, substantial administrative time is saved (Bosco, 1986, Fletcher, 200, Wren, 2008).

2.10 Significance of Multimedia Courseware in Art Education

The significance of a multimedia courseware in Art Education cannot be belittled, considering the scope of Art; as a practice (with very unique processes) and a product (the outcome of these unique processes). All processes or activities that has its end product as an artwork emanates from a set of ideas, feelings or an expression of experiences gathered overtime. This viewpoint is expressed by Seltzer & Bentley (1999), noting that the arts are organized expressions of ideas, feelings and experiences in images, in music, in language, in gesture and in movement. These arts provide for sensory, emotional, intellectual and creative enrichment and contribute to humans' holistic development. This holistic human development is achieved through a variety

of uniquely tried, tested and proven art processes and activities that yields results of heart soothing expressions of artworks and performances.

In pursuance to these artistic expressions, elements such as tools and materials, techniques and processes, critiquing and appreciation of arts cannot be overruled. All these elements can and will impact positively if multimedia courseware or systems are used in our various classrooms. Even though the literature abounds on the importance of multimedia in Art Education, there is a paucity of empirical literature on the significance of using a multimedia courseware in teaching creative arts in basic schools. It is the strongly held view of the researcher that all creative arts classrooms will be better off with multimedia courseware as part of the teachers' instructional materials for both theory and practical lessons. Therefore, the development of this multimedia courseware contributed to knowledge in the courseware design and development literature by making use of, and recommending the use of appropriate colours, fonts, layout styles, and simple transitions.

2.11 Working with Tools, Materials, Processes and Techniques

All through our arts, there are techniques and processes in achieving any artwork. These techniques and processes are made manifest through the use of some tools and materials. Every technique or process in the arts has its uniquely designed tool and how those tools are to be handled to achieve certain results. The tools and materials used in the arts are acquired from diverse backgrounds which therefore demands training from the experts of these tools and materials. The experts are obviously scattered all over the world therefore it's impossible for budding artist to meet these experts one-on-one to train them on the use of these tools and materials. It is rather possible to use multimedia

courseware to teach when and how to use these tools and materials in achieving certain techniques or styles.

Using a multimedia courseware can give budding artists the privilege of meeting some experts in certain areas of art popularly known for using certain unfamiliar tools and materials from which they can learn. Multimedia courses online and on other accessible platforms afford artist across the world the platform of learning new things from their practice.

There are various techniques and methods in producing artworks. These techniques and methods vary slightly based on the preference and experience of the artist. When multimedia is used as a tool for knowledge and skill dissemination, students learn these techniques, methods and practice and also try them on their own until they become familiar with the techniques and methods. Using a multimedia approach in learning propels absorption rates in both the young and old.

2.12 The Design Processes

2.12.1 Planning, Design, and Layout

There is combination of ideas used in planning and designing a product called a layout. A layout is the arrangement of all the units or elements into a usable and desirable format. These units or elements include the heading, subheading, body matter, illustrations, and photographs. The preparation of a complete set of layouts require pre-layout planning, thumbnails sketches, a rough layout, and a comprehensive layout.

Graphic planning lets the designer review and revise ideas while changes are still easy to make. When all the people involved in a project know what they are to do, the work can be done more quickly and accurately. Good planning and a complete layout will make sure that spelling, spacing, sizes, and placement of materials are right. The specification of clients must be met. When a high quality final work is delivered, everyone thus, the buyer, the graphic arts commercial printing management, and the skilled workers will be satisfied with a job well done.

2.12.2 Layout Procedure

The sequence for preparing graphic layout materials is an essential part of every designed product. Several thumbnail sketches are usually proposed, as it formed the very foundation of the design process. The selection of one of the thumbnail sketches of may be made by the person ordering the product or by the designer. After the thumbnail sketch is chosen, the rough layout is made. The rough layout is generally the same size as the final product and contains all the copy and illustrations. Changes can easily be made between the thumbnails sketches and the rough layout, and again between the rough and the comprehensive layout. The comprehensive layout is based on the thumbnail sketches and the rough layout. This is a precision layout that lets the customer see how the final product will look.

2.12.3 The Thumbnails Sketches

Thumbnail sketches are simple idea sketches which help the designer quickly think through a number of possible ways of presenting a product. The designer and the client can then select the ideas that they would like to develop further. Thumbnail sketches serve three main purposes:

1. They record ideas that might be forgotten.
2. They let the designer and others see how an idea looks.
3. They let you compare ideas.

Thumbnail sketches should be made as soon as the information is available and the pre-layout planning is ready. The pre-layout planning should be written before the thumbnails are made so that all elements are planned. The designer of a printed product should have all specifications in hand when beginning work.

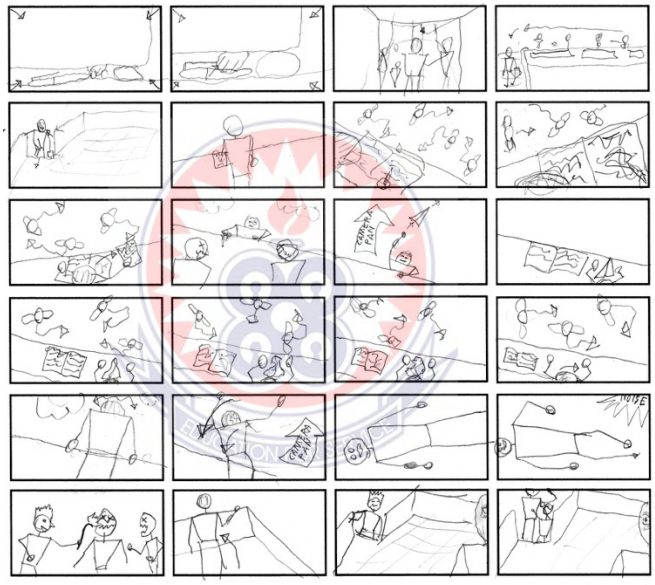

Figure 1: Sample of thumbnails sketches
(source: VIZA 643 Final Project, 2012).

2.12.4 The Rough Layout

The second major step in the layout design stage is preparing a rough layout popularly known in designing as the rough. The rough is an improvement or refinement of a thumbnail sketch. A rough layout has three main purpose.

1. It makes the client and the designer choose one of the several sketched ideas. They may also decide to combine elements of two or more of the sketches. Whatever they do, the rough will represent their final decision.
2. It gives everyone concerned something to look at that can be studied and changed.
3. It lets the designer refine the final ideas in needed.

Figure 2. Sample of Rough Layout
(source: Seven Camels, 2014)

2.12.5 The Comprehensive Layout

The comprehensive layout is the most important step in the production of a design. It is the master plan or blueprint of the finished product. It lets the designer and the client to see the finished product and change it if necessary. After the designer and client have

the necessary decisions, the comprehensive layout will be marked with all information needed to complete the printed product. It will guide specialist who will produce the final product.

Figure 3. Sample of a Comprehensive Layout

(source: Behance, 2017)

2.13 Design and Layout Considerations

According to Dennis and Jenkins (1991), the following considerations are key designing tips for accurate and desirable graphic design product.

1. Planning
2. Design and layout are essential to quality finished product. Know the elements in each layout stage.
3. Make your text reader friendly because a product with text is meant to give information to end-users.

4. A comprehensive layout is a blueprint, a master plan.
5. Prepare the final product in pencil; then compose the final product with type, illustrations, and photographs.
6. Keep it simple.
7. Know type styles and principles of typography.
8. Understand the point measurement system.
9. Understand the basic design principles.
10. Know about colour and how it affects people.

2.14 Graphical User Interface

A graphical user interface (GUI) is a pictorial interface between a human being and a device, that enables the human to interact with the device through a program, software, game or an application. According to Aldrich & Garrod (2013), a graphical user interface, or GUI for short, is a visual way for a user to interact with an electronic system through visual icons rather than a command or text-based interaction. The purpose of a GUI is to increase the simplicity of controlling an electronic system and to make the time to learn of such systems. GUI can make programs easier to use by providing consistent appearance and intuitive controls like pushbuttons, list boxes, sliders, menus, etc. These components used in designing GUIs are called interface development tools (IDTs) or GUI builders (Myers, 1995). The GUI behaves in an understandable and predictable manner, so that a user knows what to expect when they perform certain tasks. For example, when a mouse click occurs on a pushbutton, the GUI should trigger the action that correspond with that clicked button.

According to MATLAB (2015), a real graphical user interface includes window frames which you create that contain buttons, text input fields, and other onscreen components. Al Ashi and Al Ameri (2001) also opined that, GUIs are potentially very complex entities because they involve a large number of interacting objects and classes. Myers, Hudson, Pausch (2000) also defines Graphical User Interface as direct-manipulation interfaces and are almost universal. These objects perform sophisticated tasks by interacting with each other which raises complicated communication and scoping issues if not handled properly. Designing GUIs are very challenging when the designed asset (designed buttons) are not able to interact with the path of code that triggers the required actions. Myers (2000) confirms the difficulty in designing and developing GUIs by stating that, because user interface software is so difficult to create, it is not surprising that people have been working for a long time to create tools that will help to make them simpler.

When a Graphical User Interface is running, the user can click buttons and interact with any of the other onscreen components in any order because the written codes trigger the actions that calls for corresponding behaviours of the assets. These buttons are driven by series of written codes that propels the performance of GUIs in various software and therefore cannot be sidelined in software production.

Szekely and Neches (1992) opined that, the main purpose of designing and developing a GUI for a software is to allow both software developers and the software users to communicate with systems in order to acquire relevant information needed to successfully interact with humans. To design and develop a successful interface, content developers need to acquire enough information about the system to be built. The information ranges from an analysis of the tasks that the users are expected to perform using the system, to detailed descriptions of the look and feel of the system. According to Szekely and Neches, the required information falls into the following categories.

Task specification: specification of the tasks that users are expected to accomplish using the system. The task specification is needed in order for developers to understand what services to provide in a system and how to deliver them to the end-users in order to help them perform their tasks more effectively.

System functionality: specification of the functional requirements of a system is key to software development. This information specifies the requirements of the software modules that the interface software calls upon to fetch data display, and to modify data in response to user requests. Different interface designs often impose different requirements on system functionality.

Interface functionality: a specification of the system information and state that needs to be presented, and the commands to be made available to users. This specification captures the content of the interface, abstracting away from style details such as font, color, layout, hierarchy etc. It is important for content

developers to understand the interface at this abstract level. For example, before worrying about style issues of a display, developers should understand whether the display presents the right amount of data at the right time to help users perform their tasks.

Screen layouts and behavior: specification of how the interface looks and behaves. This information is of primary importance to both content developers and the end-users because it defines what the end-users can see and do. Therefore, designing and developing a GUI is a very vital part of software development since it requires information that will aid the end product to looks and feels stunning enough for easy usage.

Design rationale: a specification of the reasons why the different design choices were made. This information is useful for many reasons. The Design rationale is used to achieve consistency in the interface's design and development.

2.15 Processes in Developing a Graphical User Interface

2.15.1 How Graphical User Interfaces are created

In an account of how graphical user interfaces are created, Luo**,** Szekely &Neches (1993) opined that, Interface builders (software), unlike facade tools, are interface construction tools rather than interface prototyping tools. Facade tools are essentially drawing editors with the power to specify input behavior into graphical components or assets that are built. They are termed facade tools because they allow user interface developers to construct screens that look and behave like the screens of the real

application, except that there is no scripting language behind them (Szekely, 1992 p.5), The main strength of these facade tools is that, they give interface developers a drawing-like interface to specify the kind of interface they intent to build.

The facade tools also provide a special scripting language to specify action or behavior into designed graphical components or assets which is meant for interface design. These interface builders use a general-purpose programming language such as NeXT Interface Builder for NeXT Step, Prototyper for the Macintosh, WindowsMAKER for Microsoft Windows, UIMX for X Windows, Motif and C or C++ to specify behavior, the same language that is often used to implement the application functionality (Szekely, 1992 p.7). Facade Tools differ mostly in the quality of their drawings (e.g. 3D shapes), and the sophistication of the input behaviours can be specified. According to Szekely (1992), Astound, Hypercard and MacroMind Director are examples of Façade tools but these tools, and other similar ones were not designed as user interface prototyping tools. They have their own domain of applicability and are reputed to be widely popular and extremely effective tools in their domain. By way of analysis, Szekely, in his discussions stated that these tools are tools for prototyping interfaces because they are often used as such.

2.15.2 How Graphical User Interfaces Work

Based on Al Ashi and Al Ameri's (2001) study, a graphical user interface provides the user with a familiar environment in which to work. This environment contains pushbuttons, toggle buttons, lists, menus, text boxes, etc. GUIs are very difficult to produce because a GUI-based program must be prepared for mouse clicks (or possibly

keyboard input) at any time in the usage of the software. Such inputs are known as events, and a program that responds to events is said to be event driven.

According to Al Ashi and Al Ameri (2001), There are three principal elements required to create a user friendly Graphical User Interface and these are:

1. Components or assets: Each item on a GUI is a graphical component or asset. The types of components or assets include graphical controls (such as pushbuttons, edit boxes, lists, sliders, etc.), static elements (frames and text strings), menus, and axes. Graphical controls and static elements are created by the functions *uicontrol* (user interface controls), and menus are created by the functions *uimenu* (user interface menu) and *uicontextmenu* (user interface menu). Axes, which are used to display graphical data, are created by the function axes.

2. Figures, pictures or images: The components of a GUI must be arranged within a figure, which is a window on the computer screen. In the past, figures have been created automatically whenever we have plotted data. However, empty figures can be created with the function figure and can be used to hold any combination of components.

3. Callbacks, actions and behavior: these are ways to perform an action if a user clicks a mouse using a mouse cursor on a button or types information on a keyboard. The action of clicking with the mouse cursor or typing information with the keyboard is termed an event, and the program or software must respond to each event if the program is to perform its assigned function on the GUI. For example, if a user clicks on a button, that event or action must cause the code

that implements the function of the button to be executed. The code executed in the background in response to an event is known as a callback. There must be a callback to implement the function of each graphical component or asset on the GUI. The basic GUI elements are summarized in Figure 4.

Figure 4: Some Basic GUI components
Source: Al Ashi and Al Ameri (2001)

2.16 Things to consider when designing a Graphical User Interface (GUI)

Human Computer Interactions span some fifty-four years ago, where devices were manipulated directly using pointing devices on graphically designed user interfaces. Myers (1996) noted that direct manipulation interface was first demonstrated on a device, where visible objects on the screen were directly manipulated with a pointing device designed by Ivan Sutherland in 1963. This interaction concentrated on the connections between the human and computerized systems directly. User interfaces and its underlying principles provides both interface developers and their end-users the luxury for these complex communications. In the formative years of human-computer interactions, user interfaces were designed to focus on the ease of use and not aesthetics. In considering the principle of ease of use in designing an interface, some typical issues must be considered. These include the properties of various input and output devices designed for users, and its learnability for both new users, as against the efficiency and extensibility for experienced users. The appropriate combination of interaction components such as command languages, menus, and graphical user interfaces (GUI) are the key things that must be considered.

GUI designs must take account of the needs, experience and capabilities of the system users (target group). Designers should be aware of people's physical and mental limitations (e.g. limited short-term memory) and should recognize that people have different learning abilities (Myers, Miller, McDaniel, and Ferrency, 1996b). GUI design principles underlie interface designs, although not all principles are applicable to all designs. According to Sommerville (2004), the following are principles to consider when designing a GUI for systems; User familiarity, Consistency, and

Minimal surprises.

2.16.1 User familiarity

The interface should use terms and concepts which are drawn from the immediate environment or the experiences of the people who will make most use of the system (Sommerville, 2000, p.4). The interface should be based on user-oriented terms and concepts rather than strange concepts which users are not familiar with. For example, an art-based system should use concepts such as letters, colours, drawing tools and materials, etc., rather than pilot's compasses, cockpit terminologies, etc. Things that are going to form very basic components of the system should not be too alien to the users in order that they get to enjoy the use of the system as many times as desired.

2.16.2 Consistency

The interface should be consistent, in that, as much as possible, similar operations should be activated in the same way. The system should display an appropriate level of consistency. Graphical assets such as buttons, icons, menus should have the same format, command punctuation should be similar and easily accessible to end-users at a glance, etc. Burgstahler (2012) confirms Sommerville's (2000) viewpoint, by stating that web pages should maintain consistency with all website pages in layout, navigation and content. This makes the website more useful and accessible to users. Halim (2009) also agrees with this assertion, stating that, a consistent look and feel throughout the website will give the user a bolder and stronger impression. Maintaining consistency is very important in the design of the software. If consistency is downplayed in the design of a software's graphical user interface, smooth navigation becomes a major problem for end-user, making the use of the software unfriendly and difficult to work with.

2.16.3 Minimal surprise

Sommerville (2004) opines that, software users should never be surprised by the behaviour of a system. If a command operates in a familiar way, the user should be able to predict the operation of subsequent commands on other pages. This kind of considerations should be dealt with in the layout stages of the software designing. The more users are surprised with changing assets of a software, the higher the possibilities of users not coming back to using the software again and that is how potentials users will avoid the loose taste use of certain software available on the markets. In the designing of user interfaces, the designs should put in place mechanisms that allow users to recover from errors that may occur in the use of the software. The system should provide some resilience to user errors and allow the user to recover from errors or mistakes made. This may include facilities or assets that allows users to undo actions that were done accidentally. Some confirmation of destructive actions such as previous, deletes, go back buttons or commands, etc. should be made available for users on almost all pages of a software were applicable.

Another important principle to consider in designing user interfaces for systems is the provision of some user guidance elements, such as help systems, online manuals, etc. (Sommerville, 2004). The interface should provide meaningful feedback to end-users when errors occur and provide context-sensitive help facilities. Such facilities aid first time users to have a fair idea of how the system or software can be navigated freely and easily in order not to encounter problems. The interface should provide appropriate interaction facilities for different types of system user. Accessibility options for different types of user requirements and preferences should be supported. For example, for some users with low vision, text or screen magnification options should be made

available for their use.

2.17 Pedagogical Principles for Courseware Development

According to Clark (2002), courseware development has three distinct and important elements namely: the instructional methods, the instructional media, and media elements. These three elements determine how effective and efficient a courseware would be when deployed on the web (Internet or Intranet) and CD. Instructional methods according to Kizlik (2017), is the learning objective-oriented activities and flow of information between teachers and learners. It can similarly be explained as the process of learning to be a teacher. Instructional methods are largely centered on the processes involved in lesson preparation and delivery (lecturing, role-play, multimedia learning, etc.) to achieve the set objective. On the other hand, instructional media encompasses all the materials and physical means an instructor might use to implement instruction and facilitate students' achievement of instructional objectives. This may include traditional materials such as chalkboards, handouts, charts, slides, overheads, real objects, and videotape or film, as well as newer materials and methods such as computers, DVDs, CD-ROMs, the Internet, and interactive video conferencing.

Media elements are the individual items that make up or form part of an instructional media. Although all these elements are important in courseware design and development, Clark (2002) contends that, it is not the medium that causes learning but rather the design of the lesson itself and the best use of instructional methods that make the difference. Clark further explained that, a learner-centered approach suggests that lessons must be that accommodate human learning processes regardless of the media involved.

In designing a courseware, six pedagogical principles are to be followed (Clark 2002):

- The multimedia principle: adding graphics to words can improve learning.
- The contiguity principle: placing text near graphics improves learning.
- The modality principle: explaining graphics with audio improves learning.
- The redundancy principle: explaining graphics with audio and redundant text can hurt learning.
- The coherence principle: using unnecessary visuals, text, and sounds can hurt learning.
- The personalization principle: use conversational tone and pedagogical agents to increase learning.

2.18 Multimedia Principles

2.18.1 Adding graphics to words can improve learning.

Graphics mean any sketch, drawing, special artwork or other material that pictorially depicts an object or a process or otherwise conveys information, as a supplement to, or instead of written descriptions. The utilization of computers to accomplish such tasks leads to a new discipline of computer graphics. According to Carry (n.d.), students need visual images to help them read and understand texts. Visual information can support reading and help make meaning of text. According to Reddi & Mishra (2003), multimedia is characterized by the presence of text, pictures, sound, animation and video; some or all of which are organized into some coherent program. Multimedia provide a technology-based constructivist learning environment, where students are able to solve a problem by means of self-explorations, collaboration and active participation (Kumar &Agarwal, 2016).

Using multimedia to support texts induces visual literacy into young learners at the early stages of their education. These young learners are able to easily identify things in their immediate environment, because they perceive those things visually. In giving an account of traits in visually literate people, Carry (n.d.) opined that, visual literacy aids learners with the ability to decode, interpret, create, question, challenge and evaluate texts that communicate with visual images as well as, or rather than, words. Visually literate people can read the intended meaning in a visual text, interpret the purpose and intended meaning, and evaluate the form, structure and features of the text. It is also believed that what is seen with the eye is what is seen with the mind.

In an attempt to explain the power of multimedia in explaining some very abstract and complex phenomena to learners, Clark and Mayer (2003), compared learning about various complex mechanical and scientific processes such as how blood flows in humans and how lightning forms when raining, from lessons that used words alone or used words and pictures (including still graphics and animations). Some complex operations, happenings and concepts are better explained using multimedia. Using multimedia in teaching has more advantages than without it. Learners embrace multimedia lessons more positively, than they do without multimedia. This is confirmed by Mayer (2003), noting “an average gain of 89% on transfer tests from learners who studied lessons with graphics compared to learners whose lessons were limited to text alone”. This statement from Mayer gives an undisputed empirical support that should discourage the use of screens and screens of text as an effective learning environment for learners, either young or older.

2.18.2 The contiguity principle: placing text near graphics improves learning.

Contiguity refers to the alignment of graphics and text on the screen. Mayer and Anderson (1992) proposed the instructional design principle called the contiguity principle, which states that the effectiveness of multimedia instruction increases when words and pictures are presented contiguously in time or space. There are two main types of contiguity principles namely; spatial and temporal-contiguity. According to Moreno and Mayer (1999), a spatial-contiguity effect refers to learning enhancement when printed text and pictures are physically integrated or close to each other rather than physically separated. For example, students who read a booklet explaining how tire pumps work that included captioned illustrations placed near the text generated about 75% more useful solutions on problem-solving transfer questions than did students who read the same text and illustrations presented on separate pages (Mayer, 1989; Mayer, Steinhoff, Bower, & Mars, 1995). Another example is, students who listened to a narration explaining how a bicycle tire pump works while also viewing a corresponding animation generated 50% more useful solutions to subsequent problem-solving transfer questions than did students who viewed the animation before or after listening to the narration (Mayer & Anderson, 1991, 1992; Mayer & Sims, 1994). When spatial contiguity principles are thought well, multimedia students will improve their cohesion of graphics and text by half. This is confirmed by Mayer and Sims, (1994) by saying, students who scored high on tests of spatial ability showed greater multimedia effects than did students who scored low on spatial ability.

Temporal-contiguity effect refers to learning enhancement when visual and spoken materials are temporally synchronized, that is, presented simultaneously rather than successively (Moreno & Mayer, 1999). Clark (2002) opines that, often in some

courseware, when a scrolling screen is used, the words are placed at the top and the illustration is placed under the words so that when you see the text you can't see the graphic, and vice versa. This is a common violation of the contiguity principle which states that graphics, and text related to the graphics should be placed close to each other on the screen.

2.19 The Creative Arts

Creative Arts is the use of multiple intelligences in self-expressed ways both intrinsically and extrinsically, involving a range of activities such as listening, observing, discussing, body movement, thinking and imagining. Ghana Teaching Syllabus for Creative Arts [TSCA] (2007) define Creative Arts as an amalgamation of Visual Arts (drawing, weaving, modelling, casting, carving and painting), Sewing and Performing Arts (music, dance and drama). This is also confirmed by Kindler (2008), stating that Creative Arts consist of arts and craft, music and dance. Participation in these activities allows for creative and imaginative expressions, such as music, art, creative movement. Adults and children who express intrinsic feelings extrinsically using their minds, bodies, and senses exhibit creative products that can be perceived physically and virtually. The Arts give children the chance to allow their individuality to be expressed through tangible form such as music, art, creative movement (Grainger and Barnes, 2006). Root-Bernstein and Root-Bernstein (2003) opined that the body cannot lie, that each gesture, each movement unerringly reveals true inner emotion of an actor knowingly or unknowingly. Creative Arts is a comprehensive curriculum of instructions meant to teach creativity in basic schools. According to the Curriculum Research and Development Division (CRDD) of the Ministry of Education, Ghana (2007), it is also a practical subject with no vocational objective. However, it

emphasizes creativity, skillful and efficient handling of tools and materials, skills and techniques to accomplish specific tasks, and responding to artworks.

Creative Arts as a course of study is very broad in scope, consisting of Visual Arts (drawing, weaving, carving, modeling, casting and sewing), Performing Arts (Music, Dance and Drama) and Literary Arts (Poetry, Recitals). These three main areas are distinct and detailed which therefore demands very different approaches in lesson preparation and delivery. Teachers who teach Creative Arts require specific knowledge and skills in all the three unique areas in teaching the subject (Boafo, 2010).

In Visual Art, there are two and three-dimensional art forms. Two dimensional arts are the arts that have no depth. These kinds of arts are not able to stand-in-the round or stand on their own, meaning they have only height and width. Drawings, paintings, prints, collages or photomontages are examples of two dimensional arts. Two-dimensional art forms are normally flat in appearance and are made on flat sub-straights or supports. On the contrary, three dimensional arts are art forms which can stand on their own without any additional support. They are art forms with depth or distance. Depth in a three-dimensional art form is created by three components, namely height, width and physical distance. Three-dimensional arts are commonly found in areas like ceramics and sculpture which are all made from solid materials like clay, wax, plasticine, metal, glass, wood etc. that can stand-in-the-round. There are four major processes of sculpture: Modeling: this is an additive process in which a soft, pliable (bendable) material is built up and shaped into a sculptural form, commonly done with pliable materials such as clay, wax or plasticine.

Assemblage is an additive process of building art forms by artist where they gather and join a variety of different materials to construct 3-dimensional work of art. Generally done with wire, metal, string, wood or found objects. Carving: this is a subtractive process of cutting or chipping away from a given mass. Generally done with wood, marble, stone, plaster or other hard substance. Casting: this is a process which is neither additive nor subtractive. A melted down metal or other liquid is poured into a mold to harden. Many copies of the same artwork can be made quickly by using casting. Generally done with plaster, slip, bronze, copper or gold.

2.20 The Rationale for Creative Arts

The main rationale for the Creative Arts is to assist pupils to develop their head, hearts and hands for all future endeavours. When all these aspects of a person fully mature, that person is considered a well-rounded personality. The labourer works with his hands, the craftsman works with his hands and his head, the artist works with his hands, his head and his heart. People see artworks and it arouses certain feelings in them. As we appreciate these artworks by talking intelligently and knowledgeably about them, we are expressing our feelings about it and this is education of the heart. Thus, Creative Arts education provides a holistic education of a person by using the head, heart and hands.

Another rationale for the Creative Arts is directly related to human survival in our immediate environments using forms of art as the vehicle. Each of the art forms (visual, music and theatre arts) has its own specific value and rationale but its blended well to provide a rich source of life experiences and understandings that cannot be gained in

any other way (Darby, 2017). The teaching and learning of the arts provides avenues for strengthening social identity and unity of purpose, discovering the cultural heritage and creating a unifying nation (CRDD, 2007). The teaching and learning of the arts is sequential and procedural and therefore requires all those who teach it to acquaint themselves with its processes and procedures. The sequential nature of the activities that brings about the end product in artwork demands critical thinking. Carole (1992) opined that, educators actively involved in teaching the arts agreed that the arts can make unique contributions to the development of critical thinking skills. Learning the arts provides the medium for critical and imaginative thinking, doing/making and responding to processes as well as products.

According to Eisner (2002) as sited in Nilson, Fetherston, McMurray, Fetherston (2013), critical thinking occurs both during and after the experience of production. The comprehensive and sequential learning experiences in the arts provide individuals with necessary skills, understandings and confidence to participate fully in the arts throughout their lives (Darby, 2017). Creative Arts as a subject of study is mainly hinged on the productions of works both physically and virtually which can be critiqued and appreciated by the audiences or viewer. It is therefore an undeniable fact that the art of producing artworks requires critical thinking, which involves processing the meaning and significance of observed experiences or expressed inferences.

Teaching Creative Arts to children boost and develop their sense of visual thinking inside and outside the classroom. This kind of thinking emerges in all art-based activities, knowingly or unknowingly. Visual thinking in creative activities occur through active exploration of ideas, materials, tools and processes; selection, grasping

of the key ideas, comparison, problem solving, combining and separating ideas (Amenuke, Dogbe, Asare, Ayiku & Baffoe, 1991). Almost all visual thinking processes yields an end product through the use of some tools and materials such as knives, hammers, pens, pencils, brushes, inks, clay, straw, wood, metal or fabric to make artefacts, which acquire manual skills. Visual thinking is using the arts to teach thinking, communication, and visual literacy to young people (Landorf, 2006). This view is confirmed by Yenawine (2014) when he stated that, visual thinking allows pupils to examine art, think, contribute ideas by observing, listening and understanding in all the activities they perform. According to Landorf (2006), when students are exposed to visual thinking, they are encouraged to do the following;

- gain confidence to construct meaning from existing phenomena.
- take part in active class discussions to help gain group problem solving skills
- develop communication and visual literacy skills.
- transfer skills to other subject areas, classroom interactions, and beyond.
- practice respectful, democratic collaborative problem solving among themselves that transfers to others.

Additionally, it helps to develop the ability to adapt positively to the changing local and global environment and the need to help sustain it. The Creative Arts also helps develop skills and aptitudes for learning new knowledge and prepare pupils for further education and training.

In child development across the world, art-based activities cannot be skipped when considering the growth of a well-rounded human being. Children play and learn through the arts acquiring various life experiences using their senses. All the art lessons and activities developed for primary schools are fashioned to use almost all the human senses (seeing, smelling, tasting, touching or feeling and kinesthetics). The sensory side of human experience is primary in the arts, or so it is believed (Eisner, 2007). The interplay of these senses and the need for sensory experience underpin the human desire to grow and develop intellectually, socially, personally, and emotionally and can play an important role in this holistic development. For children to gain full knowledge and understanding of the world around them, they will have to investigate objects and materials by using all their senses as appropriate, e.g. exploring the different properties of materials, such as differences between wet clay (which can be shaped to build things) and dry clay (which can be pounded into powder) Pound (2011).

2.21 The Creative Arts Syllabus

The Creative Arts can be considered as a course and be likened to a product. All products are designed with target audience in mind, in this case, primary school teachers and pupils. Every product designed for humans demand a comprehensive and user-friendly manual to ease its use. All parts and features of the product are spelt out and explained clearly in the manual to aid users in the day-to-day use of that product. The Creative Arts as a course of study and a product has its manual generally known as the Creative Arts Syllabus. The syllabus has been broken down to simple understandable sections thus; introduction, rationale, general aims, scope of content,

organization and structure of syllabus. Each of these sections carry very vital information that is designed to aid the teachers in their lesson preparation and delivery.

According to Ampeh (2011), the syllabus is a reference material for teachers to plan and evaluate the instructional programme for creative arts in the respective basic schools. Because the subject is broad, the syllabus gives the teachers a starting point to begin planning their lessons. During the lessons delivery, the teacher is given some points to consider in terms of teacher activity and student or pupil activity as the case may be. From primary 1 to 6, comprehensive and sequential procedures are displayed to help teachers get a fair appreciation of how lessons are to be handled, including the skills needed for the lessons and values pupils will acquire after a lesson is successfully completed. Studying the arts develops individual and social values. This is confirmed by the United Nations Educational, Scientific and Organization (UNESCO), which noted that there are very important virtues (knowledge, skills, values and attitudes) that should be transmitted to current generations in order to guarantee a sustainable future for the arts.

> All forces of society must be engaged in the attempt to ensure that the new generations of artists in this century gain the knowledge and skills and, perhaps even more importantly, the values and attitudes, the ethical principles and the moral directions to become responsible citizens of the world and guarantors of a sustainable future (UNESCO, 2006 p.14).

The syllabus is designed to be pupil-centered and in turn, make the contents, instructions and pupils' learning outcomes increase progressively from class to class. When pupils progress in their day-to-day lessons and activities, it increases their artistic expression and thereby boosts their confidence for future endeavours.

2.22 Time Allocation

According to the TSCA (2007), a maximum of six periods a week of 30 minutes (three double periods of 30 minutes) is recommended for teaching Creative Arts. The six periods should be put into double periods of 60 minutes each. During preliminary investigations of the study, some schools (both public and private) were found to be allocating two periods of 30 minutes a week for their creative arts lessons. These periods were normally put in the last slots on the class timetable for Thursdays and Fridays. Some teachers use these periods to clear arrears or begin lesson plan for the following week, since they get busy during the weekends. Boafo (2010) revealed that, teaching and learning periods allotted for Creative Arts are reduced to three or four periods, whiles much time is spent on theory lessons more than practical's. This act by the teachers is contrary to the Ghana Teaching Syllabus for Creative Arts which directs that, much attention must be focused on the practical skills rather than the theoretical lessons.

According to Boafo (2010), practical skills must be give 80% of the instructional hours while 20% can be used for theoretical lessons. Therefore, they allot inadequate time for the subject, hence reducing the contact hours meant for lessons. Boyd (2006) pointed out the fact that, there is a myth in the educational community that all art forms are somewhat the same. Therefore, Dance, Drama, Visual Art, and Music are condensed into the same timetable slot in many primary schools.

2.23 Primary School Teachers (Colleges of Education Syllabus)

Colleges of Education in Ghana run a three-year diploma programme consisting of various subjects including Vocational Skills (Visual Arts and Home Economics). Two of the three years are structured for tuition, and the final year for off-campus teaching practice. For the Colleges of Education who run Vocational Skills as part of their curriculum, students are allowed to choose which of the two vocational skills courses (Visual Arts and Home Economics) they prefer. Trainees who choose visual art will have to complete seven main visual art topics. These topics are made up of two and three-dimensional visual art forms. According to the Colleges of Education Visual Arts Syllabus (2014), the following are the topics to be treated;

- Fundamentals in Visual Arts
- Principles and methods of teaching Visual Arts
- Assemblage and Construction
- Fabric and leather decoration
- Modelling, casting and carving
- Visual communication
- Weaving and stitching

It is expected that after a successful completion of these topics, the teacher trainee would be equipped with the knowledge and skills to teach visual arts in the basic school. However, they are usually unable to teach Creative Arts. This is because the visual arts as a subject of study forms part of the creative arts discipline. The visual arts aspect of the Creative Arts discipline would be partially catered for but not the other areas like music and performance. This therefore means that when such a teacher graduate and

starts to teach, they will lack the requisite knowledge and skills for teaching the other relevant areas (Music and Performance) that form part of the Creative Arts subject.

2.24 The Uniqueness of primary school teaching.

Dosoo (1996) states that, primary school education is the most essential form of formal education a nation provides for its citizens. Primary education in Ghana span six years, which makes if the very foundation for all educational levels. After the six years of foundation works in education, pupils go through three additional years of Junior High School to complete the nine years compulsory basic school in Ghana (UNICEF, Division of Policy and Planning, 2007).

According to Lockheed, Adriaan, Verspoor and associates (1991) and Dosoo (1996), the fundamental aim of Primary Education is to equip young children with basic competence in;

1. Numeracy - pupils should be able to count, use or manipulate numbers or figures,
2. Literacy - they should be able to read, write, comprehend and communicate ideas effectively,
3. Socialization - developing in pupils such skills and attitudes that will enable or make them become good citizens.

The skills to be developed in pupils include inquiry and creative skills and the ability to: observe, collect information, develop working principles and application of the principles to new situations. The creative skills to be imbued in the pupils consist of

manipulative skills, body movements and artistic skills such as drama, art, music, home economics and dance.

Primary school teaching is the art and science of helping pupils to grow in their knowledge and understanding (Nunan 2009). It also involves the giving of oneself to others so that possibly, the piece that one gives will blossom in the heart of another and, even more importantly, might cause others unknown to you to blossom. Teaching goes with learning, which simply means teaching and learning are closely woven to each other such that, anywhere there is teaching, learning is present. According to Fry, Ketteridge & Marshall (2009), the untold tasks of teaching are selecting worthwhile learning activities, giving helpful explanations, asking productive questions, and evaluating students' learning. All these activities depend on the teacher's understanding of what it is that students are to learn. Therefore, teaching needs to begin with the teacher. A teacher must be adaptable enough to relate to strangers (learners) in a way that reaches each one of them. There is also need for the teacher to have the courage and strong conviction in what he/she teaches and be able to communicate that in different ways to learners.

Buchmann (1984) points out, it would be odd to expect a teacher to plan a lesson on, for instance, writing reports in science and to evaluate related student assignments, if that teacher is ignorant about writing and about science, and does not understand what student progress in writing science reports might mean. (p. 32). Teachers in a child-centered classroom act as facilitators. They assist students in learning without providing direct instruction but by providing a very congenial atmosphere for learners to explore and find out things for themselves. The teacher’s ultimate role is to help

provide guidance and order within the class while allowing each student to explore his or her own potential in order to facilitate all students' skills and interests.

In some child-centered schools, teachers divide students into learning communities or use multi-age groupings. This strategy provides learners of various abilities and age levels to work and learn in an environment that is intended to optimize their learning potential. Additionally, learners are able to spend longer periods of time with the same teacher. This allows the teacher to develop a deeper understanding of a child's strengths and needs, and is therefore placed in a better position to support the child's learning. According to Song, Spradlin & Plucker (2009), some benefits of multi-age groupings include more holistic, child-responsive curriculum practices that consider the understandings, capabilities and dispositions that children need for future work, e.g. working in diverse environments that seek workers who are multi-skilled, literate, cooperative, creative, adaptable, independent and resourceful. According to Timperley, Wilson, Barrar & Fung (2007), teachers are responsible for creating certain opportunities in which students: are able to set and re-set their own goals, define strategies and identify indicators of success, think about their own performance and become better at asking questions of themselves and their peers.

Learning becomes an active process for the individual student as well as an interactive process between students, as learning is constructed together in a social activity. Learning as Watkins (2003) puts it is 'individual sense making'. Teachers play a very major role in this sense making process by asking students probing questions that lead to the arrival of the expected outcome or answer. When the expected outcome is

obtained, it brings satisfaction to both the teacher and learners (pupils) which further equips them for advanced tasks that is yet to come.

2.25 Teaching Creative Arts in Ghanaian Basic Schools

Teaching can be viewed as the way a teacher transmits or impacts self-acquired experiences, knowledge, skills, attitudes and values to learners in a formal or non-formal environment. Meaning, teaching can be done in or outside a confinement called the classroom.

Education in the arts is essential to students' intellectual, social, physical, and emotional growth and well-being. Experiences in the arts; in dance, drama, music, and visual arts play a valuable role in helping students to achieve their potential as learners and to participate fully in their community and society as a whole. The arts provide a natural vehicle through which students can explore and express themselves and through which they can discover and interpret the world around them. This artistic exploration and expression found in the Creative Arts are expressed using the various skills and values acquired in each activity found in the various topics in the discipline (Creative Arts).

Each lesson under the Creative Arts has specific skills and values pupils must acquire. According to the Creative Arts syllabus, at least three skills and values are to be acquired after a successful completion of a lesson. An example of skills and values to be acquired in a primary one, term one, lesson one are as follows:

- Skills: displaying, colouring, observing, drawing, appreciating, handling of tools and creativity materials etc.
- Values: patience, tolerance, sharing etc.

These aforementioned skills and values are inevitably part of our day-to-day activities and cannot be overruled. In linking these skills to our day-to-day activities; displaying, colouring, observing, appreciating, effective handling of tools and materials are some of the very basic skills employers expect employees to possess before seeking employment in their firms or institutions. Values like patience, tolerance, sharing etc. are very key things expected from every well-behaved and well-trained personality. These are some of the reasons these skills and values are attached to the training given to pupils at the basic school level. It is expected that the primary school teachers will understand and acknowledge the role these skills and values play in the lives of the pupils they teach. However, for these skills and values to be impacted to these pupils successfully, there is the need for the Creative Arts to be taught by subject-specific teachers or by one well trained all rounded teacher. At the moment, the latter is the case in our various primary schools in Ghana.

Preliminary investigations made by the researcher shows that, for Creative Arts to be taught with the required effectiveness and efficiency, the subject must be taught by subject-specific teachers (such as Visual Art teacher for the Art, Music teacher for the music and the Theatre Arts teachers for the Performances in the syllabi) until such a time that there will be enough trained teachers specifically meant for Creative Arts in our primary schools. The investigations additionally revealed that, there is no course specifically structured for basic school teachers to prepare or equip them for the

teaching of the Creative Arts in any teacher training institution in Ghana. As gloomy as the case is, Creative Arts is a mandatary subject for all basic school teachers to be taught in our various primary schools. The question is, how can these teachers teach the subject effectively if they are not trained to do so?

Apart from the fact that the teachers have no training, there are no tools and materials for the various disciplines under the Creative Arts, although there are many tools and materials to be used in the teaching and learning of the subject. Although improvisation is encouraged in the teaching and learning of the arts, some special tools and materials cannot be left behind in some specific activities or processes. Acquisition of tools and materials for the various areas in the discipline has been left for the basic school teachers to provide, meanwhile they have not been provided the funds to buy these things. If this is the case, how can the Creative Arts be taught effectively without tools and materials or funds to purchase these things for the discipline? These are very important issues to be attended to in order to rescue a dying subject.

As the worldwide military slogan goes; *hard training, easy battle.* There is the need for training and development of employees to enhance their performance in every endeavour in life (Engetou, 2017). However, this does not appear to be done for teachers who teach the Creative Arts in Ghana. Since the Anamoah-Mensah Committee's Educational Review in 2007, there has been no workshop, seminar, symposia or training for the basic school teachers. Training for these primary school teachers was very important since the 2007 educational review gave birth to the inclusion of Creative Arts in the basic school curriculum. Without any frantic effort by the Ministry of Education through the Ghana Education Service to organize

seminars, workshop, symposia for these primary school teachers currently at post in various basic schools in Ghana, Creative Arts as a subject to be studied by basic school pupils will not bear the fruit for which it was included in the curriculum of Ghanaian basic schools.

During a personal interaction with some headteachers, it was clear that teachers in the basic schools were expecting some form of training in the teaching of the Creative Arts since not all the teachers have the requirement to teach the subject. They further explained that, because the education directorate in the municipality is aware the teachers are not trained in the area of Creative Arts, supervisors who come for supervision ask very little or no questions about how they (teachers) are handling the subject. It is so because there are no qualified personnel to check whether what teachers are teaching is appropriate and up to the standard required by CRDD and Ghana Education Service.

2.26 Methods, Techniques and Strategies of Teaching Creative Arts

Every activity in this life has its own methods, techniques and strategies that make it unique from others. The question is why is learning methods important in the teaching and learning process? It is important to realize that teachers need to know different approaches so that they can choose the one that makes teaching more comfortable and the learning process easier for students. Teaching is an art and a science, and therefore has its methods, techniques and strategies which makes it a special activity for those who are trained to practice it. According to Mykra (2015), variety is an important aspect

of teaching and learning; the more different teaching methods and techniques a teacher has, the better chances (s)he must maintain and enhance learner engagement (p.14).

According to Suskie, (2009)., there are two general methods of teaching; the direct and indirect methods.

1. Direct Method: it is an approach in which pupils or learners are told or instructed on what they need to know or do. This method is effective for explaining ideas, dealings with abstractions that cannot be shown through concrete lectures and demonstrations which are most direct and formal teaching methods. According to Andriyani (2015), the meaning of the name, Direct Method, comes from the fact that, meaning of a concept is to be conveyed directly through demonstration and visual aids. An example of direct method of teaching is teaching pupils how to construct, assemble and decorate mobile and stables with cards and colours. Teachers use photographs that tell or illustrate someone, something or somewhere by using direct method. It will guide students to explore and generate interesting ideas (Andriyani, 2015 p. 14). It is the quickest and commonest method of teaching that a teacher can use in delivering a lesson. This method also serves as a solid foundation for further learning and exploration by students. Due to application of the direct method, students can understand what they learn, think about it and then express their own ideas.

2. Indirect Method: this method of teaching is pupil-centered. It promotes pupil involvement in the learning process thus; observing, investigating, drawing inferences, or forming hypotheses. It takes advantage of pupils' interests and

curiosity, encouraging them to become active learners. In this method, pupils are challenged to examine and explore hence called inquiry or discovery method. Here, the teacher's role is to organize a series of activities in which the pupils are to investigate to resolve a problem. An example of this method is using multiple intelligences in teaching to role-play a specific theme for pupils to understand and work (in group or individually).

According to Pearson Education (2010), in this approach, concepts, patterns and abstractions are mostly taught using strategies that emphasize inquiry or problem- solving skills of learners. Indirect instruction involves the expression of learner ideas, teacher-mediated discussion, and group problem solving. Again, in indirect instruction, the learner acquires information by transforming stimulus material into a response that requires the learner to rearrange and elaborate on the stimulus material (Borich, 2007, p.3). A teacher using an inductive approach may start a lesson with asking questions and using examples and thus helping students to recognize the principle being learned. This inductive approach is more indirect, but it can be very effective because students interact with the content to make meaning.Inductive strategies often begin with exploratory activities and lead to students discovering a concept or generalization.

Petrina (2007) also describes teaching or instructional methods as a comprehensive instructional approach that can be used to shape subject matter, design teaching materials and activities and guide pupils to perform those activities appropriately.

Teaching can therefore be explained as a procedural manner of sharing and inculcating ideas into learners in a structured or an unstructured approach.

2.27 Theoretical Framework

The most obvious of all the points identifiable from literature is the consideration of all teaching methods in the delivery of Creative Arts at the basic school level, other than multimedia. In other words, the idea of capitalizing on technological advancement for deduction and implementation of novel procedures for effective delivery in the teaching of the Visual Art component in the Creative Arts have not been given the needed thoughts.

The study therefore was underpinned by two theories; the Technology Acceptance Model (TAM) and the Theory of Diffusion of Innovation (DOI).

2.27.1 Technology Acceptance Model (TAM)

The TAM is a model that addresses the issue of how users come to accept and use a technology. There are two specific variables, namely Perceived Usefulness and Perceived Ease of Use, which are suggested to be fundamental determinants of user acceptance of technology (see figure 5). According to Davies (1989), Perceived Usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance, whiles Perceived Ease of Use is defined as, the degree to which a person believes that using a particular system would be free of effort. In other words, a person will accept to adopt and use a technology if he/she believes

that the technology would improve his/her productivity whiles presenting little or no difficulties.

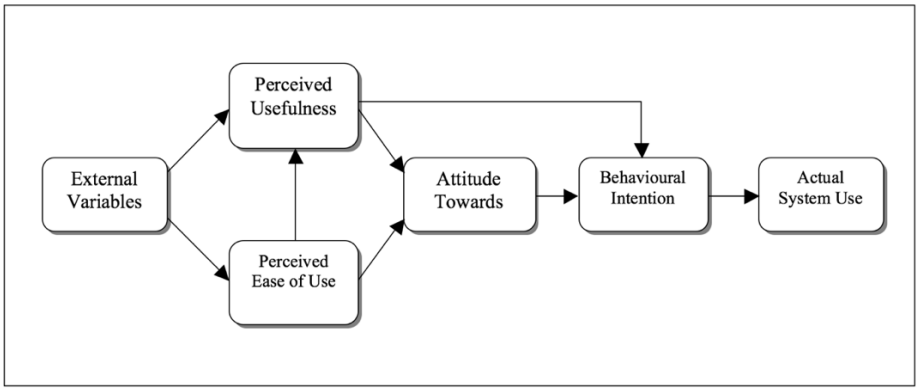

Figure 5: Technology Acceptance Model
(Source: Davies, 1989)

2.27.2 Implication of the theory to this study

The decision to adopt the Technology Acceptance Model as the underpinning theory for this study is that using it enabled the research to assess how the teachers (respondents) accepted and used the multimedia courseware for their preparation and delivery of Creative Arts Lessons. Specifically, the TAM was adopted and applied because the individual variables of the model related to the issues that the study focused on. "External Variables" related to the capabilities and experience of the teachers in the use of computers and smart phones. These resulted in the Perceived Ease of Use and the Perceived Usefulness of the multimedia courseware, which also had an impact on the attitude towards adopting and using the multimedia courseware. All these variables, put together, helped to determine the teachers' behavioural intentions and actual use of the courseware.

2.28 Conceptual Framework

A conceptual framework may be described as the way in which ideas are organized to achieve a research project's purpose (Shields & Rangarjan, 2013). For a study like this, it is important to have a framework that will guide and organize the different variables. In this study, the researcher conceptualized that the content (videos, sounds, graphics, text, etc.) as well as the Graphical User Interface (GUI) form the multimedia courseware. In this regard, the courseware is not complete without the content and the interface. The Content consist of the subject matter and the Graphical User Interface is the medium through which users access the content. Between these two variables exist a relationship which allows the user to access the content through the GUI.

Also, there is a relationship between Design and Development and the multimedia courseware. This relationship suggests that the multimedia courseware (Content and GUI) must be designed and developed based on user requirement and preferences. Again, the relationship suggests that the must be Testing of the multimedia courseware upon completion, to ensure that it meets the needs of the users. Together, all these variables contribute to the attitudes that the processes and features that must be considered in the design and development of a multimedia courseware for Ghanaian Basic School teachers. Even though some studies on the design and development of multimedia courseware projects did not employ any conceptual framework (Anderson, 2000) it was deemed necessary for this particular study because it afford the researcher an opportunity to organize the variables of the study appropriately before commencement of the project, and also followed the principles outlined by other courseware development researchers (Noordin, Ahmad, & Yew, 2015). Figure 1 is a graphical representation of the conceptual framework for this study.

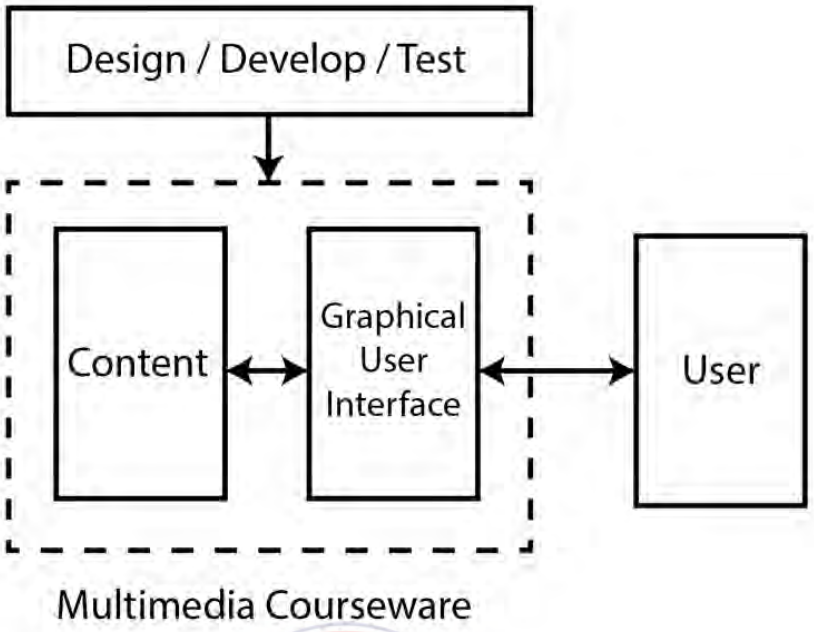

Figure 6: Conceptual Framework
(Source: Researcher's Own Construct, 2018)

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter provides step by step details of how the entire research was conducted. It contains the research design, target population for the research, description of the population, sample and sampling techniques employed. In addition, it states the data collection instruments and how they were administered, data collection procedures and finally, the data analysis plan of the study, based on the objectives and research questions.

3.1 Research Design

The design for this study was determined by the three distinct stages of the project described as the pre-production investigation stage (main questionnaire), the production and the post production investigation stage (evaluative questionnaire).

The pre-production investigation stage (main questionnaire) of the study which sought to find answers to the research question one combined document review and content analytical procedures that established the major thematic contents of the visual art aspect in the creative arts syllabus. This stage also involved the use descriptive research procedures that sought to establish the need and the relevance of a multimedia courseware among teachers and relevant stake holders. This same design was employed for the post-production stage which tested the efficacy of the courseware.

The production stage of the courseware which mainly involved studio practices and hands-on activities was based on Art-Based research procedures. The consideration of this procedures was informed by the end product of the entire project which would be presented as one piece of artwork.

Being an Art-Based research design, this study hinged paramountly on photographs, videos and digital technology for a better expression and explanation of what goes into the entire process of designing and developing a multimedia courseware for teaching Creative Arts in Ghanaian Basic Schools. In this pursuit, Art-Based Research approach was employed for the study.

Art-Based research ensures the realization of physical configuration of art forms which is basically a process of connecting theory to practice. In this process, the researcher conceives the idea of art making and transforms the idea into praise-worthy physical or virtual artworks in solving artistic problems through artistic process. Processes involved in solving an artistic problem varies, depending largely on the nature of the problem and the preferred methodology of the artist in solving that problem. Developing more integrated and holistic understandings of art practice through research processes that articulate conceptualization and findings in meaningful ways contribute to the artistic research process (Stewart, 2003).

Art-based research establishes itself through the use of artistic intelligences by applying arts to solving artistic problems and understanding the experience that makes complete sense and suggests endless possibilities at the end of the process (Hamm, 2003).

Art-based research operates with basic formulae namely; committing an eye on the conditions of the practice, documenting the acts, moving between insider and outsider positions and preparing works of art (Hannula, Suoranta & Vaden, 2005).

In these basic formulae, committing an eye on the conditions of the practice mean to put into consideration all the necessary procedural requirements in artistic production. These procedural requirements begin from the kind of tools to use for the execution of the artwork and the relevant skills to employ to arrive at the desired end in solving the artistic problem. All these considerations also come to play in the brainstorming periods of almost all artistic works both physical and virtual. It is a key part of all the processes which bring about artistic realization and existence.

Documenting the acts is the second formula. The act in this case is the processes involved in any artistic production. The artistic production that brings about desirable artworks must be made known through a step-by-step textual documentation of all the processes involved in the artwork production. This textual documentation is paramount in this case because, any interested person who goes through this same textual documented procedure should arrive closely if not fully at the artwork as expected. To get a fair idea of how the artwork will function during and after rendering, there is the need to take both positions as the artists and the end user of the artwork in order to ascertain its efficacy. Taking these two positions as an artist also helps in evaluating the produced work of art both in its formative and summative states. Doing this also helps in completing the experimentation and after production. This is very important in any art-based project.

To further establish the importance of art-based research to this study an experimentation with materials of expression and imagination in drawing, weaving, carving, modelling, casting and sewing was conducted, in line with Hamm's (2003) position.

3.2 Population

All Creative Arts teachers (Lower Primary Teachers) in Ghanaian Basic Schools formed the target population for the study. This is because the basic school teachers are the end-users of the multimedia courseware. Out of these target population, the accessible population was derived from the Effutu Municipality. One hundred and twenty-six (126) respondents formed the accessible population.

3.3 Sample and Sampling Technique

Of the 126 accessible population, 21 respondents were sampled for the evaluation and post-production investigation stage of the study. The sampled population of the study consisted of seven schools (three private and four public schools). Three lower primary school teachers were selected from each school, hence, twenty-one (21) respondents.

Purposive sampling technique was used for the study. The use of this sampling technique ensured that appropriate respondents with the requisite knowledge were selected to participate in the study (Engel & Schutt, 2013). Very critical and important information needed for the evaluation of the multimedia courseware were collected from these respondents in a form of pre-production (main questionnaire) and post-

production investigations (evaluative questionnaire). The use of purposive sampling also ensured that respondents who were willing to participate and have the ability to give candid opinions in an articulate, expressive, and reflective manner were selected (Etikan, Musa, Alkassim, 2016).

Prior to selecting the respondents for the study, the researcher sought permission from the municipal director of education, as well as the municipal coordinator of creative arts. Also, a list of all teachers in the lower primary classes (classes 1 to 3) was obtained from the municipal coordinator. Further, the researcher visited seven basic schools to inform the teachers of their selection to participate in the study, and also to seek their consent to be involved in the study. The seven schools were selected due to the proximity of the researcher to these schools. Another reason for the researcher's choice of these schools was the fact that they have teachers who teach the creative arts, and also because these schools were equipped with computers that would be used to access the content of the multimedia courseware.

The purposive sampling technique gave the true reflection of happenings on the field of teaching Creative Arts in the basic school. Getting information across two divides (private, public school settings) helped the researcher to get close to the respondents for reliable primary data.

3.4 Data Collection Instruments

After a careful review of literature, two instruments were selected to be used for data collection in this study. The researcher employed documentary review and the use of opinionnaire to obtain data needed to answer the research questions guiding the study.

3.4.1 Documentary review

Documentary review is the technique of categorization, investigating, interpreting and identifying the limitations of physical sources, most commonly written documents whether in the private or public domain that contain information about the phenomenon we wish to study (Bailey 1994, Payne & Payne 2004, Silverman, 2000). It is concerned with collecting both textual and non-textual data for review purposes and analysis. Documents in either hard copy or electronic format in the form of scholarly research reports, reputable journal articles, Creative Arts syllabus, textbooks and class activity books were collected. This form of data collection is relevant to the study because it offered the researcher a good source of background information which facilitated the content for building the multimedia courseware. This method of data collection is unobtrusive in nature, providing behind-the-scenes look at content and structure of the Creative Arts subject (Witkin & Altschuld, 1995) to determine its components.

3.4.2 Opinionnaire

Two distinct opinionnaires were administered to respondents (See Appendix B and C). An opinionnaire is a special form of inquiry used to collect the opinions of respondents of research study on certain facts or factors relating to the problem under investigation

(Angadi, 2018). Both set of opinionnaires were constructed using closed-ended questions that consisted of ten items. The close-ended items were used because of its simplicity in answering by respondents and easy statistical coding and analyses. The opinionnaires were labeled Pre-Production and Post- Production Investigations. The Pre-Production Investigations was administered in order to collect the background information of the teachers and to also ascertain the availability of visual arts contents in the Creative Arts subject (found in the syllabus, textbooks and activity books) and how often they were used to aid lesson preparation and delivery.

Additionally, it was used to solicit suggestions or ideas, views and expectations of the selected teachers with regards to what they expect in a multimedia courseware for Creative Arts. These suggestions or ideas, views and expectations that were collected aimed at making the courseware user-friendly. Designing a user-friendly graphical user interface is a critical part of courseware design and development as emphasized by Rubenstein and Hersch (1984) stating, the golden rule of design: remember the things you did not like about a software interface you have ever used. Make sure you do not repeat the same things to users who will use interfaces designed and developed by you. The decision to administer the Pre- Production Investigation was driven by Rubenstein and Hersch's advice on user interface design and development. The data gathered from the Pre-Production Investigation was relevant to the designing and development of the multimedia courseware. After the designing and development of the multimedia courseware, it was deployed to respondents for use and evaluation. The Post-Production Investigation was administered to test the use of the multimedia courseware and to ascertain its strength and efficiency.

3.5 Data Collection Procedure

The data collection procedure was structured in three broad phases namely: Pre-Production Investigations (main questionnaire), Courseware Production and Post-Production Investigations (evaluative questionnaire). There was the need for the breakdowns of the study into three phases because in producing an interactive multimedia courseware of this kind, very unique information needs to be sought at each phase. Permission was sought from the heads of the selected basic schools whose teachers were involved in this study. The researcher sought approval from the respondents by personally meeting them and administering an Informed Consent Form which was filled by those who volunteered to participate in the study. This form was also used to assure the respondents of their confidentiality and anonymity during and after the study.

3.5.1 Pre- Production Investigations

Data gathering during this stage of the study was of paramount interest to the researcher because there was a very important need to ascertaining the facts on the ground about current trends and happening in the teaching and learning of Creative Arts in the selected schools. When these facts were established, it gave the researcher first-hand information on current state of the teaching and learning of Creative Arts in the selected schools. The Pre- Production Investigations was administered to respondents face-to-face by the researcher. The face-to-face approach was adopted in order to inform respondents about the purpose of the Pre- Production Investigations and to seek their permission and participation. In furtherance to the face-to-face approach of questionnaire administration by the researcher, the study was also explained to

respondents, some unclear items in the questionnaire were also clarified when the need arose and thereby increasing response-rate during the collection of questionnaire.

3.5.2 Courseware Production

There were three phases of the courseware production namely; courseware production, gathering of relevant courseware content and video production. In executing these phases of the project, very distinct yet detailed information was required. This information was acquired from various sources such as reliable government agency (Winneba Municipal Education Office), scholarly research reports (thesis/dissertations), reputable journal articles and experts with long standing experience and reputations.

During the courseware production, several enquiries and follow-up calls were made to some experts and agencies to seek a variety of opinions on what to consider in producing a user-friendly multimedia courseware. Additionally, there was the need to also enquire from some reputable website hosting companies what types of bandwidths they have available and which type will be appropriate for a massive learning system of this kind.

Before the video production, there was pressing need to find out what relevant contents (syllabus, textbooks and activity books) were available to be used for this courseware production. The researcher personally went to the Winneba Municipal Education Office to acquire approved relevant documents (syllabi and textbooks) to form the

content of the courseware. This move was very important to the study since the content needs to be acquired from a reliable government agency to provide appropriate content for the interactive multimedia courseware production.

In the video production phase of the study, the researcher went to professional photographers and cinematographers to enquire which kind of tools and material (studio, camera, lighting systems, microphone and backdrop) were appropriate for producing video for the multimedia courseware. This was done in order to ascertain the relevant and appropriate tools needed for producing videos for academic purposes. Although the researcher read some related literature on photography and cinematography tools, it was empirical and instructive to seek the opinions of the professionals on the field.

3.5.3 Post - Production Investigations

The Post - Production Investigation was administered to respondents face-to-face in order to test the efficacy of the multimedia courseware after it is deployed to the Creative Arts teachers of the selected schools. The face-to-face approach was adopted in order to meet respondents personally for an opportunity to clarify to respondents, items in the questionnaire when the need arose, and also to increase the response-rate during the collection of questionnaire.

3.6 Data Analysis Plan

Documentary review is the systematic examination of instructional documents such as syllabi, assignments, teaching notes, and course evaluation results in order to identify instructional needs and challenges and describe an instructional activity (Weber, 1990). This analysis plan involves the study of existing documents, either to understand their substantive content or to illuminate deeper meanings which may be revealed by their style and coverage. These may be public documents like media reports, government papers or publicity materials, procedural documents (e.g. minutes from meeting, formal letters or financial accounts). Lincoln and Guba (1985) state that, public records are materials created and kept for the purpose of attesting to an event or providing an account and personal documents (e.g. diaries, letters, photographs). Data gathered from the documents were analyzed thematically; whilst questionnaires data were also analyzed thematically and descriptively. This strategy was adopted for the study because, it pinpoints, examines, and record themes within the collected data (Boyatzis, 1998). Data so analyzed provided the basis for the design of the multimedia courseware.

CHAPTER FOUR

DESIGN DEVELOPMENT STRATEGY (PROJECT WORK)

4.0 Overview

This chapter describes the nature, scope and content of the Multimedia Courseware based on the topics in the primary one to three Creative Arts syllabus for Ghanaian Basic Schools. The chapter also talks about the step-by-step processes in the designing and development of the multimedia courseware. Finally, the efficacy of the Multimedia Courseware was tested and the results analyzed and discussed into details under three main themes. The Multimedia Courseware produced to be used on compact disc and online is a virtual self-paced study medium which runs on mobile phones, tablets and personal computers. It further gives an account of how pictures, sound and videos were integrated to form one interesting interactive learning experience for the Creative Arts (the visual art aspect) teachers in Ghanaian Basic Schools.

4.1 Design Objective

The main objective for this study is to feed Ghanaian Creative Arts teachers (from primary one to three) with very relevant content via multimedia courseware. The multimedia courseware is meant for all Creative Arts teachers to make their lessons practically understandable and also interesting for pupils to relate to and participate effectively. The contents meant for the preparation of the Multimedia Courseware were acquired from government approved materials in both soft and hard copies. The

multimedia courseware contains content from approved Creative Arts Syllabus from CRDD and textbooks and activity books from the Ghana Education Service (GES).

The focus of this courseware was to design and develop a user-friendly material good enough to be used by all interested Creative Arts teachers from primary one to three. The assets used for this Multimedia Courseware such as fonts, colours, layouts, sound, videos, transitions, etc. were all focused on delivering an easy-to-use Multimedia Courseware for primary one to three Creative Arts teachers. The courseware which was developed to be used online and on compact discs was designed to have a very smooth and fluid navigation which allows for easy operation and surfing. The videos for the Multimedia Courseware were shot and edited into an acceptable file size and format to enable smooth streaming and downloading by users on any platform.

4.2 Production Processes

Multimedia courseware that is well designed and developed facilitates and promotes very positive and deep learning outcomes for end users. There are many issues surrounding the designing, development and use of effective courseware. Some of these issues to be considered in the production is the designing of the graphical user interface and in the development, the coding or scripting. In the execution of this Creative Arts interactive multimedia courseware, the researcher used a three-strand approach to arrive at the set goal. This three-strand approach are outlined below namely;

- Still Graphics Assets
- Motion Graphics Assets
- Courseware production processes

4.2.1 Still Graphics Assets

Still graphic assets or elements which can also be called object-oriented graphics were the very core of this multimedia courseware production. In the designing stages, the researcher considered the following object-oriented graphics (fonts, colours, buttons, header, body, footer, etc.) as the pivot around which the entire production was to be created. Like film and other motion pictures, animation uses sequences of still graphics to create the optical illusion of movement (Zajac, 1965). The set of assets featured in two main forms; in the video and in the courseware production respectively. At the video production stage, these assets were designed and developed into features like class identities and unit numbers at the beginning of every video (e.g. Primary One, Term One, Unit One) for easy identification, lower thirds (e.g. lesson headings and subheadings), tools and materials mentioned in each lesson of the courseware, etc. In the case of the courseware development, these aforementioned set of assets were also employed.

In designing interesting still graphical assets or components for the Graphical User Interface (GUI), the use of a software cannot be over emphasized. The entire courseware production was hinged on the use of a reliable computer and appropriate software. In designing still graphical assets for the GUI, Adobe Photoshop and Illustrator 2017 versions were used. Adobe Photoshop Cc is a photo editing program that pushes the boundaries of digital imaging and editing by using picture elements popularly known as pixels (tinny monochromatic perfect squares, measured in Pixels Per Inch [PPI] or Centimeter Per Inch [PPCM]). It is used by professional photographers as well as web and graphic designers worldwide. Photoshop is a raster

(bitmap) images-based software which require higher resolutions to appear smooth. Raster images or documents are best used for editing photographs and images with subtle shading, (continuous tone images). Photoshop has the ability to create motion graphics, but it is popularly known for its spectacular still graphics for both photo editing and producing stunning infographics. Raster graphic software like Photoshop saves files in formats such as TIFF, JPG, GIF, BMP, PNG, PSD, EPS.

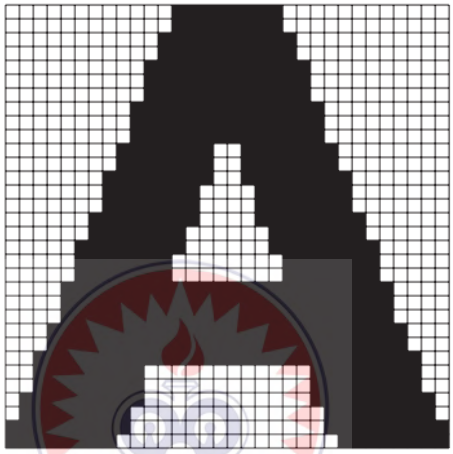

Figure 7. An example of a pixel or raster-based work (3200% zoom).
(Source: Researcher's own construct, 2017)

Adobe illustrator is another popular graphic design software for still designs or artworks. According to Rowan (2014), Adobe Illustrator is a program used by both artists and graphic designers to create vector images. These images can be used for company logos, promotional uses or even personal works, both in print and digital form. It is typically used to create illustrations, charts, graphs, logos, diagrams, cartoons of real photographs. Adobe Illustrator is a vector graphic software which operates mathematically using coordinates, anchor points, handles and paths to define its normally smooth artworks. Illustrator works can be scaled in size without any loss of quality. They are typically used for type, illustrations and line art. All the still assets explained below were produced by one of the software mentioned above.

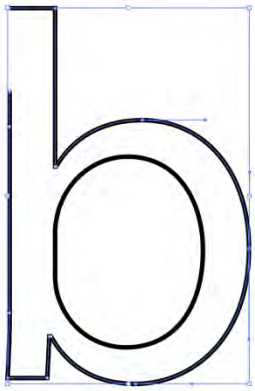

Figure 8. An example of a vector-based work
(Source: Researcher's own construct, 2017)

4.2.2 Fonts used for the Courseware Production

In the entire courseware production, san-serif fonts were employed. San serif fonts are fonts without any ornamental projections called serifs and on the contrary, serifs fonts have decorations or ornamental projections on them for close-up reading purposes. The San serifs typestyle were employed because the researcher saw that San serif letters have the power to project and create some sense of legibility in reading on computer screens and on long surface too. Slattery and Rayner (2010) opined that, documents written in a sans serif font may lead to faster identification times than words written in a serif font. It is also important to note that, sans serif fonts are becoming increasingly popular. A sans serif font such as Helvetica has been used in many commercial wordmarks, and even films. Thus, sans serif fonts should be the preferred choice for text on computer screens as already is the case for guide signs on roads, trains, etc. as opined by Slattery and Rayner (2010).

Three interesting san serifs google fonts were employed for the designing of the GUI for the courseware. These fonts are Open San (used for the body of the courseware),

Monserrat (used for the Menus of the courseware), and Impact (for the figures used in numbering the classes e.g. Primary 1,2 and 3). These fonts have very interesting appeal and huge readability traits, which was the main reason why they were employed for this multimedia courseware. Google Fonts which were previously called Google Web Fonts are interactive directory of free hosted application programming interfaces for web fonts. Google fonts are constantly available for use on online projects and activities like designing and developing online courseware. Below are samples of the various San serif fonts used for the project.

Figure 9: An example of an Open Sans Font used for the body of the courseware.
(source: Researcher's own construct, 2017)

The Open Sans font was used to write text on all the buttons designed for the courseware. These clickable buttons with their fonts are be revealed only when a mouse curser is hovered (on mouse-over) on the huge colourful button holders or containers labelled primary 1, 2, and 3 which are themselves not clickable buttons but rather button holders or containers. The fonts displayed on figure 8a are not Open Sans fonts but are there to help explain the actions that exposes the buttons that lie under the huge

colourful button holders or containers. On the contrary, figure 8b displays clickable buttons with Open Sans fonts on them and these buttons are exposed upon a mouse hover. The huge colourful button holders or containers are displayed below with their corresponding mouse-over displayed buttons.

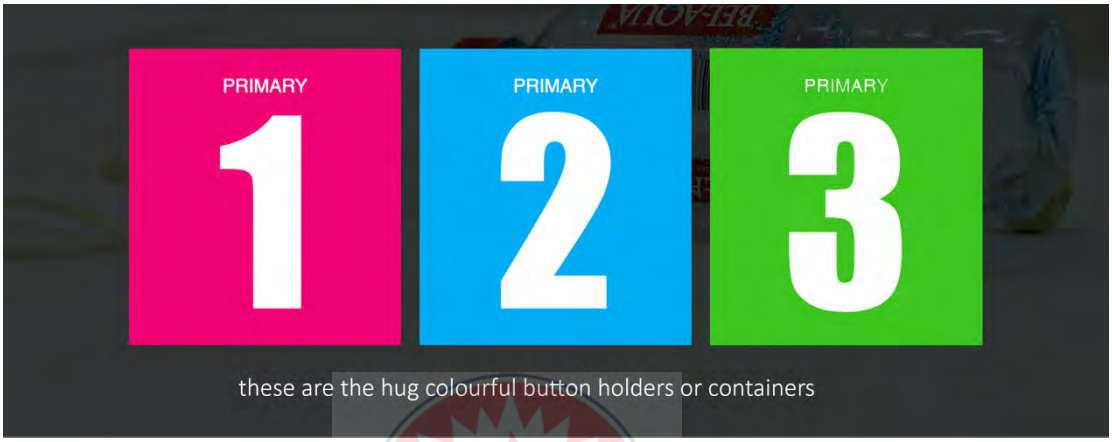

Figure 10a: A sample of the hug colourful button holders or containers.
(source: Researcher's own construct, 2017)

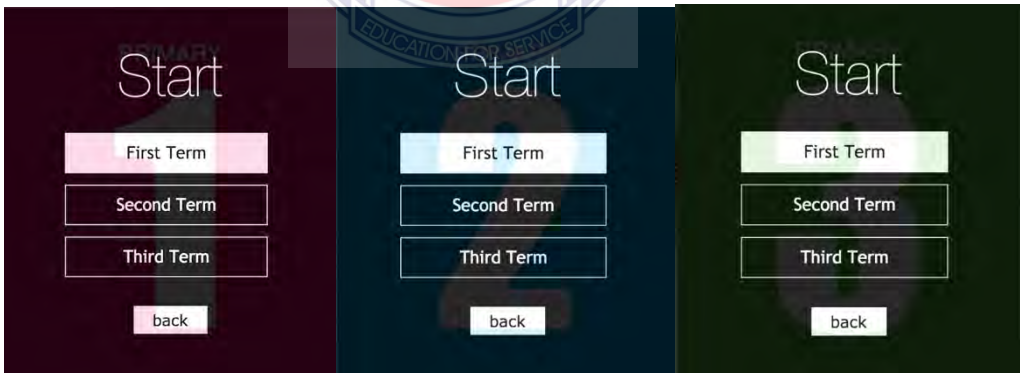

Figure 10b: A sample of clickable buttons that lie under the hug colourful buttons holders or containers and can be exposed upon a mouse hover.
(source: Researcher's own construct, 2017)

The Montserrat font mentioned earlier in the discussion can be found on the banner and the body of the courseware. This font was employed in writing the title of the courseware (Multimedia Creative Arts Courseware for Visual Arts) and the home and

courses link found on the body of the courseware. Figure 8a below shows a sample of the font (Montserrat) and figure 8b shows how Montserrat font was used in the designing of the GUI of the courseware.

Figure 11a: A sample of Montserrat Font
(source: Researcher's own construct, 2017)

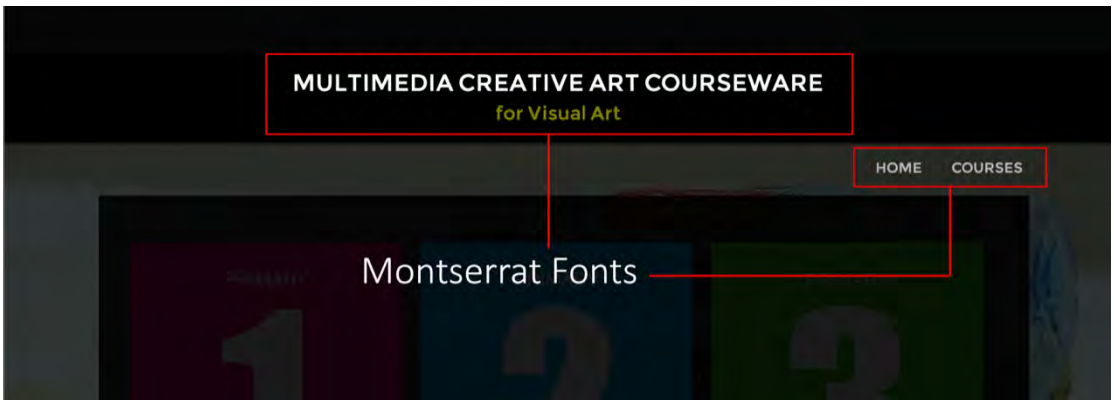

Figure 11b: An example of how the Montserrat Font was used in the GUI design
(source: Researcher's own construct, 2017)

Impact is a font that has huge presence wherever it is placed. It is one of at least seven bold, condensed sans-serif typefaces designed between 1954 and 1967. With Impact, every vertical stroke is based on a thick, uniform rectangle, and each counter or combination of counters is of uniform size, again roughly rectangular. In addition, Impact exaggerates the regularity of its rhythm by employing an unusually high x-height (high in relation to the cap-height), along with short ascenders (as in b, h, k) and descenders (as in p, q, y). These features of Impact give it the conspicuous look and that is why the researcher used it in the designing the GUI for the courseware. Figure 10a shows an example of Impact and 10b and 10c showcases how it was used in the GUI.

Figure 12a: An example of Impact Font used for the designing of the GUI.
(source: Researcher's own construct, 2017)

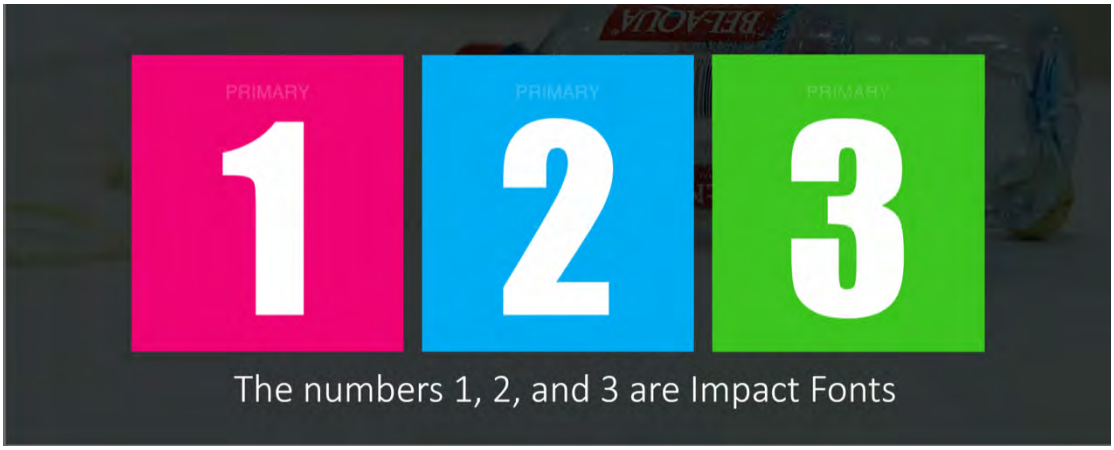

Figure 12b: An example of how the Impact Font was used in the GUI design
(source: Researcher's own construct, 2017)

Figure 12c: An example of how the Impact Font was used in the GUI design
(source: Researcher's own construct, 2017)

4.2.3 Colours used for the Courseware Production

Colours are very powerful and interesting in the production of any graphical artworks. People are physically, psychologically, and socially influenced by the kind of colours that appeals to them. Many studies show that colour has been found to have connections with human health and it can also help set the mood through which your designs are

perceived and accepted. Color communicates meaning and so we need to be conscious of what meaning we're conveying when we choose to use one color over another. It's not enough for a designer to use a color simply because he or she likes that color.

Six distinct colours were used in the execution of this Creative Arts Multimedia Courseware. These colours were selected based on their appeal to the human eye and also the fact that they also help to catch attention and support reading. These colours are green (in two different shades), red, violet or purple, yellow (in two different shades), pink and blue. These colours were not necessarily arranged in a purposeful and particular order. But, they were arranged for the sake of harmony.

4.2.3.1 The Colour Green

Green is the color of nature. It symbolizes growth, hope, freshness, and fertility. In countries with green money such as the U.S. it evokes thoughts and feelings of financial wealth. Green is associated with healing, stability, endurance, harmony, safety. life, and well-being. It can sometimes signify a lack of experience and is often used to indicate the safety of drugs and medical products in advertising (Ariane, Finlay, & Watts, 1994). In the courseware production, two different shades of green were employed with hexacodes #44c230 (which contains a hue: 112°, saturation: 61% and brightness: 77%.) and #66af34 (containing a hue: 90°, saturation: 70% and brightness 69%) (Figure 13).

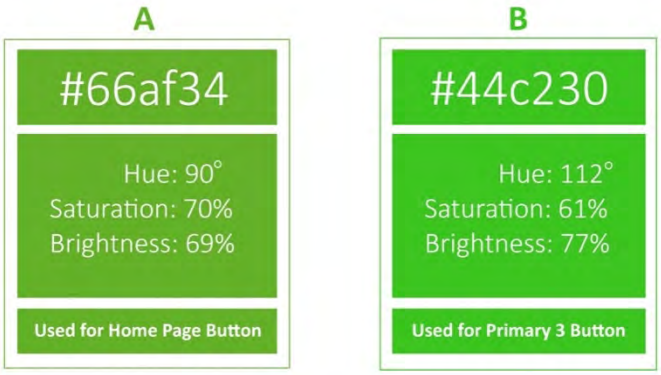

Figure 13: Samples of the greens used for the GUI of multimedia courseware.
(source: Researcher's own construct, 2017)

Sample A was used only for the Home Page button. The Home Page button is the only button placed on the Home Page to allow entry into the courseware. The sample B was used for the background of the last letter T of ART page and the Primary 3 button and all other things related to that particular class. This was deliberately used in order to categorize all components or assets of primary 3 with one unique colour for easy identification. The Figures 14, 15a, and 15b show how the green colours were applied in the designing of the Graphical User Interface.

Figure 14: A button created with green in sample A
(source: Researcher's own construct, 2017)

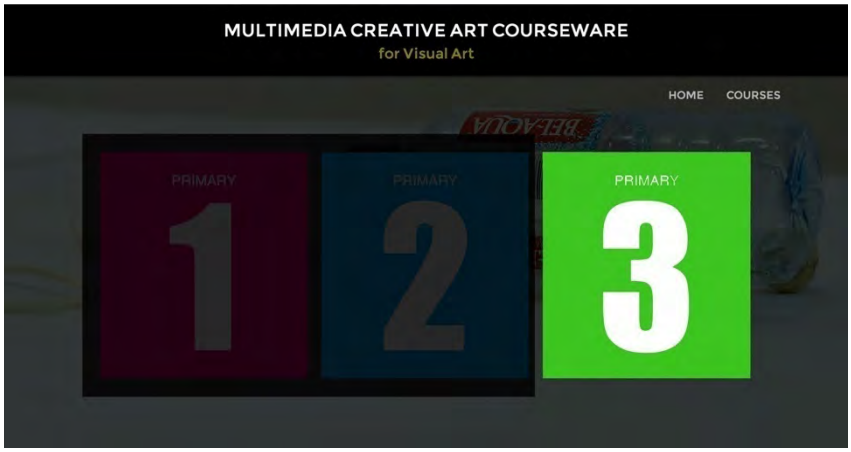

Figure 15a: A sample of how green was used in the GUI of the Courseware
(source: Researcher's own construct, 2017)

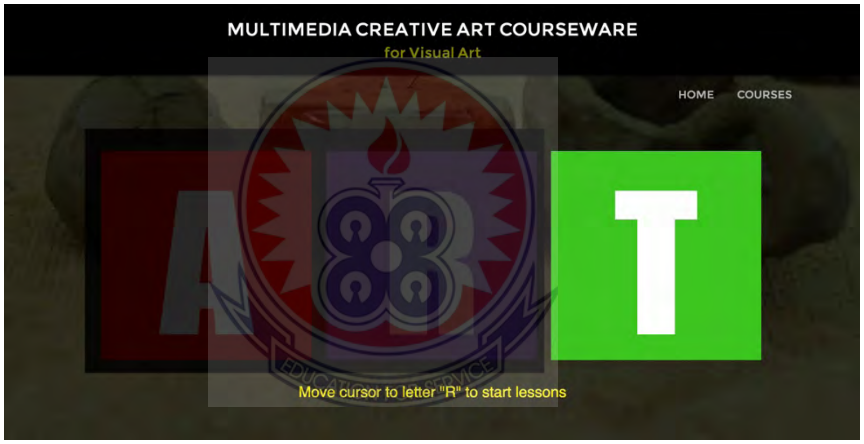

Figure 15b: A sample of how green was used in the GUI of the Courseware
(source: Researcher's own construct, 2017)

4.2.3.2 The Colour Red

Red is the color of fire and blood and it is emotionally intense. Red is associated with energy, war, danger, strength, power, determination, action, confidence, courage, vitality, passion, desire, and love. It can enhance metabolism, increase respiration, and raise blood pressure. Red has a high visibility and advances to the foreground. It is often used for buttons in order to get people to take impulsive action (Bradely, 2010). In the courseware, the colour red was employed for the background for the letter A in

the ART page with a hexacodes of #fe0000 (containing a hue: 0°, saturation: 100% and brightness: 99%). Figures 16a and 16b below are samples of how the colour red was used in the Graphical User Interface.

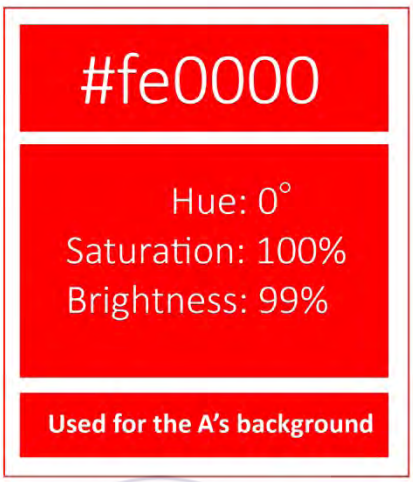

Figure 16a: A sample of the red used for the GUI of multimedia courseware
(source: Researcher's own construct, 2017)

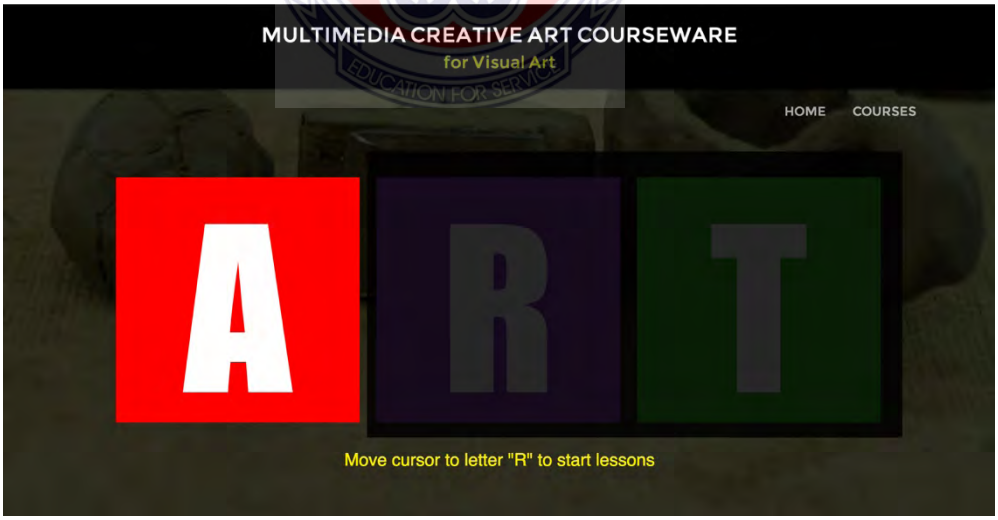

Figure16b: A sample of how red was used in the GUI of the Courseware
(source: Researcher's own construct, 2017)

4.2.3.3 The Colour Violet/Purple

According to Fehrman & Fehrman (2004), the colour violet or purple combines the stability of blue and the energy of red. It conveys wealth and extravagance and it is seen as the color of royalty. It symbolizes power, nobility, luxury, and ambition. Purple is associated with wisdom, dignity, independence, creativity, mystery, and magic. Light purple is seen as feminine and purple is a popular color with children. Purple occurs less frequently in nature and some may consider it artificial. According to Wang(2015), in some cultures, the violet or purple colour is representative of death. In Christianity, violet is said to be a sign of the temporary death that occurs in a state of sin while awaiting baptism and penitential liberation (Brusatin, 1991). This is also confirmed by Dilloway (2006), when he also mentions violet, describing it as a shade of separation and a sign of detachment and widowhood and can also signify royal hood. In the courseware production, the violet or purple that was employed has hexacodes of #8848bd (which contains a hue: 273°, saturation: 62% and a brightness: 74%.) and the colour was used for the letter R's background on the ART page. Figure 17a shows a sample of the violet used for the GUI of the courseware.

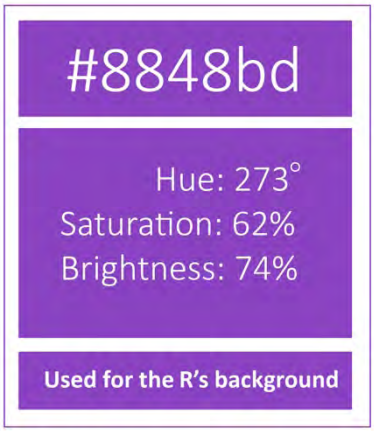

Figure 17a: A sample of the violet used for the GUI of multimedia courseware.
(source: Researcher's own construct, 2017)

Figure 17b: A sample of how violet was used in the GUI of the Courseware
(source: Researcher's own construct, 2017)

4.2.3.4 The Colour Yellow

Yellow according to Wang (2015), is the color of the sun. Bright yellow attracts attention, though it can also be distracting when overused. It is associated with joy, happiness, wisdom, and intellectual energy. It stimulates mental activity and generates muscle energy. Again, produces a warming effect, arouses cheerfulness and is often used to evoke pleasant feelings. Shades of yellow can become dingy lessening the pleasing effect but can also emit cool and pleasant emotions. In the early stages of the evolution of colour symbolism, the colour yellow would often represent two mutually exclusive counterparts (Eisenstein 1986).

In the entire project, the colour yellow was employed two separate times and in two different shades giving one emphasis against the other. The shade of yellow which has hexacodes #808100 (containing hue: 60°, saturation: 100% and brightness: 51%) found on the banner of the courseware is used to particularly define which aspect of the Creative Arts subject this multimedia courseware is focused on. On the other hand, the bright yellow with hexacodes #fff000 (containing hue: 56°, saturation: 100% and brightness: 100%) found below the letter R on the ART page was used purposively to

draw the attention of the end-users of the courseware to how to get entry in the system. Entry into the system is found on the letter R by hovering the mouse cursor over the R, then you enter. The Figures 18a and 18b below show how the dark and bright yellow were used to design the GUI of the courseware.

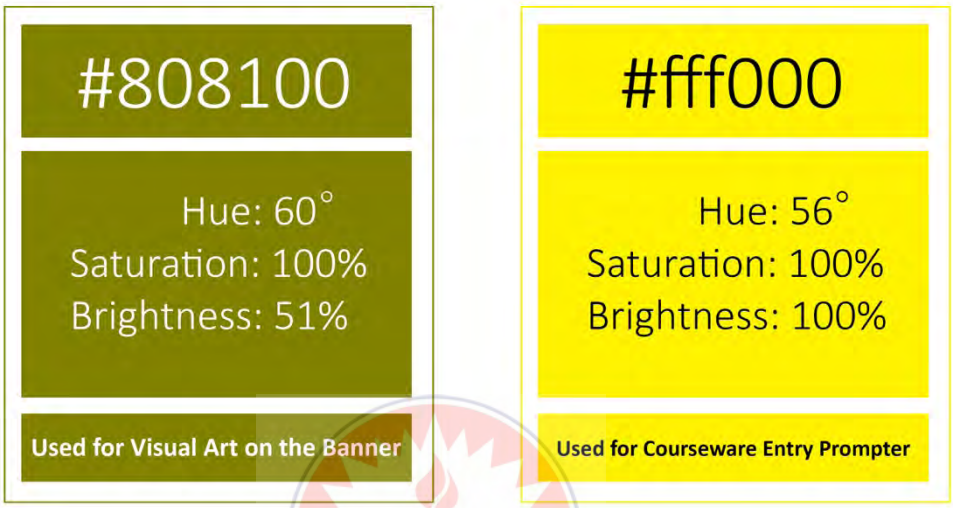

Figure 18a: Samples of the dark and bright yellow used for the GUI.
(source: Researcher's own construct, 2017)

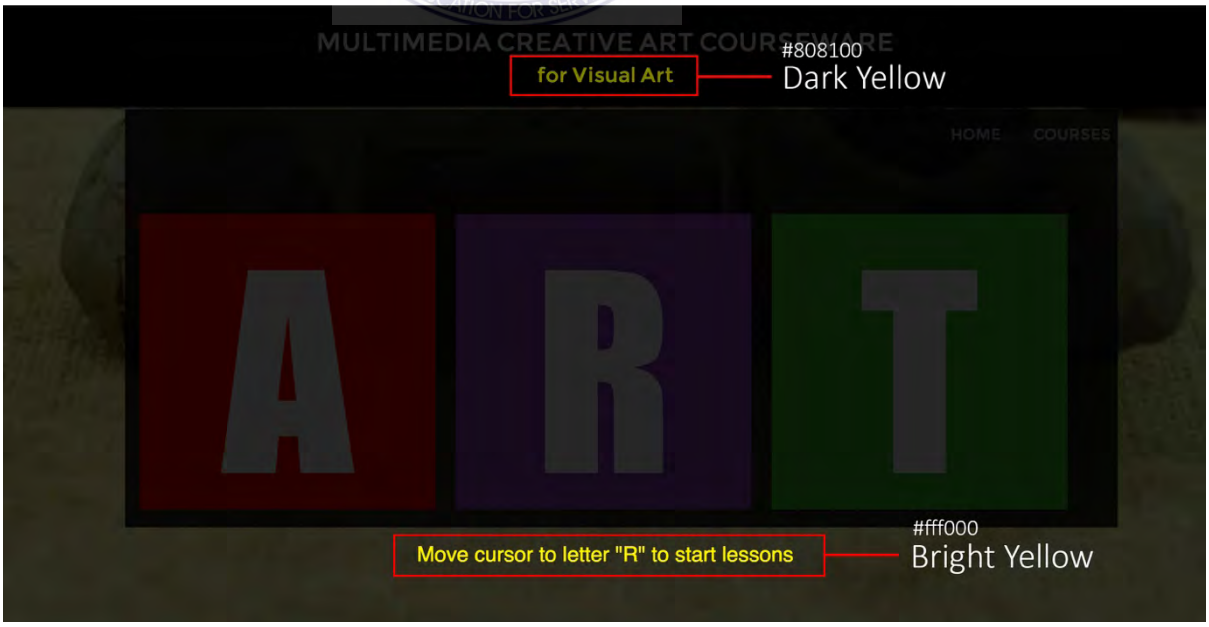

Figure 18b: A sample of how the dark and bright yellow were used in the GUI.
(source: Researcher's own construct, 2017)

4.2.3.5 The Colour Pink

The color pink is the color of universal love of oneself and of others. It represents friendship, affection, harmony, inner peace, and approachability. Additionally, it is the official color for little girls and represents sugar, spice and everything nice. Pink is the sweet side of the color red. While the color red stirs up passion, aggression, and action, large amounts of the color pink can actually create physical weakness (Graf1x, 2015). The negative side of the pink color is that it may represent a lack of willpower, self-confidence and low self-esteem. It can indicate a sensitive and overly cautious nature but the deeper the pink color, the more passion and energy it radiates.

In the entire project, the colour pink was employed ones. The pink colour has hexacode of #ef0473 (containing a hue:332°, saturation: 98% and a brightness: 94%.) and the colour was used for the background for the huge colourful button holder or container which houses buttons for terms 1, 2, and 3 in primary one. The Figure 19a below shows the sample of the pink colour that was used and Figure 19b is an example of how it was used in the designing of the GUI for the courseware.

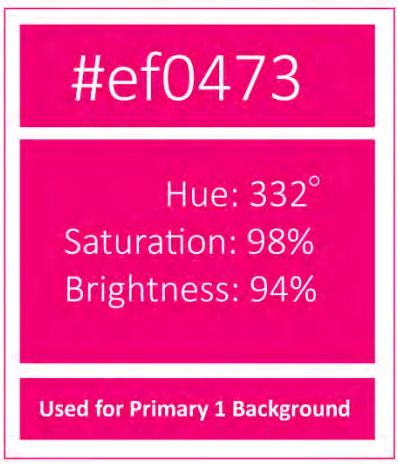

Figure 19a: A sample of the pink used for the GUI.
(source: Researcher's own construct, 2017)

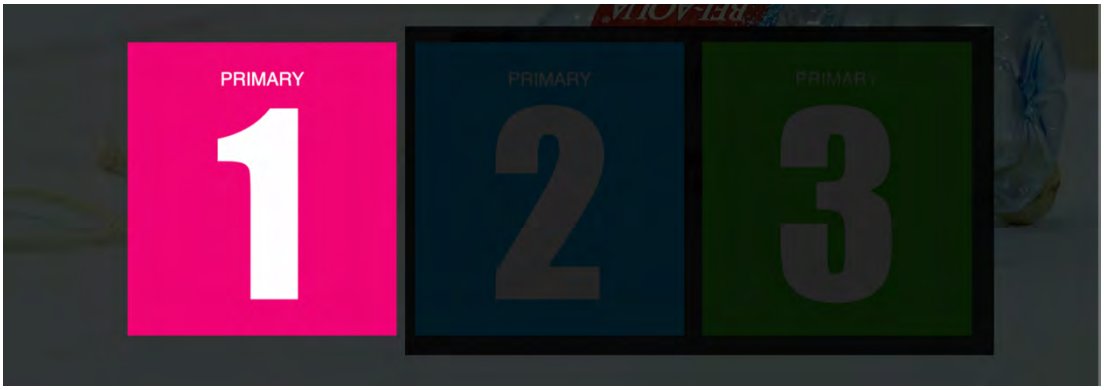

Figure 19b: A sample of how the pink was used in the GUI.
(source: Researcher's own construct, 2017)

4.2.3.6 The Colour Blue

Blue is the color of the sky and the sea. It has the opposite effect of red and slows metabolism, breathing, and heart rate. It's seen as a masculine color. Blue is associated with trust, loyalty, wisdom, intelligence, expertise, confidence, stability and depth. It creates a calming effect, suppresses appetite and has been considered to be beneficial to both body and mind. Blue is often used for corporate sites given the previously mentioned associations. The colour blue is a cool and calming color that shows creativity and intelligence. The color blue is a popular color among large companies, hospitals and airlines. It is a color that symbolizes loyalty, strength, wisdom and trust. It is also known to have a calming effect on the psyche. Blue is a color that generally looks good in almost any shade and it is a very popular color, especially among men.

In the entire courseware, the colour blue was employed only once for the huge colourful button holder or container for primary 2. The blue colour that was used has hexacode #00acf1 (containing hue: 197°, saturation: 100% and brightness: 95%). The Figure 20a shows the sample of the blue that was used, and Figure 20b is an example of how it was used in the designing of the GUI for the courseware.

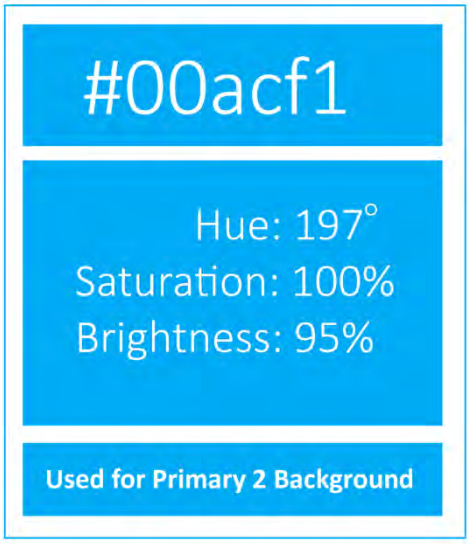

Figure 20a: A sample of the blue was used in the GUI.
(source: Researcher's own construct, 2017)

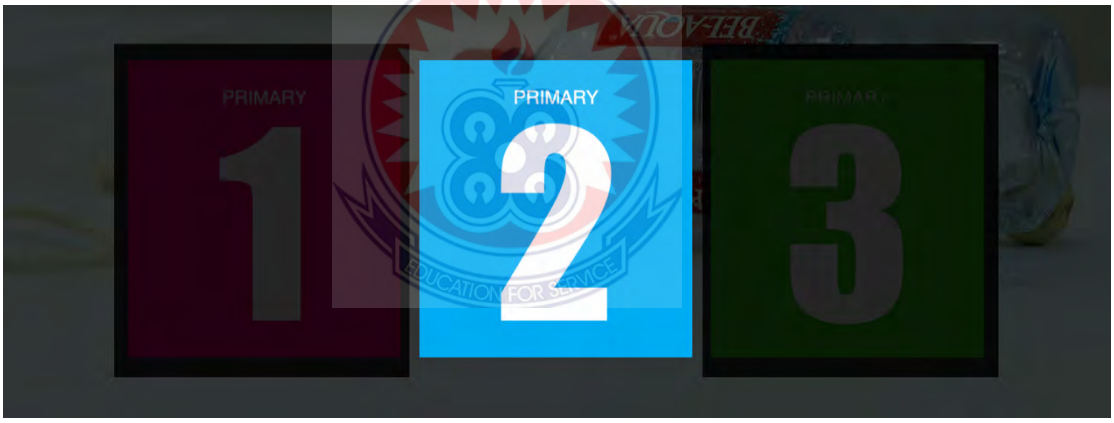

Figure 20b: A sample of how the blue was used in the GUI.
(source: Researcher's own construct, 2017)

4.3 Motion Graphics

Motion Graphics is simply the creation of movement in inanimate things such as text and graphics on screens (such as television, computers, tablets, phones, etc.). Motion or movement is created by applying actions and sometimes sounds to inanimate or still assets to create kinesthetic appeal. The creation of movies, animations are achieved by

making still assets (such as text and artworks) move in a very rapid pace on screens. Sometimes in producing moving pictures, videos and films, interesting but unrelated scenes from different locations are made to blend inconspicuously with each other to create attention-grabbing scenes or episodes. The process of blending different footages into one whole to making meaning is termed video editing. Video editing is the manipulation and arrangement of video images. Video editing is used to structure and present all video information, including films and television shows, video advertisements and video essays (Calandra, Gurvitch & Lund, 2008).

4.4 Video Production for the Multimedia Courseware

In order to produce stunning videos for this multimedia courseware, the researcher and crew went through several hectic activities to arrive at the set goal which is producing very clear and likable videos for the target end-users of the Creative Arts courseware. The following are processes the researcher and crew went through to produce the videos for the multimedia courseware:

1. Pre-Production
2. Production
3. Post-Production

4.4.1 Pre-Production Stage

This stage includes everything one has to do before entering the studio or reaching the shooting location. It involves idea development, research, scripting, discussions with all the crew members and talents (actors), arranging equipment, video / audio tapes,

properties, costumes, set designing or location hunting and booking of editing shifts. Producing videos for the courseware was one huge task which therefore demanded brilliant ideas and expertise from both cast and technical crew. Numerous meetings were summoned between the researcher and his cast and technical crew on what things were needed for the commencement to the video shooting. Some demanding questions needed to be answered before the video shooting begins. The following questions needed answers:

1. What tools and equipment are required for the video shooting?
2. How many camera angles (close-up or wide-angle shots) will be appropriate for the courseware?
3. What tools (drawing tools such as pencils, pens, rolling pin, suck board, etc.) and materials (colours, clay, papers or cards, cords, etc.) are needed for teaching both introductory and demonstration lessons?
4. How many personnel are needed for the demonstration lessons?
5. What times will be appropriate for the video shooting?

4.4.2 Production Stage

At this stage, all tools and equipment needed for production are ready for the commencement of the video shooting. Tools and equipment such as cameras, tripods, lighting systems, microphones were used at this stage of the production process. Figures 21, 22, 23, 24, and 25 shows images of photography tools and equipment employed in shooting the video.

4.4.3 Tools and Equipment Used for the Courseware

4.4.3.1 Cameras

Two Canon EOS 7D cameras were used for the video shooting. One for close-up shots and the other for wide-angle shots.

Figure 21. An example of Canon EOS 7D Camera used for the courseware.
(source: Canon U.S.A. Inc. ,2018)

4.4.3.2 Tripod Stand

Two tripod stands were used for the video shooting. One was mounted on the camera for the close-up shots and the other for the camera for the wide-angle shots.

Figure 22. An example of the Tripod used for the Video Shooting.
(source: Sony, n.d)

4.4.3.3 Lighting System

Figure 23. An example of the Speed Light used for the Video Shooting.
(source: Godox Photo Equipment Company Ltd., 2017)

Figure 24. An example of the LED Light used for the Video Shooting.
(source: The Outdoor Gear, 2018)

4.4.3.4 Microphones

Two microphones were used in the video shooting to capture sounds. One was connected to the camera for the close-up shots and the other was for the camera for the wide-angle shots.

Figure 25. An example of the Microphones used for the Video Shooting.
(source: Amazon.co.uk, 2011)

4.5 Some scenes of the Production Stage

The Figures 26a, 26b and 26c shows some of scenes of the video production stage. These images show technical men (cameramen, light men, etc.) and practical lesson demonstrators (National Service Personnel from the Department of Art Education, University of Education, Winneba).

Figure 26a. A scene of the video production showing the technical crew.
(source: Fieldwork, 2017)

Figure 26b. A scene from the video production stage showing a Practical Lesson Demonstrator.
(source: Fieldwork, 2017)

Figure 26c. A scene from the video production stage showing the video editors.
(source: Fieldwork, 2017)

4.6 Post-Production Stage

This is one of the most challenging stages of the entire project. This stage spanned about six months because the personnel who assisted in the production were mostly students and National Service Personnel. The post – production stage consists of major themes like:

1. File Transfer and Arrangement
2. Video Editing (using Adobe Premiere Pro and Adobe After Effect)
3. Rendering
4. Compressing Videos (using HandBrake and Adobe Media Encoder)

4.6.1 File Transfer and Arrangement

File transferring was a major activity in the entire courseware production process. During the production stage (video shooting), two separate cameras were employed. One camera for Wide-Angle Shots and the other for Close-Ups. The wide angel shots were purposely for capturing an entire area of an activity, whilst the close-up was to concentrate on specific spots of the activity to be captured or shot. At each video shooting section, these cameras run concurrently in order to get two synchronizing shots (wide and close-up shots) for both video and sound. When a set of videos (such as a wide angle shot and a close-up shot) are completed, two distinct files with the same duration will be produced and must be transferred onto a suitable shortage space for editing. The files were transferred into labelled folders based on the Class, Term, Unit and Sections for further action. In each of these breakdowns (such as Class, Term, Unit and Sections) one will find two distinct files in each folder.

Although there are two distinct files in each folder (e.g. Introduction Videos Folder), there is another folder (e.g. Demonstration Video Folder), which also house two other files (a wide angle shot and a close-up shot). It therefore means, in a main folder there are two separate folders which contain two files apiece. These two files (e.g. wide angle and a close-up shots of an Introduction Lesson) needs to be edited in unison to make a meaningful video and the same must be done for the other file (e.g. wide angle and a close-up shots of the Demonstration Lesson). The Introduction and Demonstration Lessons are again merged to produce a complete lesson (e.g. a primary one, term one and unit one lesson). Figure 27 below shows the main folder and the two other distinct folders and the files they each contain. Figures 28a and 28b also display an example of a wide angle shot and a close-up shot of practical lesson demonstrations.

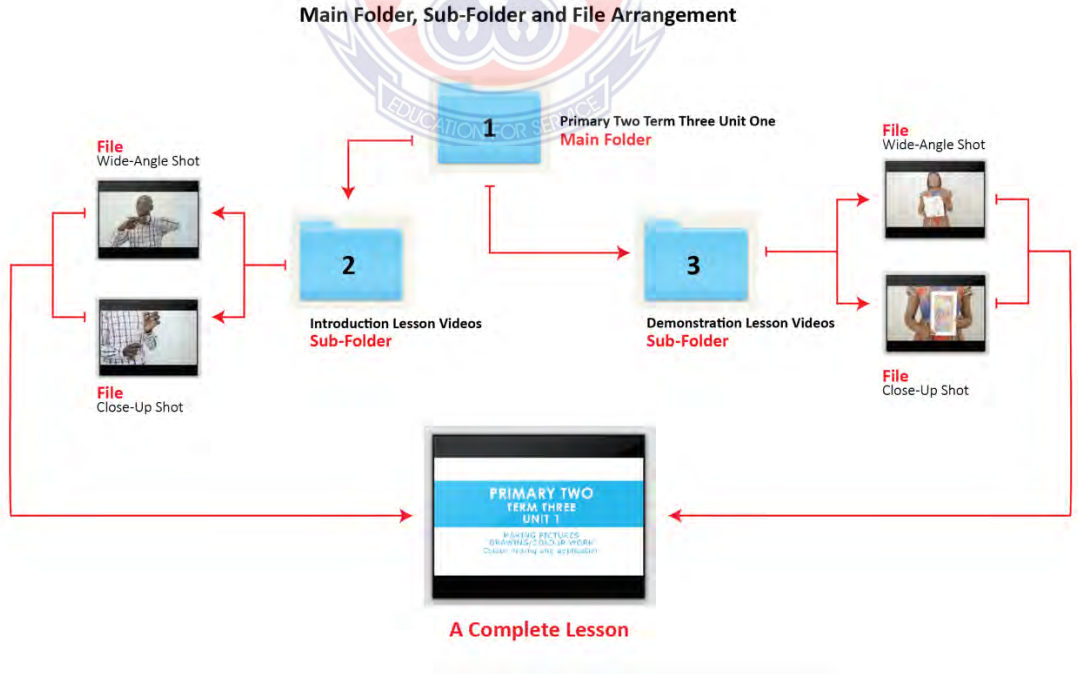

Figure 27. An arrangement of Main folder, Sub-folders and files during the File Transfer and Arrangement Stage.
(source: Fieldwork, 2017)

Figure 28a. An example of a Wide Angle Shot.
(source: Fieldwork, 2017)

Figure 28b. An example of a Close-Up Shot.
(Source: Fieldwork, 2017)

4.6.2 Video Editing

Video editing is the process of cutting and joining disjointed motion images together using an appropriate software like Adobe Premiere Pro, Sony Vegas Pro, iMovie, Final Cut Pro, etc. to make a complete video. In editing the video for the multimedia courseware, the researcher focused on three main things:

- What Software to use
- Desired File Format and Size
- Final Destination of your files

4.6.2.1 What Software to use

There are numerous software for editing videos, some for professionals and others for hobbyist or amateurs. These software vary in performance and features, which simply means depending on the kind of task at hand you need to choose wisely. The purpose for the videos for this project was to educate and therefore demands very clear and accurate footages. To get accurate footages, there was the need to look out for software that has been tried and tested. Adobe Premiere Pro and Adobe After Effects were the most appropriate software because they have been used by well-known professionals over many years.

4.6.2.2 Adobe Premiere Pro

Adobe Premiere Pro as a software has been around for several years. It is a video editing software package suitable for both amateur enthusiasts and professionals. It can be

purchased and used alone, or alongside other applications such as Adobe Photoshop, After Effects, etc. Premiere does both common and very professional editing tasks and is suitable for almost all situations in video editing. Some of the features of Premiere Pro are as follows:

- The built-in title maker is fine for most titles.
- Premiere has some good audio mixing and effects features.
- The range of transitions and special effects is adequate for most videos.

Adobe Premiere Pro was used in editing all the videos for the multimedia courseware. Wide-angle and Close-up footages were trimmed and joined using the array to tools available in the software.

To work effectively in Premiere Pro, it is demanded that a root folder was created to contain all necessary files (such as videos [wide and close shots], images and audios). All these files will have to be imported into the project panel of Premiere Pro. After the files are imported, there was the need to generate or create a sequence. A sequence is a group of settings that will be used when creating a new document in Premiere Pro. These settings include frame size, pixel aspect ratio (e.g. 16:9, 5:4, 4:3, etc.), editing time-base (frame rate), and QuickTime video and audio settings (such as codec, audio sample rate, etc.). When the sequence was ready, files from the project panel can then be imported into the timeline for editing.

Editing videos using the timeline requires files to be placed based on an order of merit or hierarchy. During editing, all close-up shots were place on the first layer, followed by the wide-angle shots and then audios and images. This kind of file placement were

necessary because two separate cameras were used during the video shooting and therefore requires that both footages are synchronized to make a meaningful story. The Figures 29 through 42 show a step by step rendition of how files were handled in Adobe Premiere Pro during the editing of the videos for the courseware.

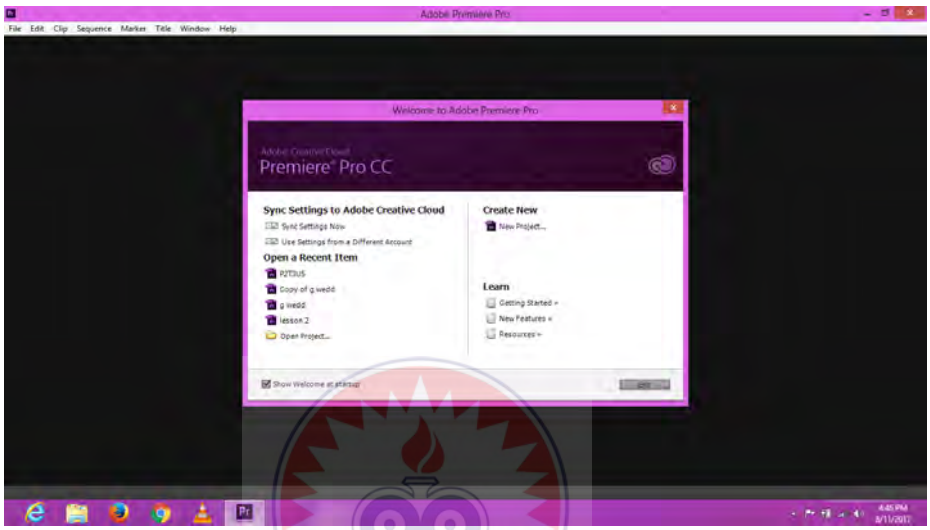

Figure 29. The Welcome Screen of Adobe Premiere Pro Cc.
(source: Fieldwork, 2017)

In almost all Adobe products, the Welcome Screen serves a great purpose by showing a user or viewer some common but great point of reference at the start of every work in a particular software and again a great place to learn about new features too.

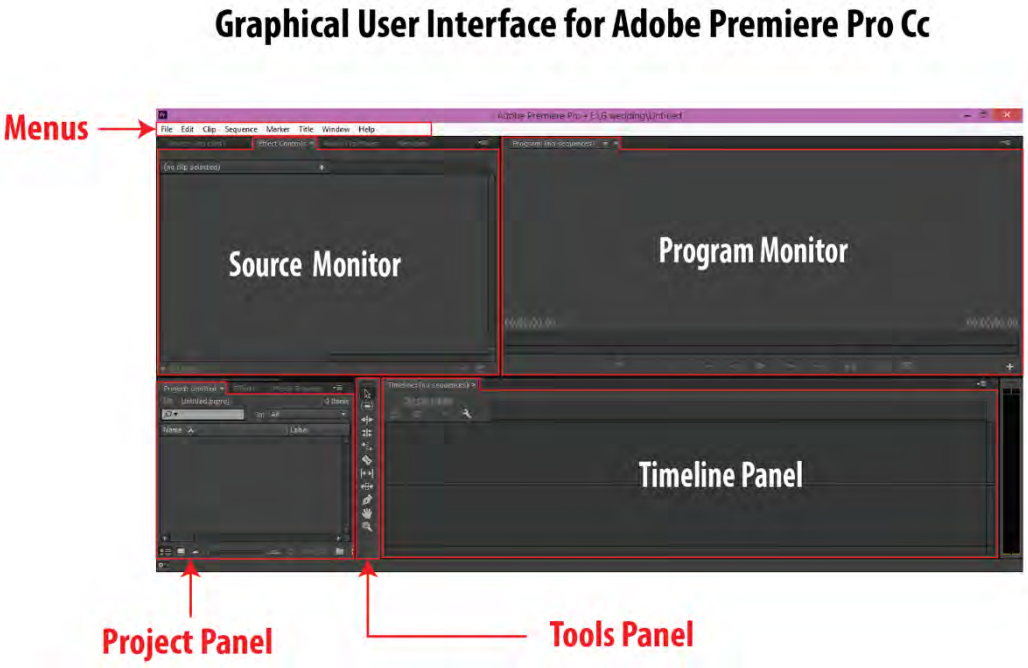

Figure 30. The Graphical User Interface for Adobe Premiere Pro Cc.
(source: Fieldwork, 2017)

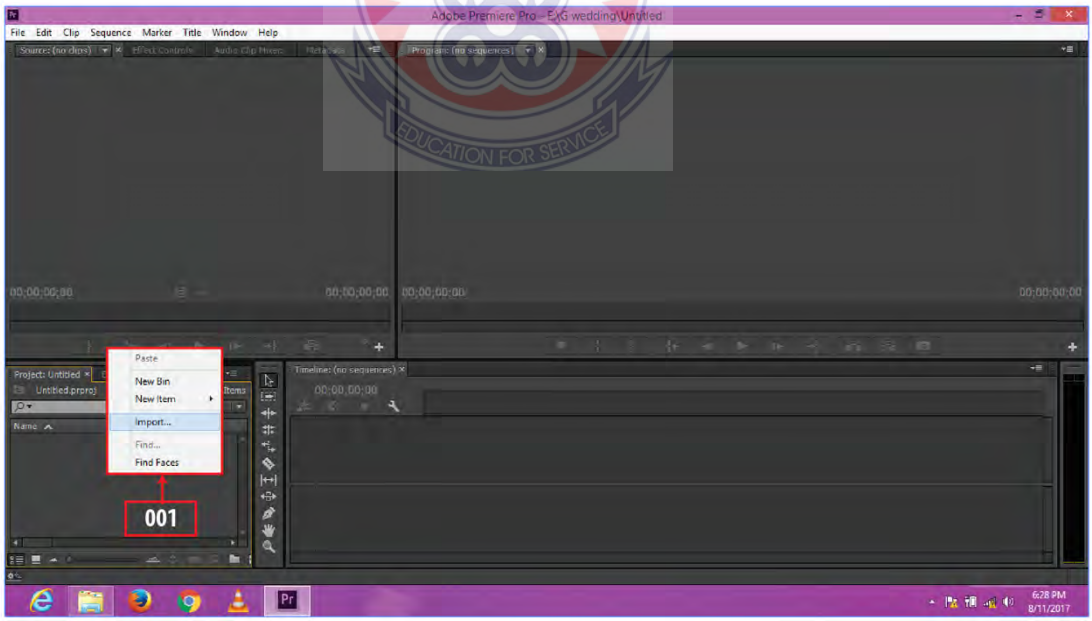

Figure 31. The 'Import Menu' labelled 001 on the Project Panel
(source: Fieldwork, 2017)

To import folders and files into the Premiere Pro, the mouse cursor was placed on the project panel and right-clicked to show the menu labelled 001 in Figure 31.

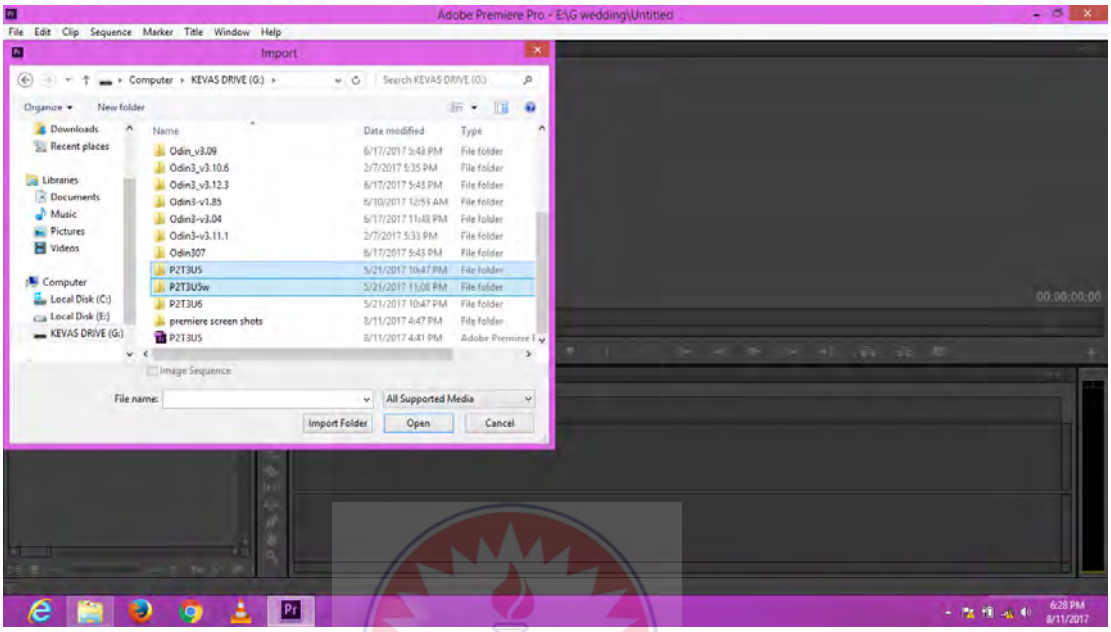

Figure 32. The 'Import Dialogue Box' of Adobe Premiere Pro for importing folders into the Project Panel
(source: Fieldwork, 2017)

Folders and files that were ready for editing needed to be located for proper transfer into the project panel of Adobe Premiere Pro Cc.

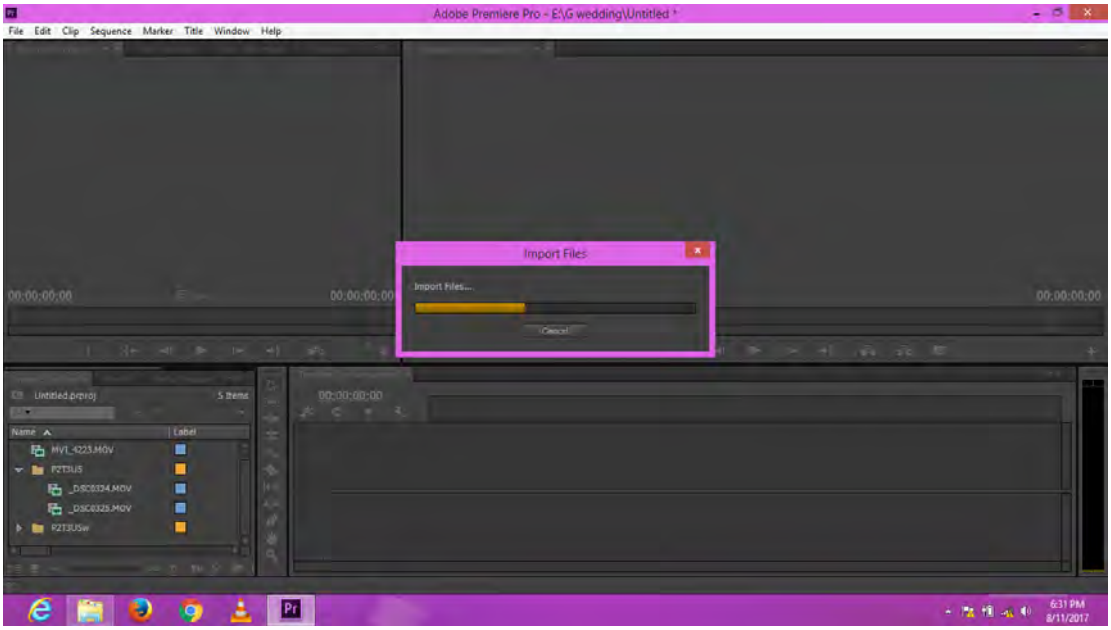

Figure 33. Shows the process of importing folders and files into the Project Panel.

(source: Fieldwork, 2017)

Figure 34. Shows a successful importation of folders and files into the Project Panel.

(source: Fieldwork, 2017)

When the folders and files are imported successfully into the project panel, the files are arranged based on the information each file carries which is termed metadata of imported files. Metadata is a set of data that describes and gives information about graphic files. The project panel displays file data such as: Label, Frame Rate, Media Start, Media End, Media Duration, Video in Point, Video Out Point, Video Duration, Video Information, Audio Information, and Tape Name.

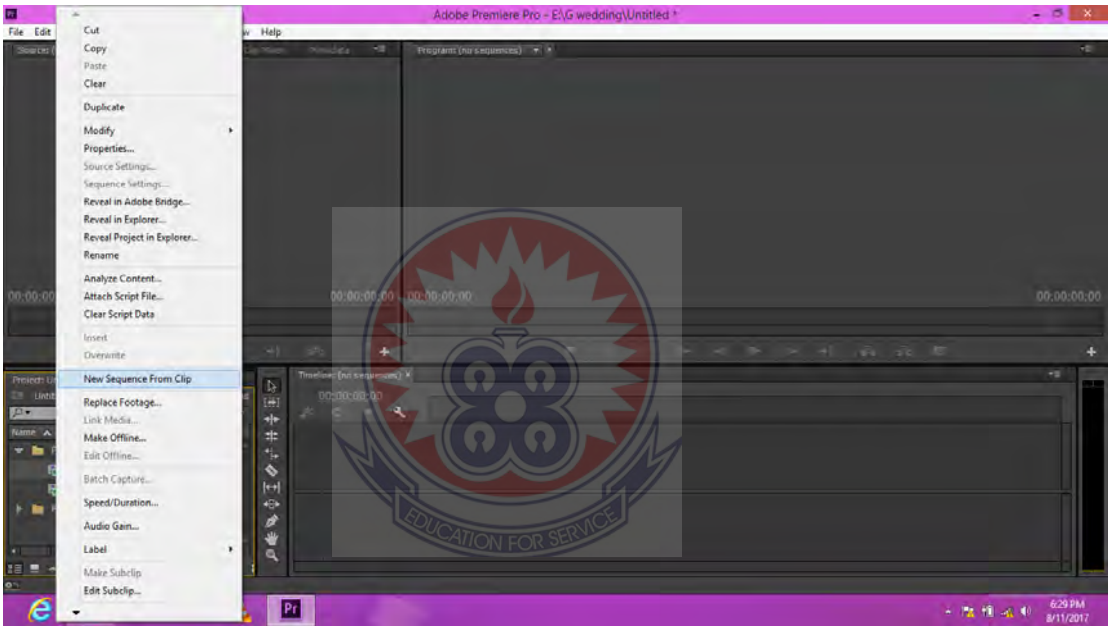

Figure 35. Shows how to create a new sequence in Adobe Premiere Pro.
(source: Fieldwork, 2017)

At this stage of the editing, there was the need to create a sequence which allowed smooth operation of the various files that were to be transferred from the project panel onto the timeline. For video storytelling, shots were taken and put together in sequences. A video sequence is a series of shots on the same subject that are edited together to tell a story. A well-edited video sequence adds visual variety to video storytelling.

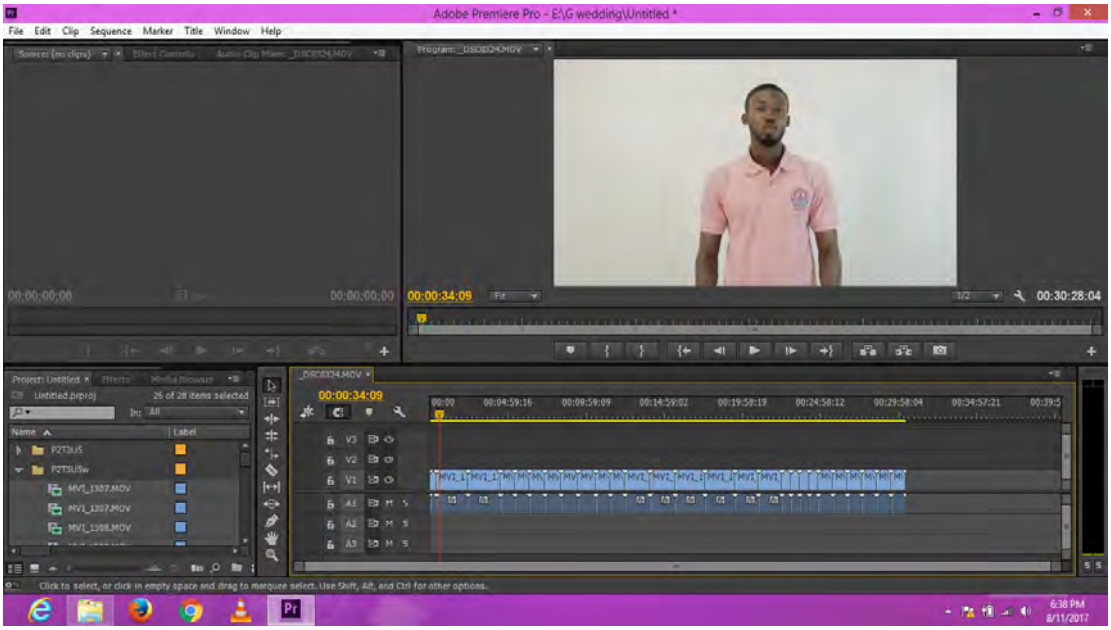

Figure 36. Shows transferred files from the project panel into the timeline.
(source: Fieldwork, 2017)

After the creation of the sequence, footages that needed to be edited located in the project panel were transferred into the timeline to commence the editing process.

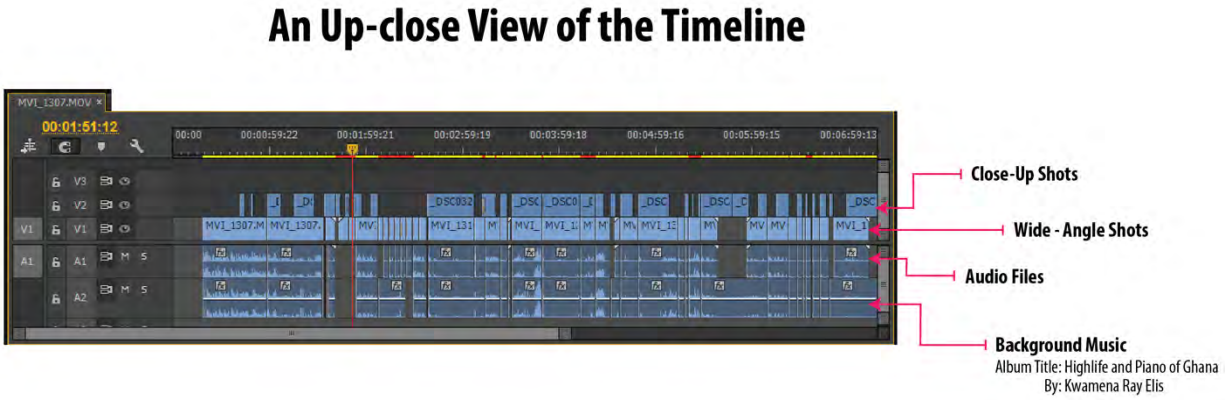

Figure 37. Shows how the timeline looks when files are transferred into it
(source: Fieldwork, 2017)

Figure 37 above shows an up-close view of the timeline loaded with files such as: close-up and wide-angle video footages, and two separate audio files.

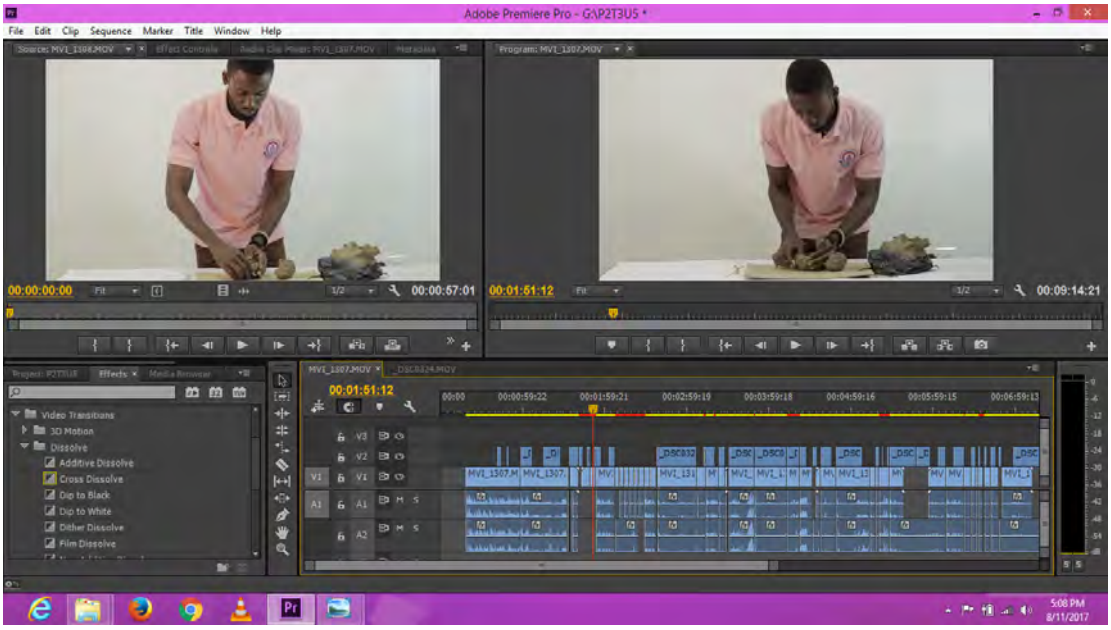

Figure 38. Shows the full view of the GUI during editing.
(source: Fieldwork, 2017)

The figure 38 above shows a full view of how the Graphical User Interface appears when the various files (such as close-up and wide-angle video footages with transitions, and two different audio files) are loaded into the timeline panel during the editing process.

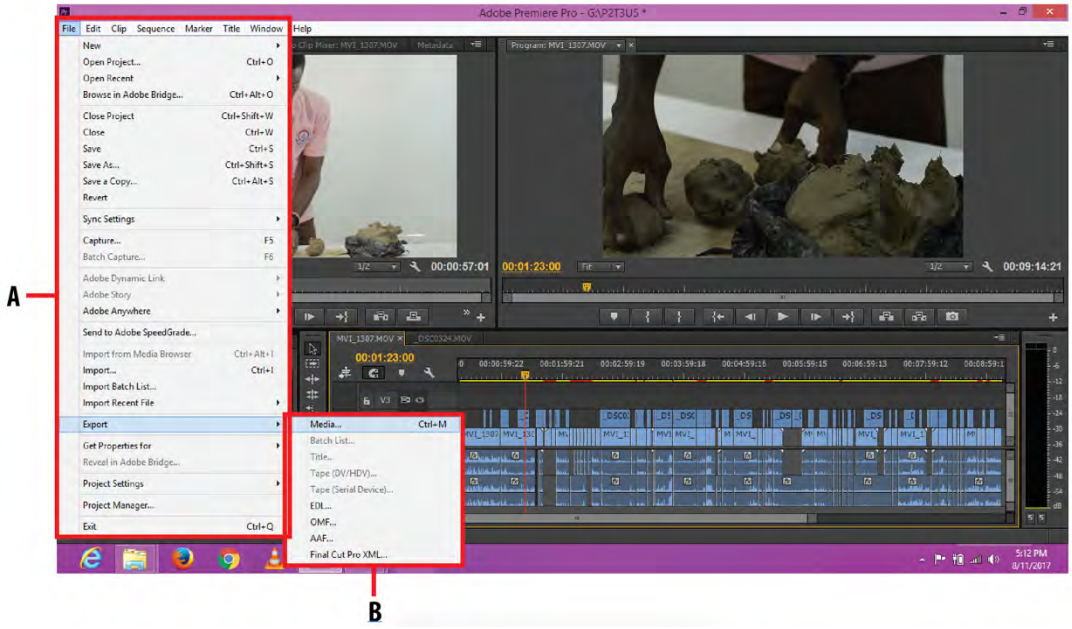

Figure 39. Shows a completely edited video ready to be exported.
(source: Fieldwork, 2017)

The figure 39 above gives an overview of a complete video ready to be exported out of the native software used for editing (Adobe Premiere Pro Cc) into another very important software (Adobe After Effect Cc) for further editing. The two dialogue boxes labelled A and Bin figure 39above, shows how and where to locate the export command in Adobe Premiere Pro Cc.

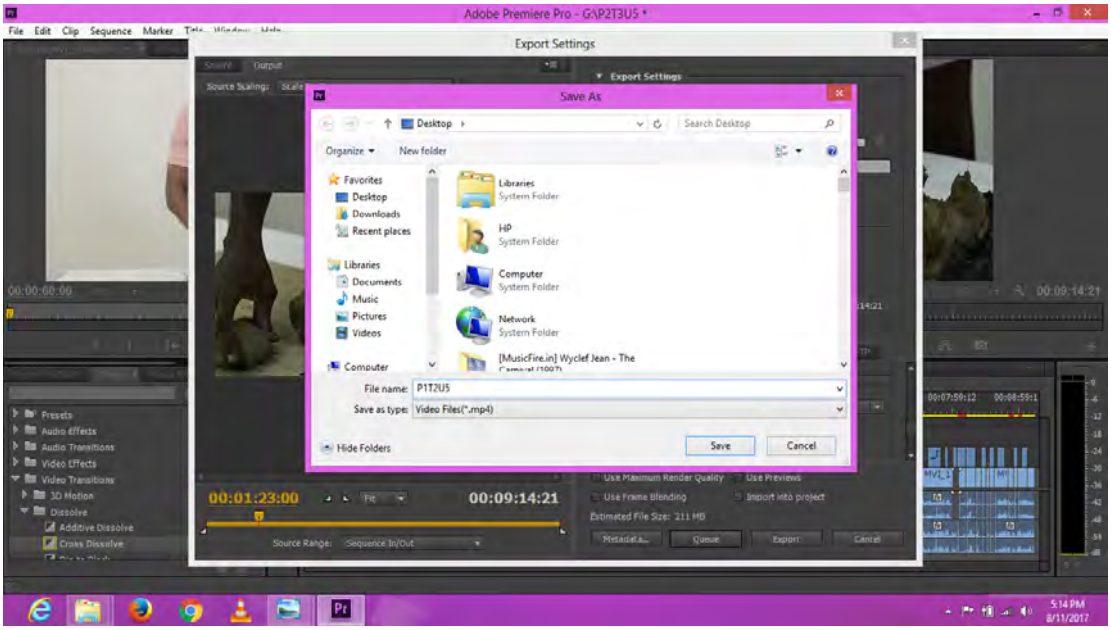

Figure 40a. Shows export settings, file format, name and destination after saving.

(source: Fieldwork, 2017)

The figure 40a above gives a visual explanation to where the export settings, file format, name and destination are located. When exporting videos, it is important to match settings to the environment that the finished video will be published. Many video editing programs will have default settings based on the final destination of the video. Nonetheless, the video editor should choose the most appropriate format because he or she is the determiner of the final destination of the video.

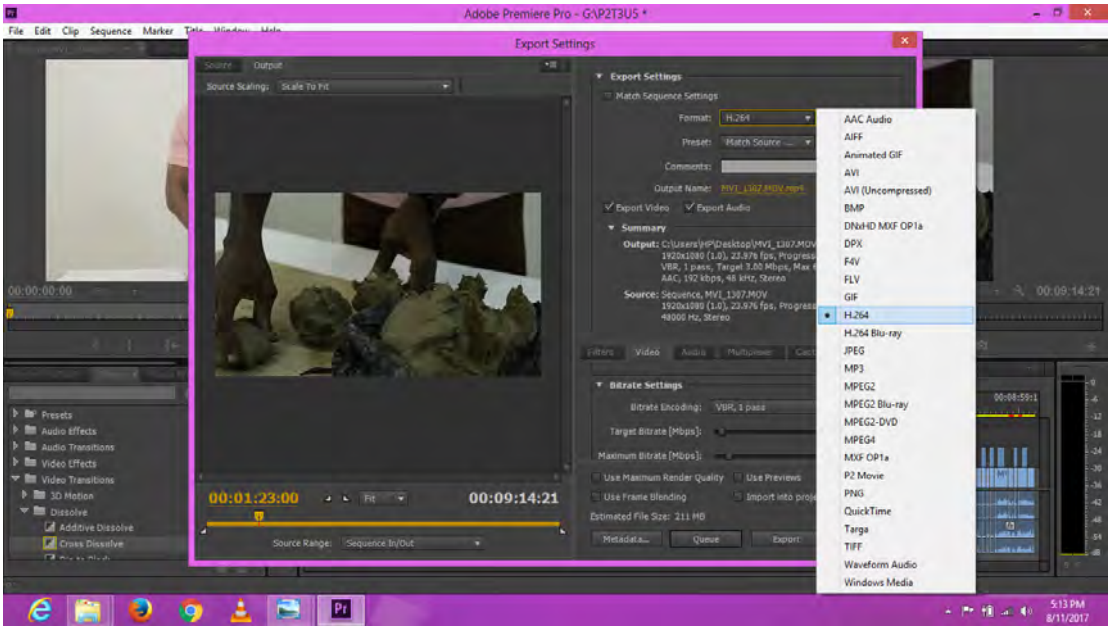

Figure 40b. Shows the file format chosen for the edited videos.
(source: Fieldwork, 2017)

A file format is the structure of how information is stored (encoded) in a computer file. File formats are designed to store specific types of information, such as .mng (multiple-image network graphics), .mov or. qt (QuickTime File Format), .wmv (windows media video), etc.

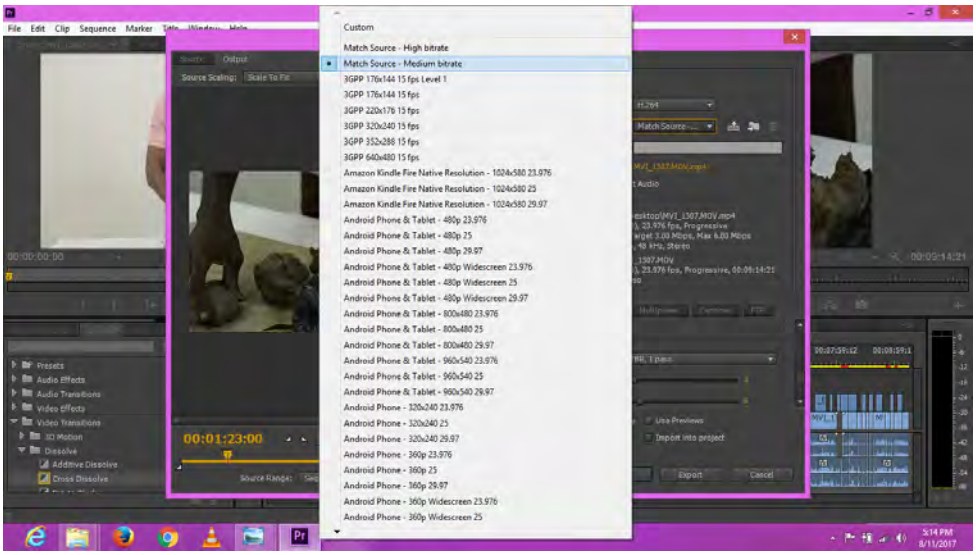

Figure 40c. Shows the preset format chosen for the edited videos.
(source: Fieldwork, 2017)

Figure 40c shows the preset settings applied to the video footages for the multimedia courseware. Presets simply contain settings for one or more effects to be applied to any footage in a sequence.

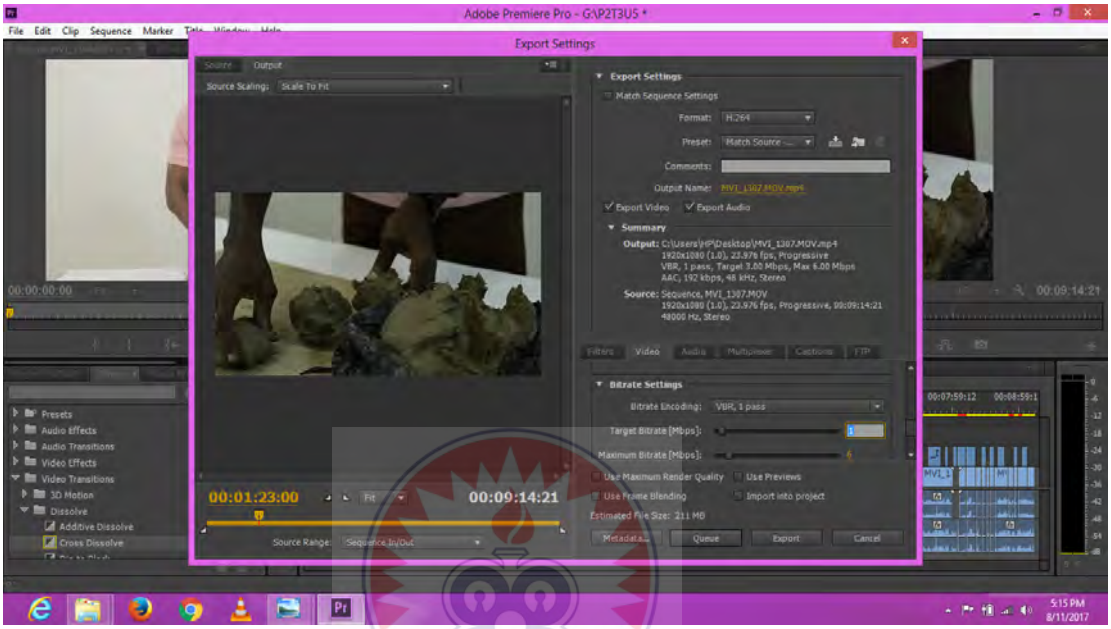

Figure 41. Shows the export settings for all the videos in the multimedia courseware.
(source: Fieldwork, 2017)

The figure 41 above displays all the settings used for the video exports which forms the metadata or background information of the footages used for the development of the multimedia courseware.

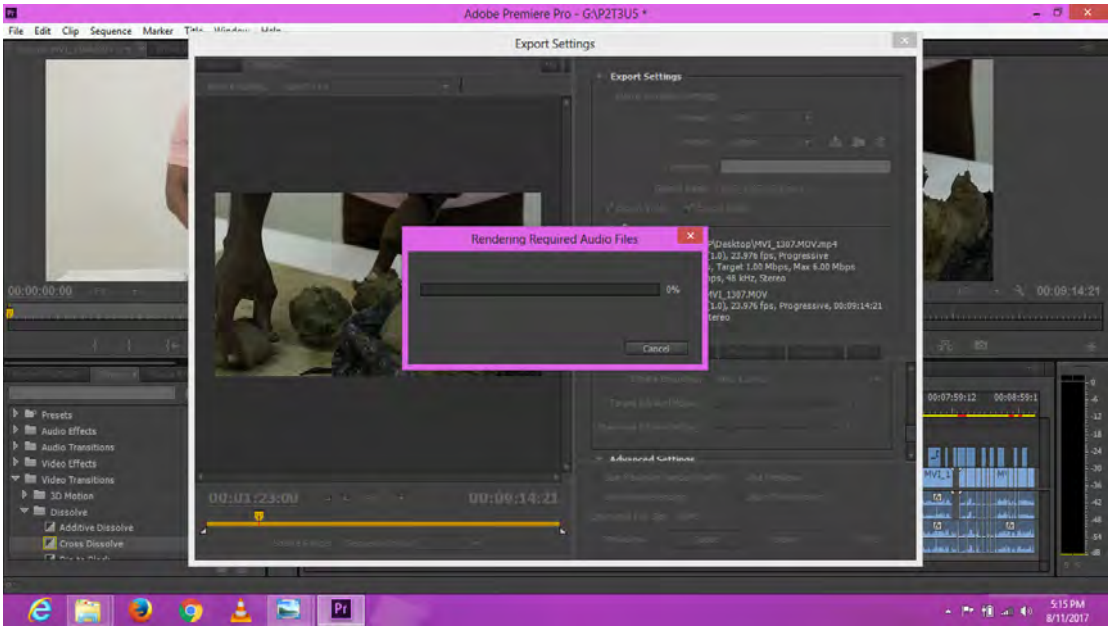

Figure 42. Shows the rendering process of a completed video.
(source: Fieldwork, 2017)

Video rendering is the process by which a computer processes information from a coded data source and uses that information to produce and display an image. The computer code may include instructions on creating images verbatim for playing back a movie or may provide a set of guidelines the computer uses to generate a custom image like a webpage. Video rendering can be one of the most hardware-demanding processes for a computer, especially when it's done in real time.

4.6.2.3 Adobe After Effects

Adobe After Effects is a digital visual effect, motion graphics, and compositing application developed by Adobe Systems and used in the post-production process of film making and television production. Among other things, After Effects can be used for keying, tracking, compositing and animation. During the post production processes,

After Effects was used to apply transitions on lower thirds, tools and materials and credits for crew in all the various videos in the courseware. Transition is an effect that blend video segments into a complete scene before and after the cut. During the post production stage of this project, assets like transitions on lower thirds were employed in order to reiterate some points made before, during and after the delivery of lessons (both introductory and demonstration lessons). The lower thirds used for the project were presets found in After Effects that were edited to suit the courseware. The Figures 43 through 52 show how Adobe After Effect was used in the post-production stage of the video editing process.

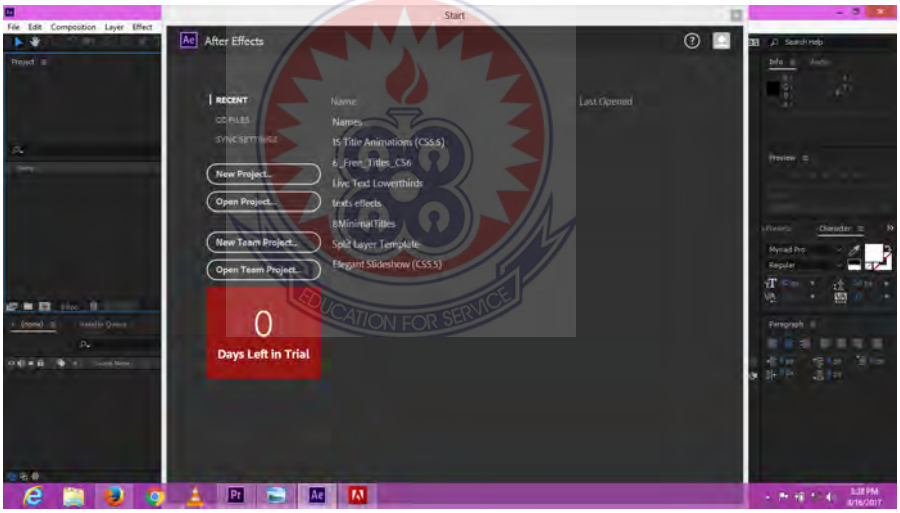

Figure 43. Shows the welcome screen of Adobe After Effects.
(source: Fieldwork, 2017)

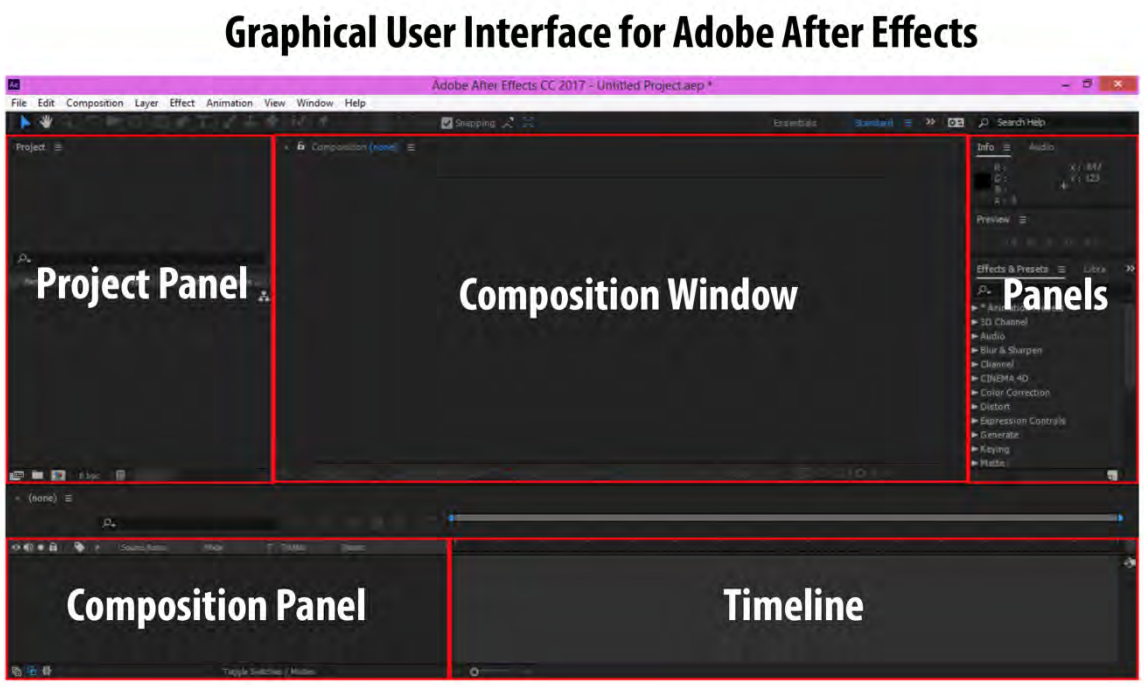

Figure 44. Shows the Graphical User Interface for Adobe After Effects.
(source: Fieldwork, 2017)

The graphical user interface of Adobe After Effects contains five major windows by default. These default windows (project panel, composition window, panels, composition panel, and timeline) operate distinctively but not in isolation from each other. There are other hidden advanced panels or windows meant for specific tasks but are not displayed by default. These advanced panels are displayed when toggled on which means they are task specific and therefore cannot be displayed by default.

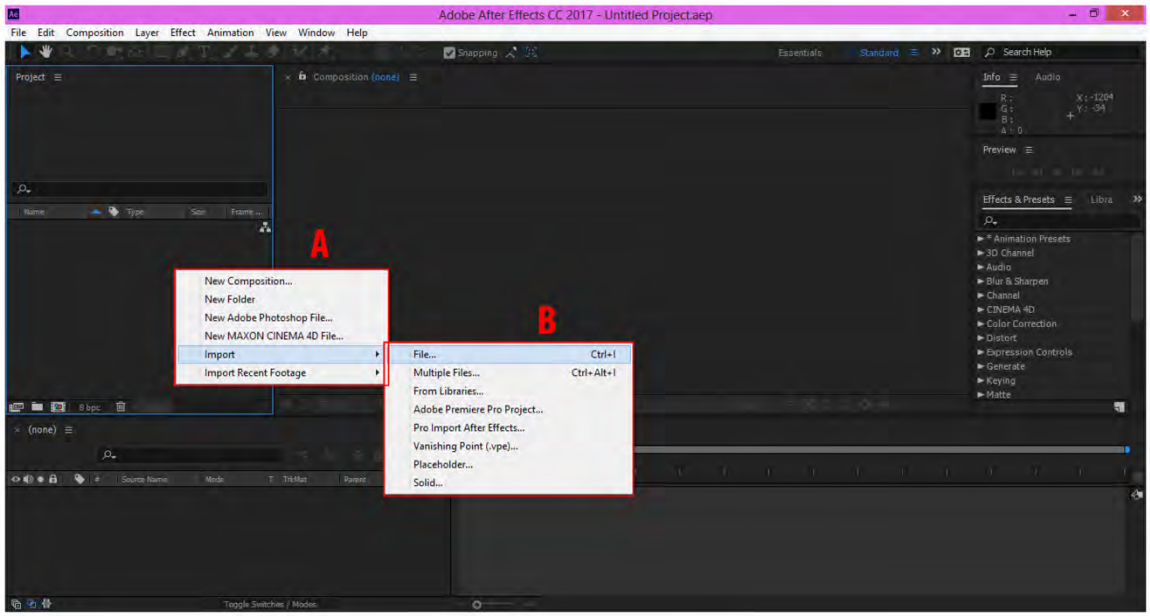

Figure 45. Shows the import files dialogue box
(source: Fieldwork, 2017)

The figure 45 above shows the commands on how files were imported in the After Effects. The mouse cursor was placed on the project panel and right-clicked to display the dialogue boxes A and B which are the first steps in bringing files into the software.

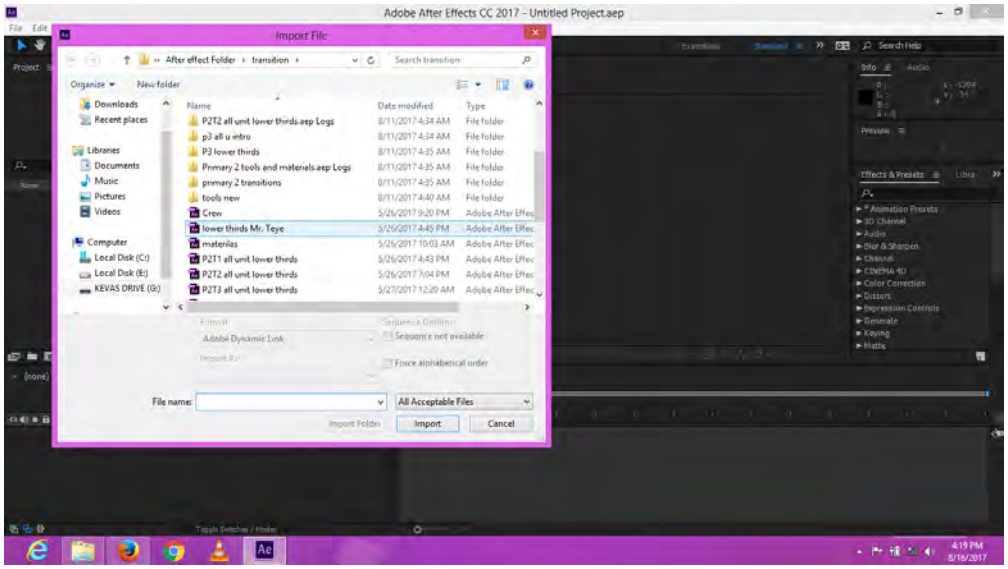

Figure 46. Shows the destination of files to be imported into the project panel.
(source: Fieldwork, 2017)

Files that need to be worked on in After Effects are placed into a folder that serves as the container or root folder for those files. There was the need to locate the destination of the files that will be used to commence work in After Effects.

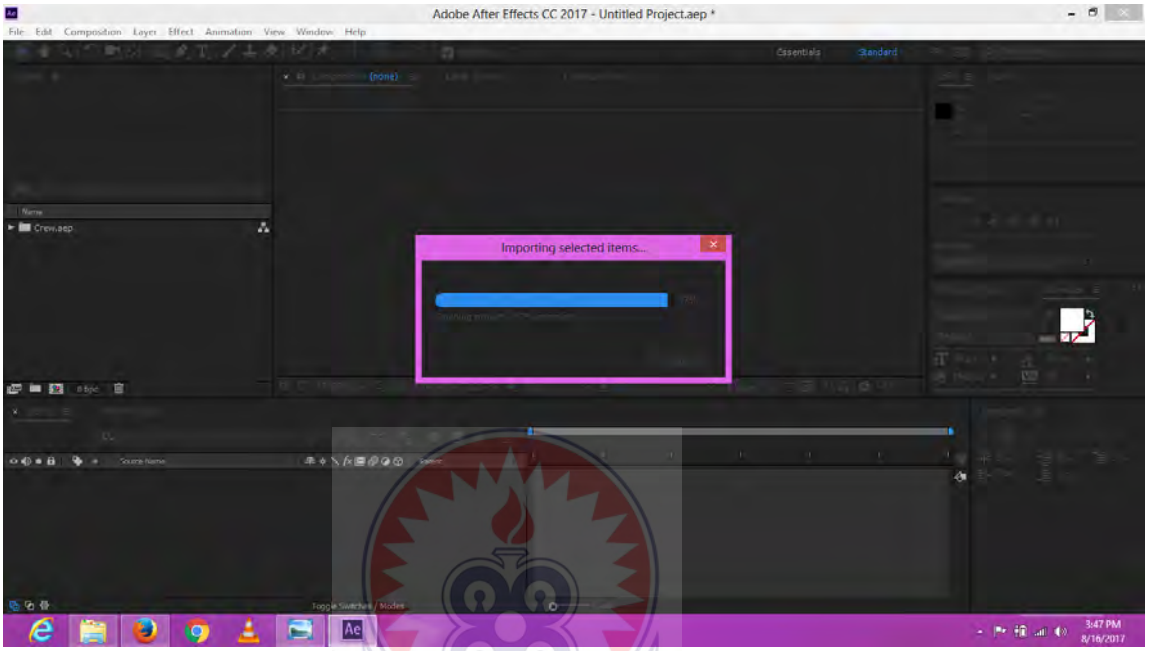

Figure 47. Shows the importation of files into the project panel.
(source: Fieldwork, 2017)

The figure 47 above shows the process of importing files into Adobe After Effect. These files were placed into a root folder which needs to be transported into After Effects for editing.

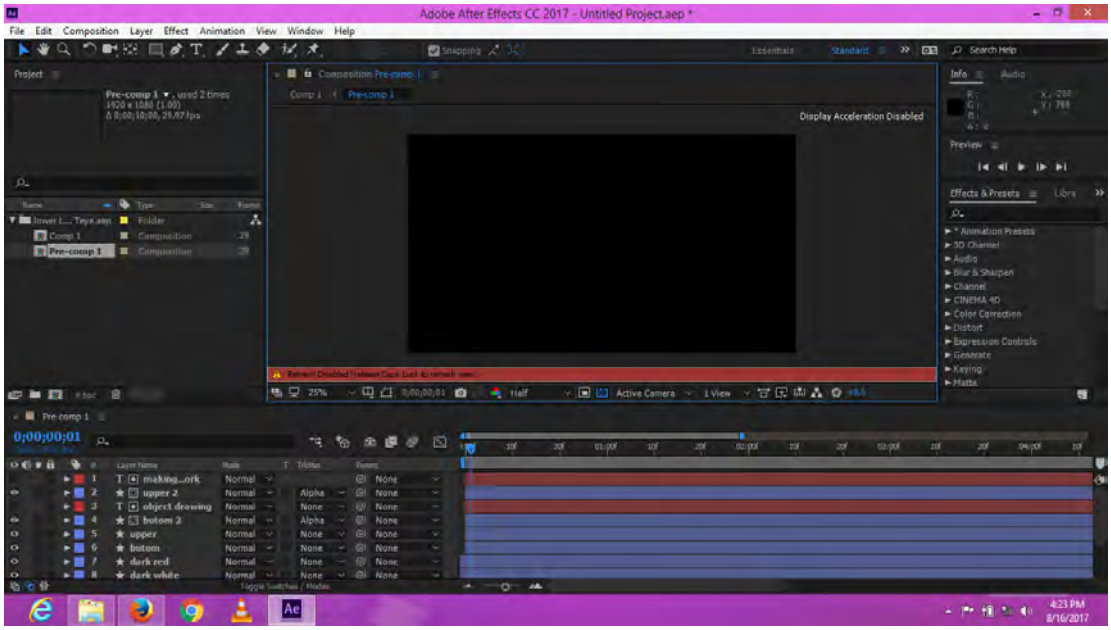

Figure 48. Shows opened pre-composed project
(source: Fieldwork, 2017)

The figure 48 above shows imported files that were edited to produce transitions and lower thirds during the post production stages of the project. This image displays the basic view of how the graphical user interface of After Effects looks when assets are imported into it for editing.

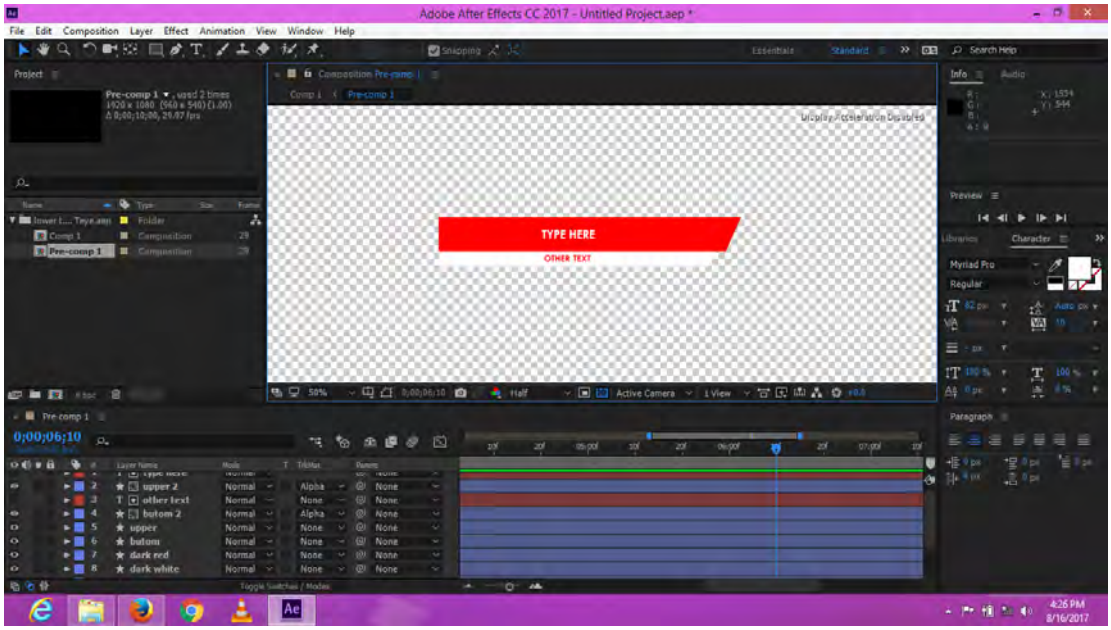

Figure 49a. Shows a sample of the lower third (preset) used for the project work.
(source: Fieldwork, 2017)

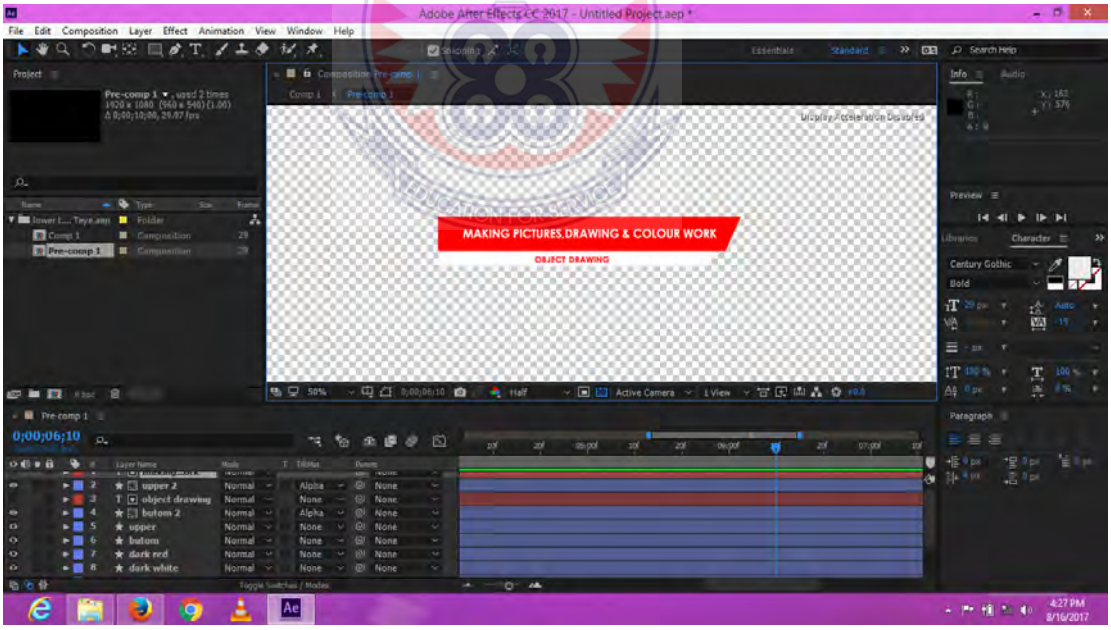

Figure 49b. Shows a sample of the lower third with its edited course title and subtitle.
(source: Fieldwork, 2017)

After Effects has several editable presets which serve as the start-up assets for its users. One of these presets was adapted for the lower thirds for the project. By default, this adapted asset has its own features and behaviour but was edited to suit the project by changing the colour and some transitional effects to make it suitable for academic use.

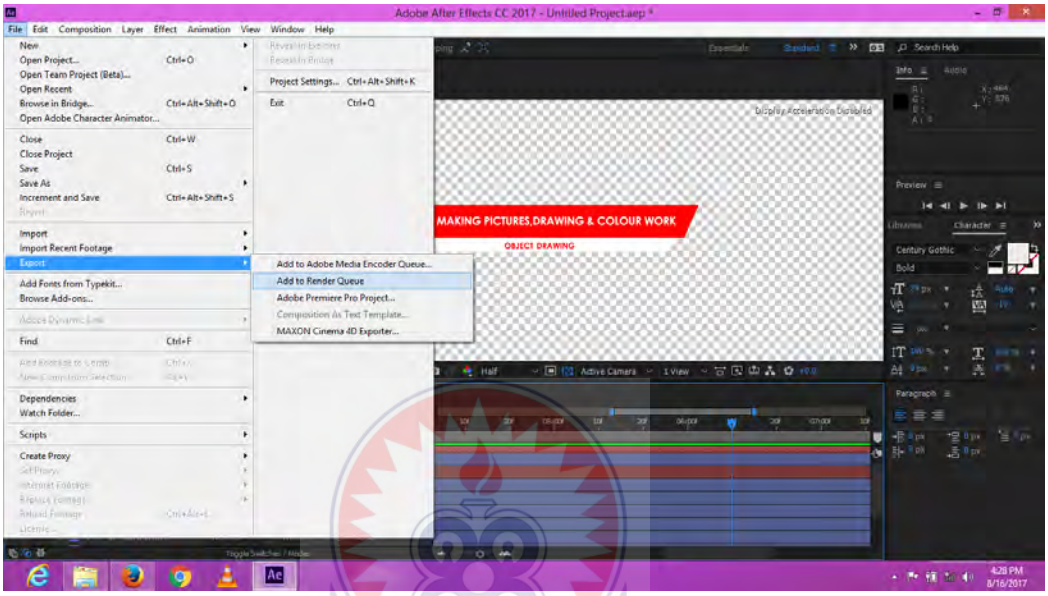

Figure 50a. Shows a sample of lower third ready for rendering and export.
(source: Fieldwork, 2017)

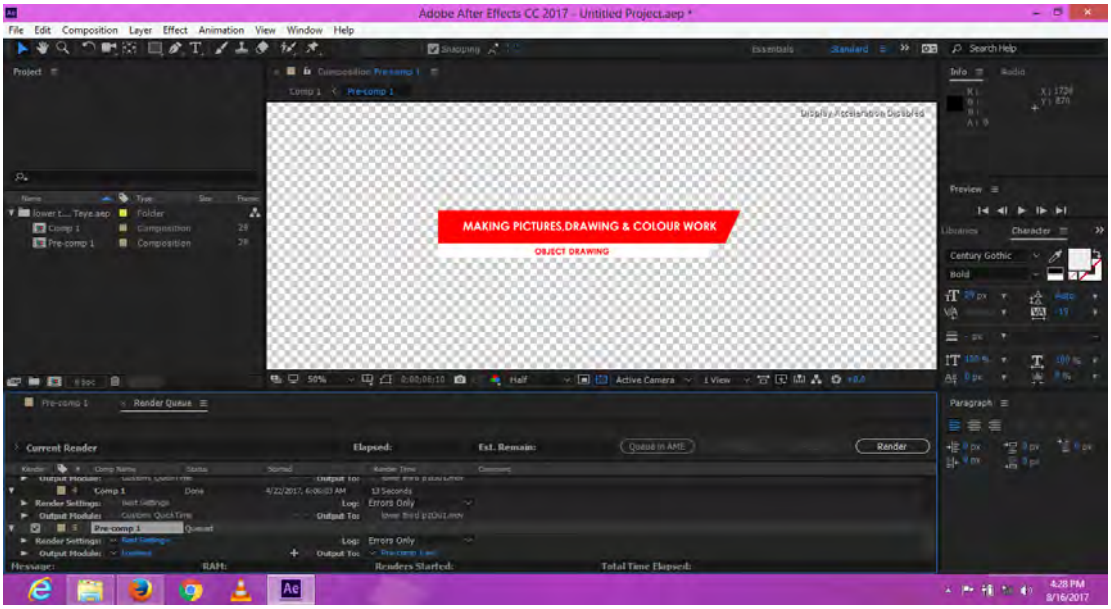

Figure 50b. Shows rendering and export settings of lower thirds.
(source: Fieldwork, 2017)

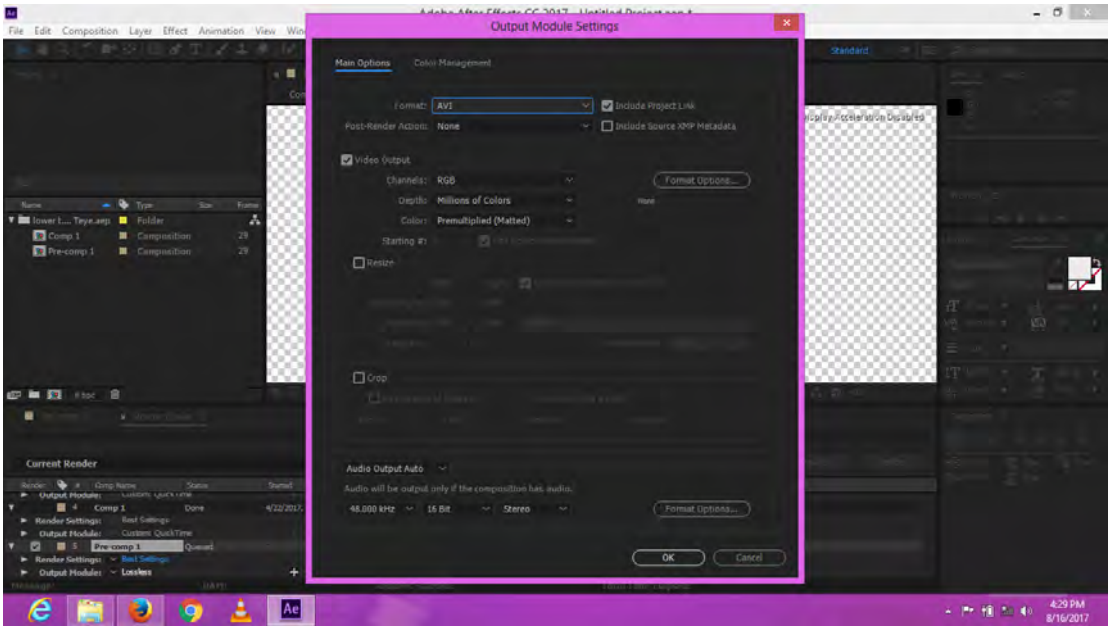

Figure 50c. Shows output module settings dialogue panel
(source: Fieldwork, 2017)

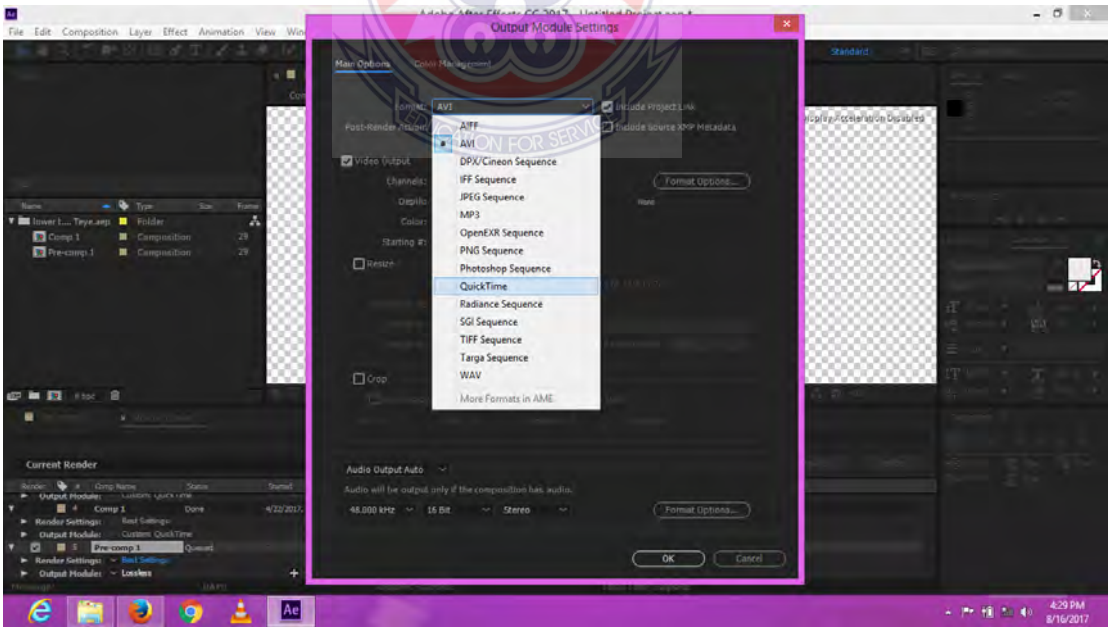

Figure 50d. Shows output file format for the lower thirds.
(source: Fieldwork, 2017)

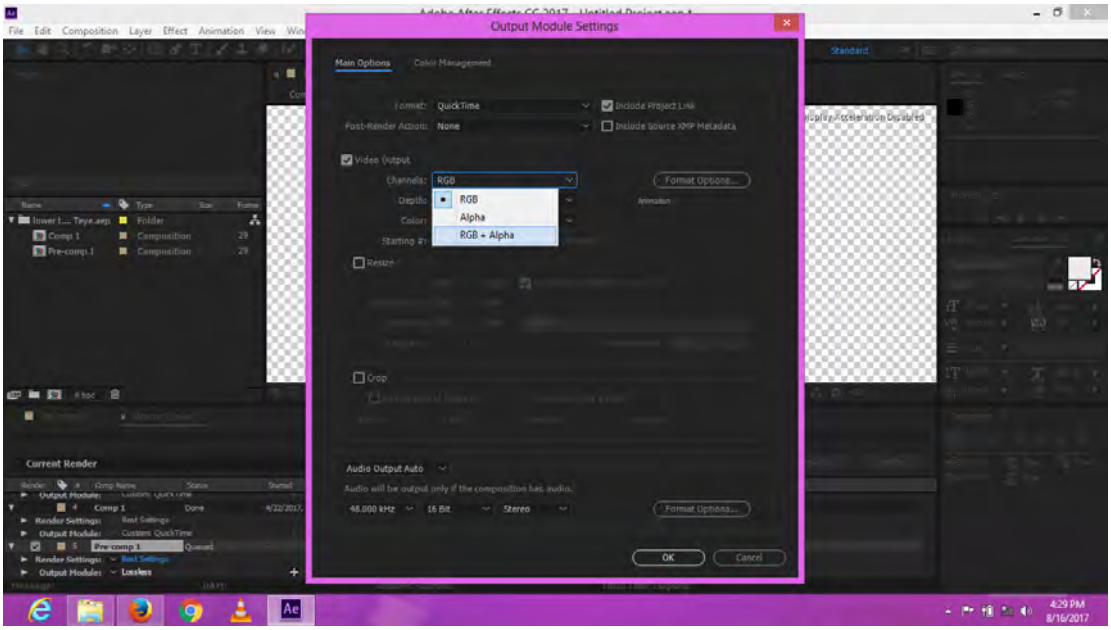

Figure 50e. Shows the video output channels for the lower thirds.
(source: Fieldwork, 2017)

Figures 50a – 50e are the various processes involved in rendering and exporting the lower third files for the project. Rendering and exporting files in After Effects demands very careful and detailed settings in order to suit whatever tasks the file is meant for.

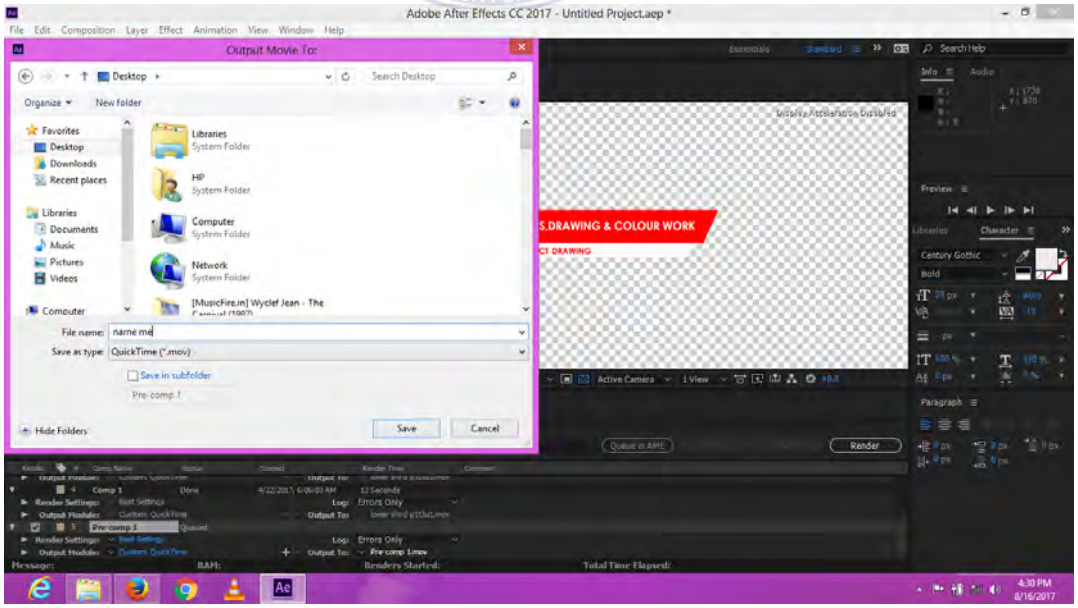

Figure 51. Shows the final destination of the lower third file.
(source: Fieldwork, 2017)

The multimedia courseware's video production stage generated numerous files which therefore made it prudent to find an appropriate destination for files such as these for easy access.

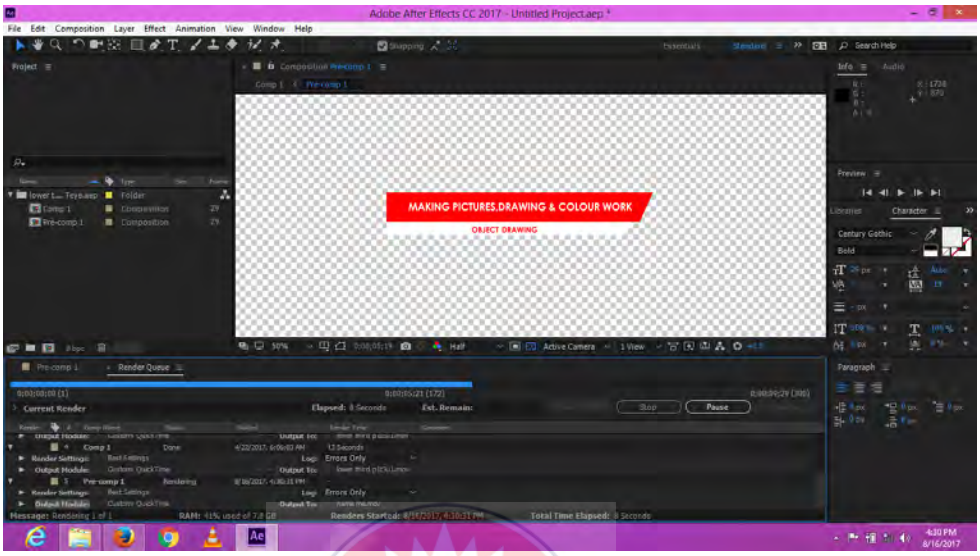

Figure 52. Shows the rendering process of the lower third.
(source: Fieldwork, 2017)

Figure 52 shows the final stage of the processes in Adobe After Effects which is the rendering of the lower thirds file. This process makes the file ready to be used for the purpose for which it was produced.

4.7 Courseware Production Processes

In designing and developing an interesting and user-friendly multimedia courseware, the following steps were followed;

- Designing a Storyboard
- Designing the GUI using Adobe Photoshop as a tool
- Dreamweaver for Courseware Development

4.7.1 Designing a Storyboard

A Storyboard is a sequence of drawings, usually with directions and dialogue, representing the shots planned for a production. Storyboards can also be explained as a visual organizer or layout of events developed from a series of illustrations displayed in sequence for the purpose of pre-visualizing a work plan or strategy. Considering the varied nature of teachers who will use this multimedia courseware, the researcher planned a very straightforward storyboard. Figure 51 shows the storyboard for the courseware.

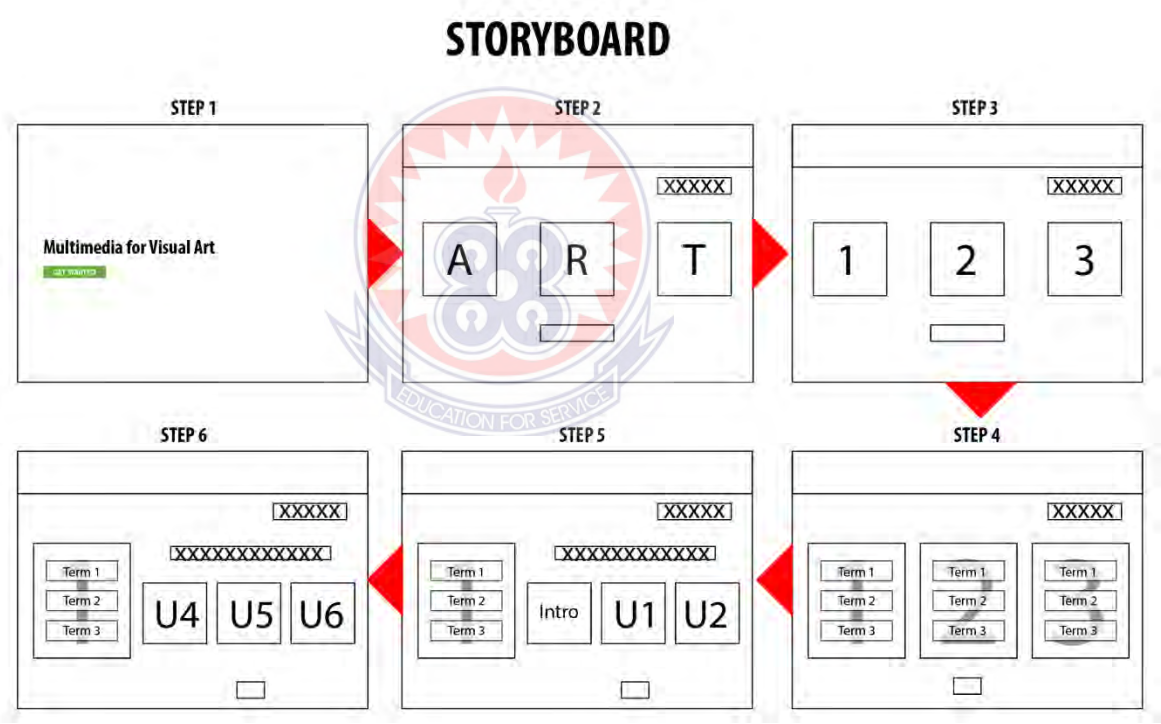

Figure 53. Shows the storyboard for the courseware
(source: Fieldwork, 2017)

Step 1

This page was designed to be the first page that welcomes every viewer into the courseware. It contains four welcoming images from the video production stage of the

courseware development. These separate images slide in and out of view with text (like multimedia for visual arts, art is fun, learning made easy and learn as you play respectively) on them inviting viewers into the courseware. The four images used for the welcome or index page (see: www.creativeartsmc.com) are displayed hierarchically in figure 54, as used in the courseware.

Figure 54. Shows samples of images used for the index page
(source: Fieldwork, 2017)

Step 2

This step displays the second interface of the courseware upon entry. The image contains three capital letters A, R and T which stands for the aspect of Creative Arts (Visual Art) the courseware is focused on. The letter R in the middle contains the start button for the courseware. If the start button is clicked, the third image displays. Figure 55 displays the start button for the courseware.

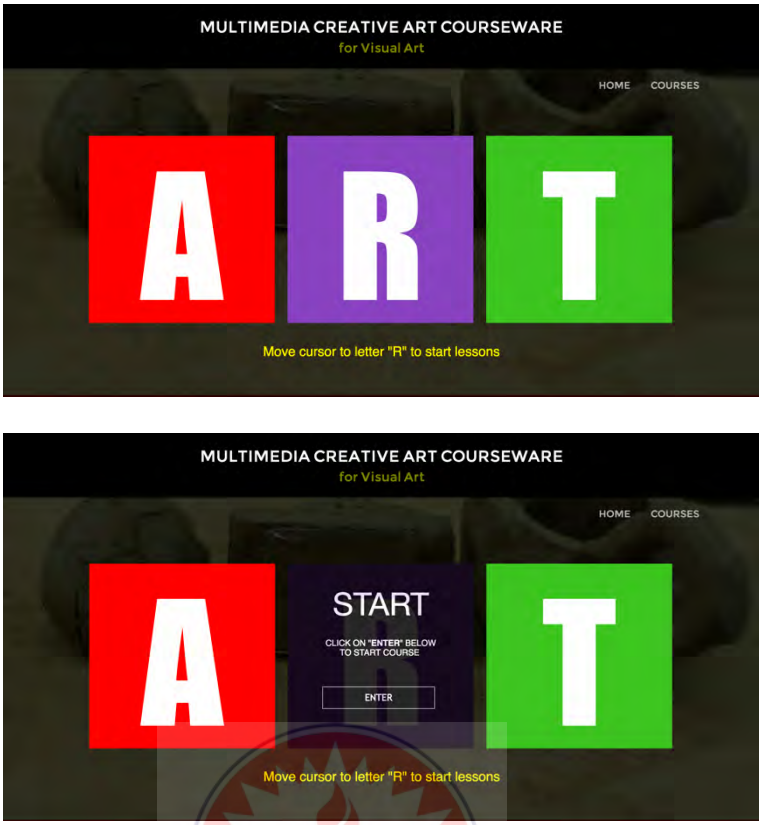

Figure 55. Shows samples of step 2 on the storyboard.
(source: Fieldwork, 2017)

Step 3

Step 3 displays the third interface of the courseware. The figure 56 contains numbers 1, 2, and 3 which stands for the classes (primary 1,2 and 3) the courseware was designed to serve. Figure 56 shows unclickable buttons for classes 1, 2 and 3 that forms the lower primary classes of a primary school.

Figure 56. Shows samples of step 3 on the storyboard.
(source: Fieldwork, 2017)

Step 4

When a mouse hovered on any of the three classes (1, 2 and 3), three terms (terms 1, 2 and 3) are displayed. If a term (e.g. Term 1) is clicked, it displays an interface that houses the first set of videos (thus, introduction, units 1 and 2 videos) meant for that specific term. A button has been placed under the first set of videos that states click button for more videos; which introduces viewers into the second set of videos (thus, units 4, 5 and 6) for that specific term. Figure 57 displays terms 1, 2 and 3 of each class (1, 2 and 3) when mouse is hovered on it.

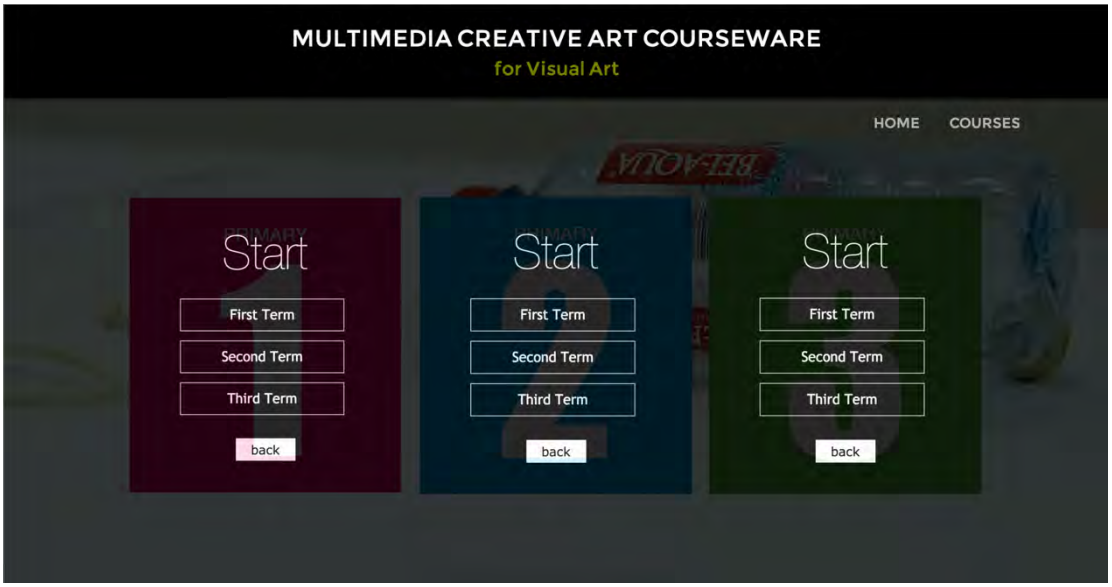

Figure 57. Shows a sample of step 4 on the storyboard.
(source: researchers own)

Step 5

On the storyboard, step 5 contains the very first set of videos for each class. This first set of videos are introductory lesson, units 1 and 2 for each class. A vivid example is displayed in figure 58 containing terms 1, 2, and 3 for primary 1, with its corresponding videos.

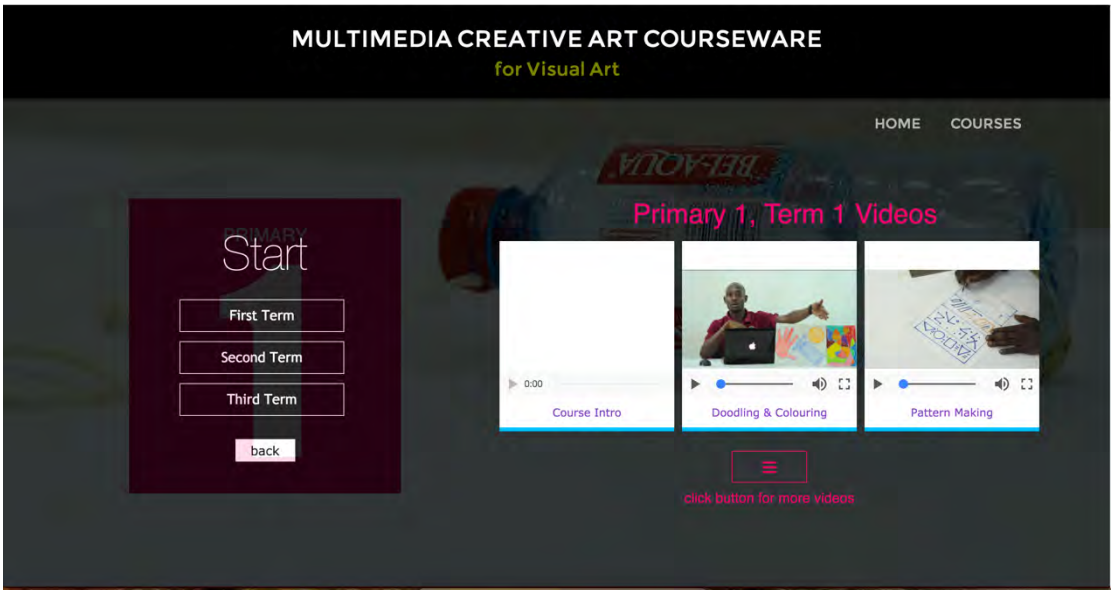

Figure 58. Shows a sample of step 5 on the storyboard.
(source: researchers own)

Step 6

In step 6, the second set of videos meant for a particular term is displayed by clicking on the button placed below the first set of videos which states; click button for more videos. An example of step 6 on the storyboard is displayed in figure 59.

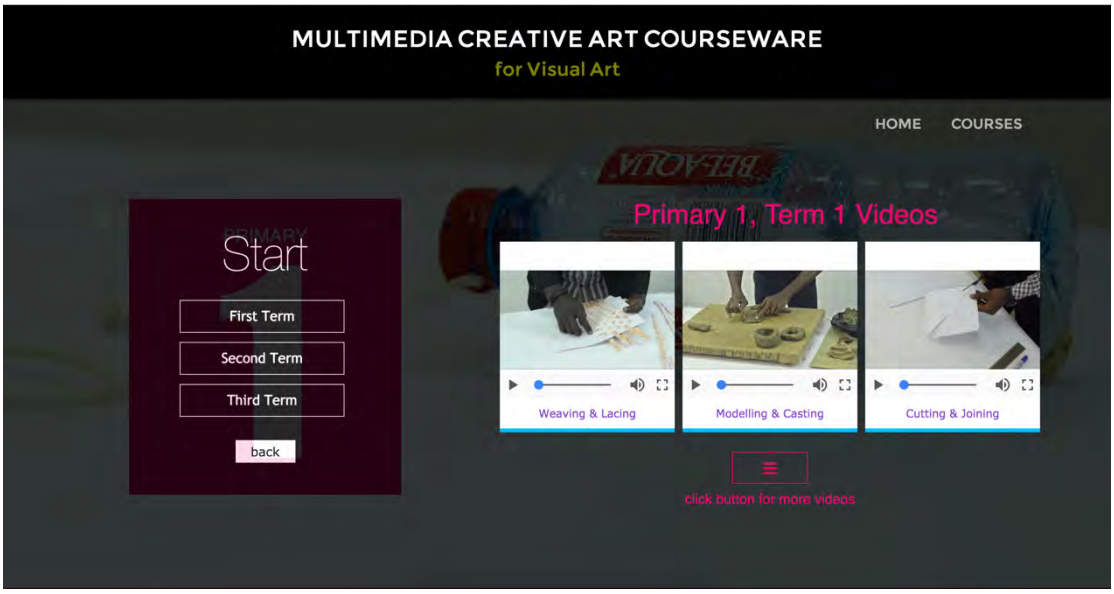

Figure 59. Shows a sample of step 6 on the storyboard.
(source: Fieldwork, 2017)

4.7.2 Designing the GUI using Adobe Photoshop as a tool

Photoshop is a great photo editing and manipulation software (Caplin, 2013). Its uses range from full featured editing of large batches of photos to creating intricate digital paintings, graphical user interfaces and drawings meant for numerous purposes. The graphical user interface designed for the courseware was produced from scratch using Photoshop. Figure 60 is the boot screen of Adobe Photoshop CC 2017 version.

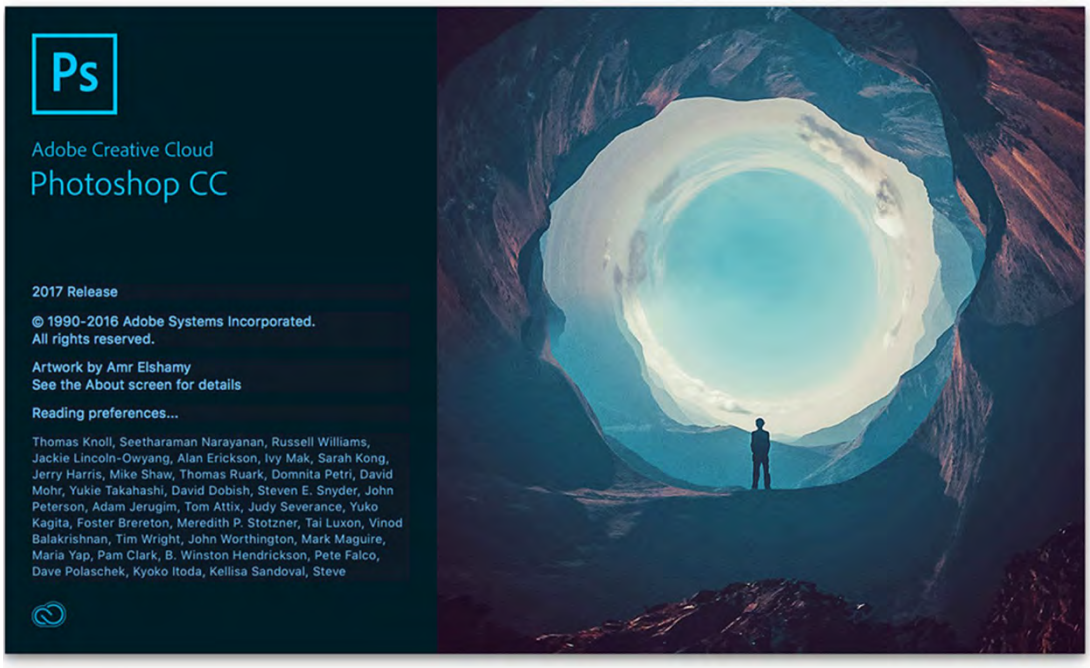

Figure 60. Boot screen of Adobe Photoshop CC 2017.
(source: Fieldwork, 2017)

When Photoshop CC 2017 is launched, figure 60 is displayed to show a successful start of the program.

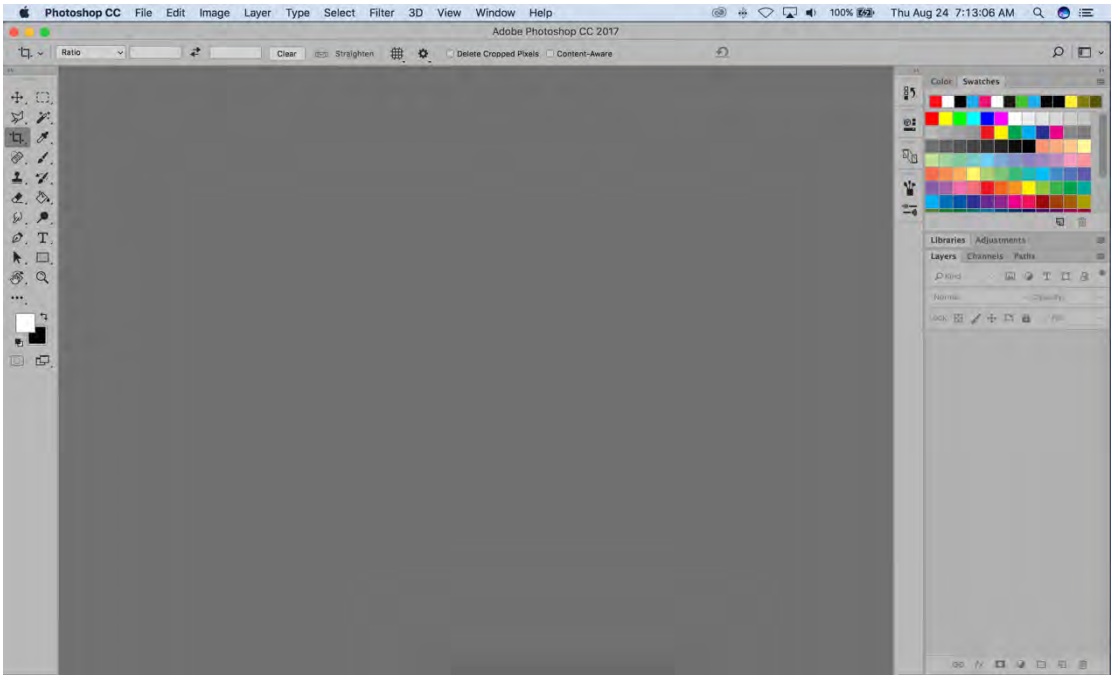

Figure 61. The Graphical User Interface of Adobe Photoshop CC 2017.
(source: Fieldwork, 2017)

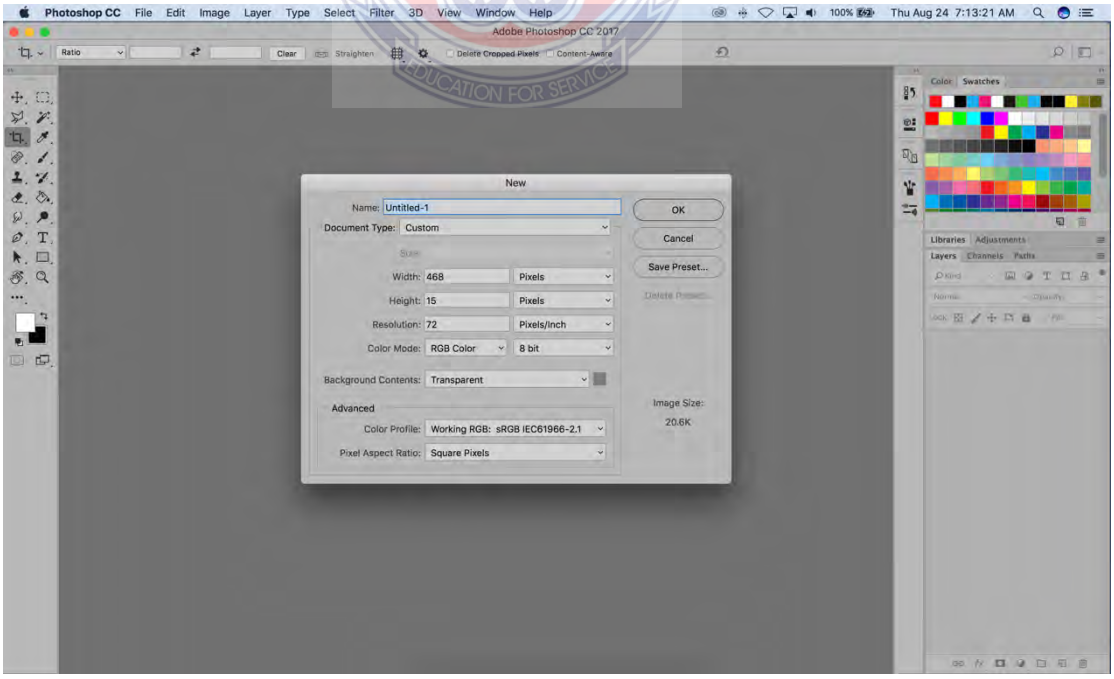

Figure 62. The 'New Document Dialogue Box' in Adobe Photoshop CC 2017.
(source: Fieldwork, 2017)

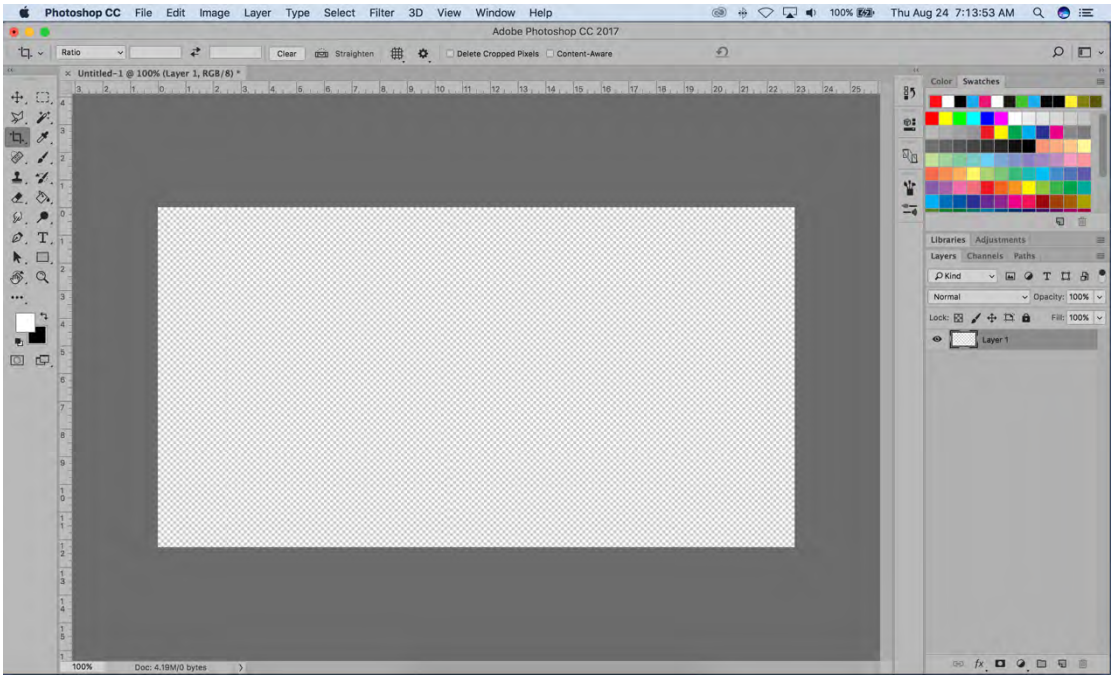

Figure 63. A new page in Adobe Photoshop CC2017.
(source: Fieldwork, 2017)

4.7.2.1 Homepage Design

A homepage is the introductory page of a website and provides information about the website's purpose and contents (Campbell, 2017), For this courseware, the homepage serves as a table of contents for the courseware or set as the default page or start-up page for a web browser is access. Figure 64 was designed as the homepage for the multimedia courseware. The homepage contains four pictures (figure 64) gotten from the video production stage of the courseware. Figures 65 through 68 show how one of the images of the homepage was transferred into Photoshop and worked on.

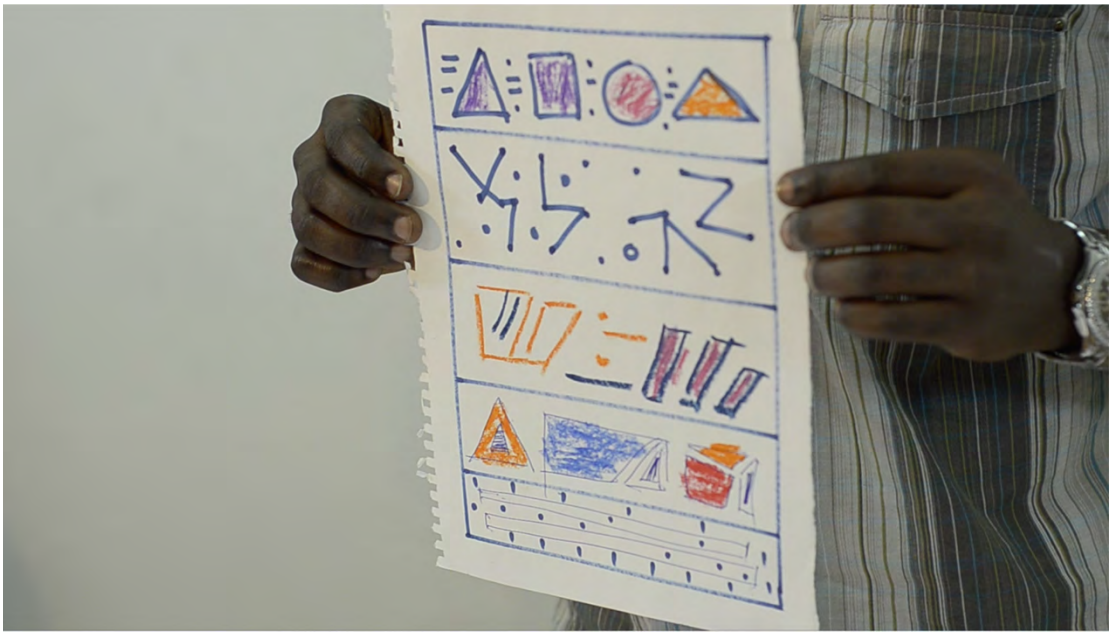

Figure 64. Shows the image used for the Homepage.
(source: Fieldwork, 2017)

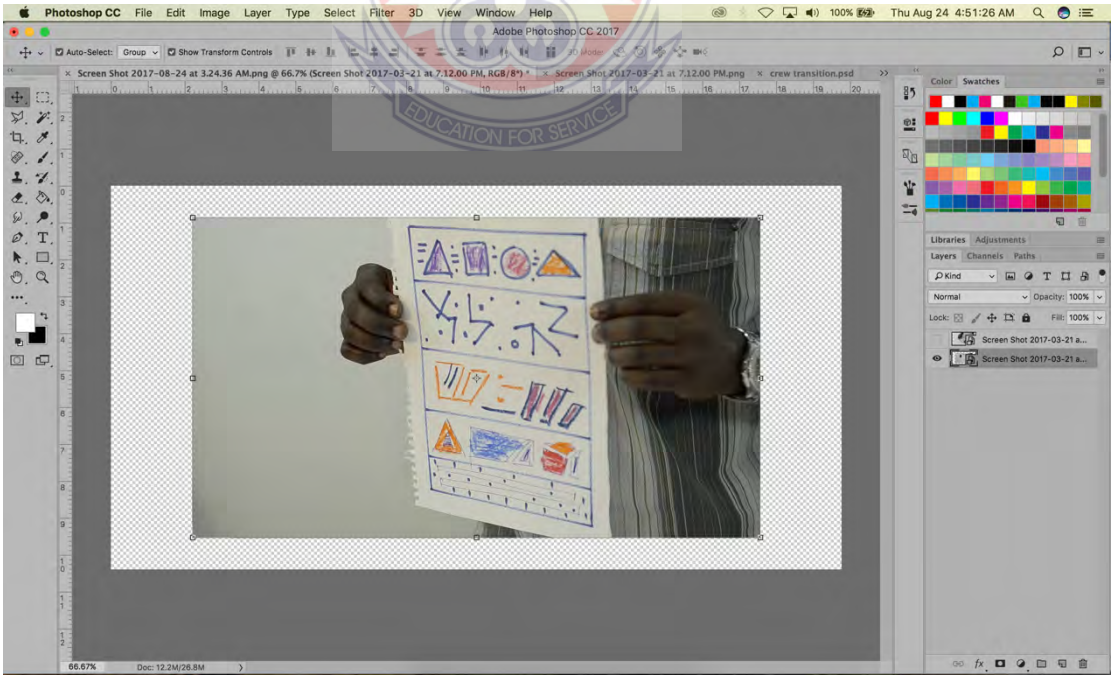

Figure 65. Shows the image used for the homepage imported into Adobe Photoshop.
(source: Fieldwork, 2017)

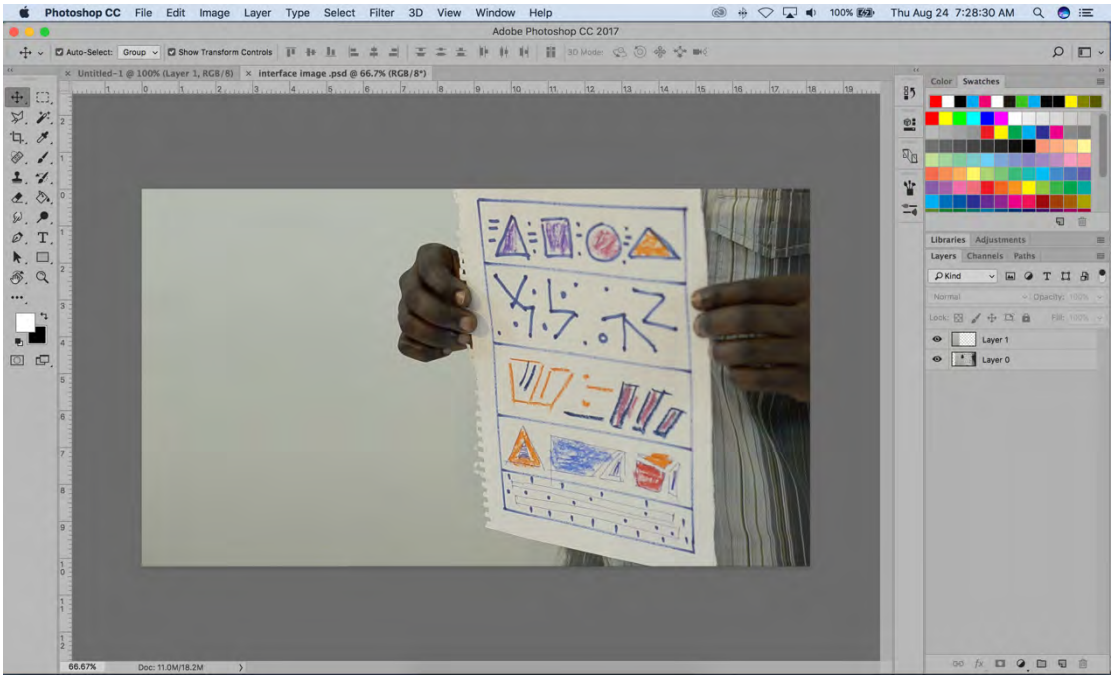

Figure 66. Shows the edited image used for the homepage in Adobe Photoshop.
(source: Fieldwork, 2017)

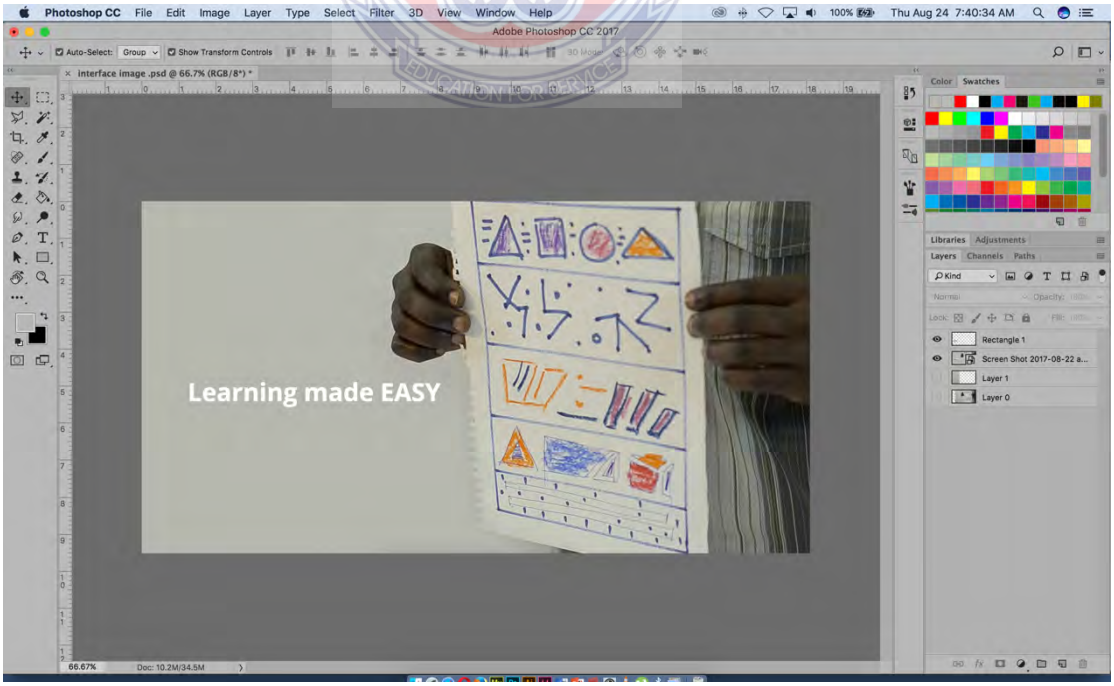

Figure 67. Shows where the text was placed on the homepage in Adobe Photoshop.
(source: Fieldwork, 2017)

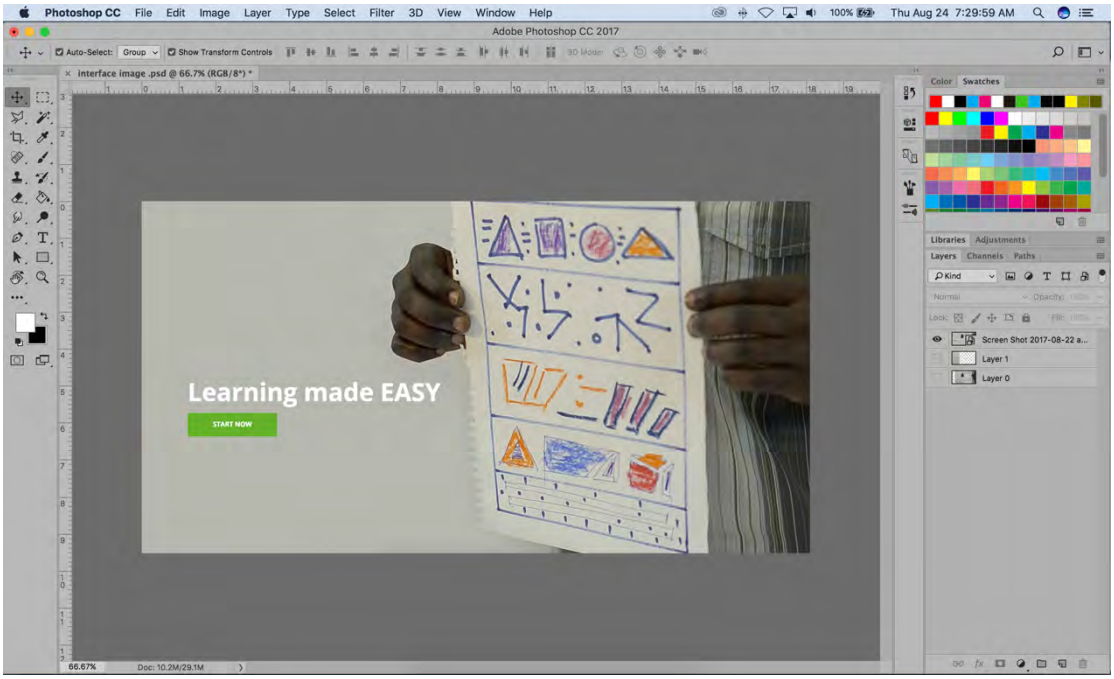

Figure 68. Shows where the button was placed under the text in Adobe Photoshop.
(source: Fieldwork, 2017)

4.7.2.2 ART Page Design

The ART Page was the second page after the home page. This page was designed from scratch using an image (as the background image) taken during the primary 2, term 3, unit 5 lesson video production. The image was put into Photoshop and edited to suit the work it was going to be used for.

Figure 69. Shows the image used as a background for the ART page.
(source: Fieldwork, 2017)

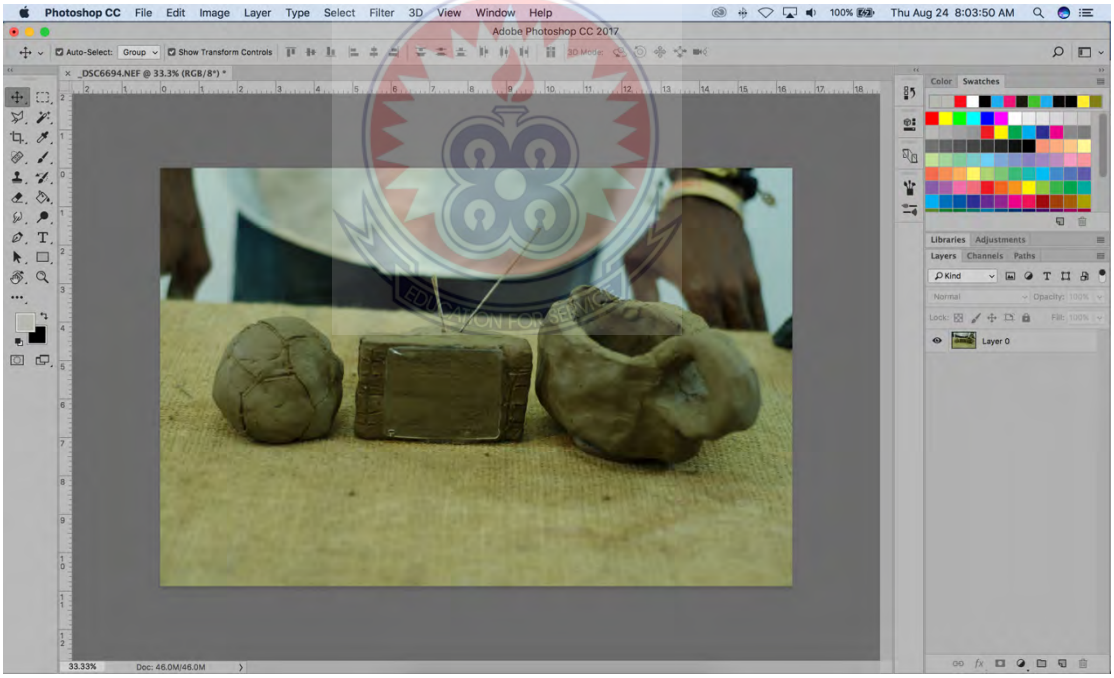

Figure 70. Shows the image transferred into Adobe Photoshop.
(source: Fieldwork, 2017)

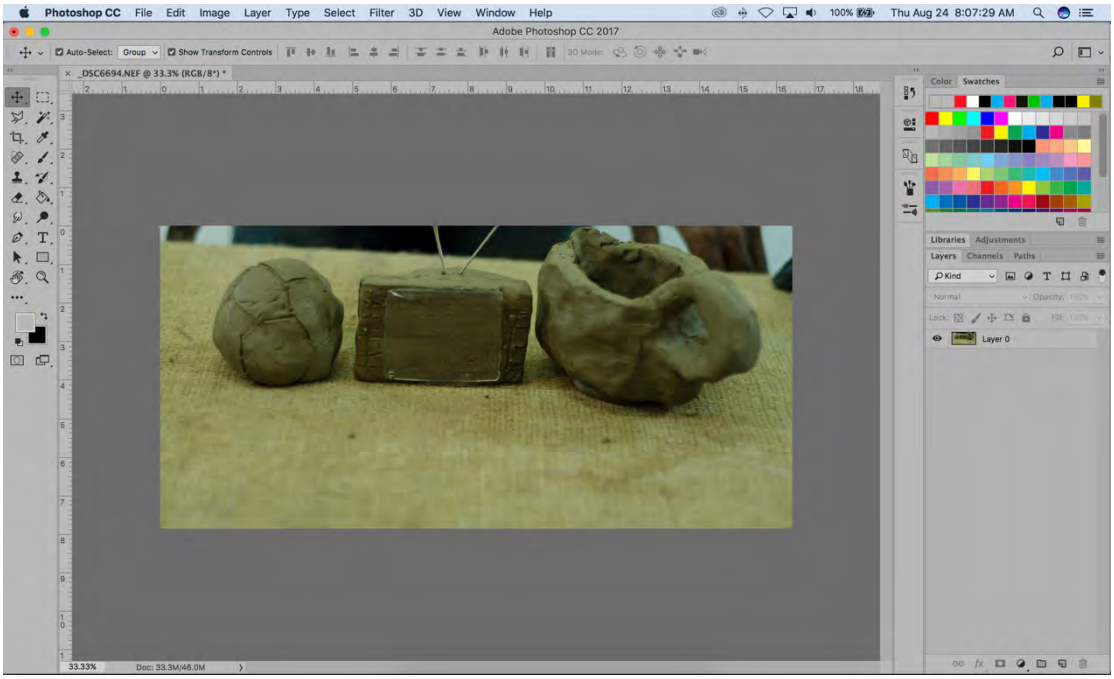

Figure 71. Shows the edited image in Adobe Photoshop.
(source: Fieldwork, 2017)

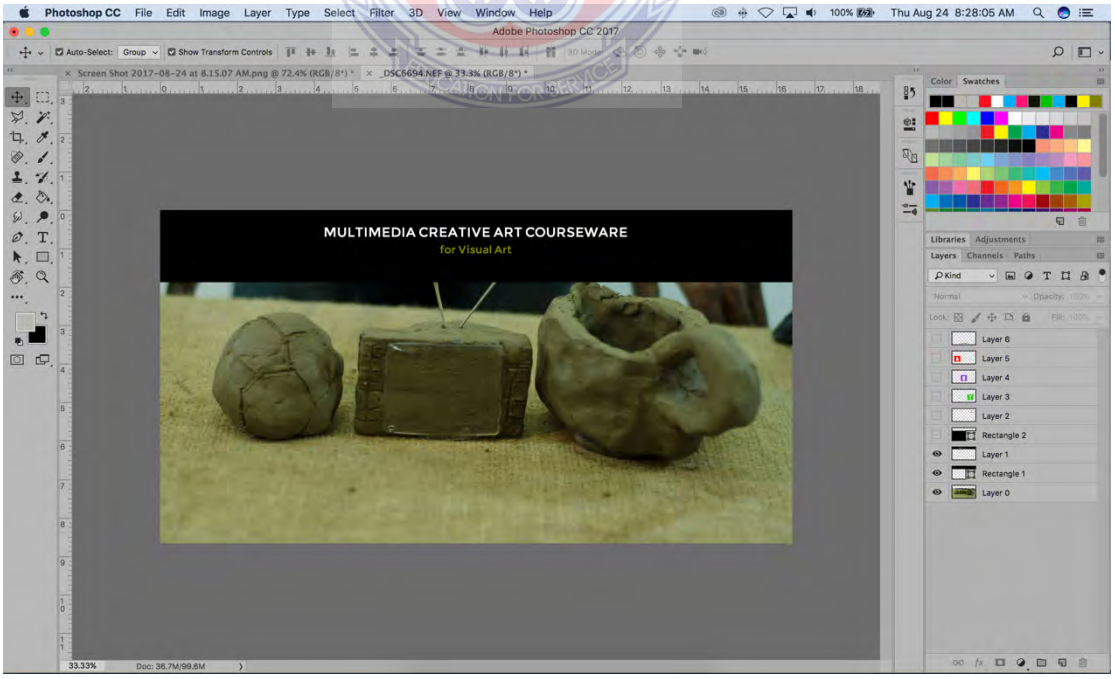

Figure 72. Shows the edited image with text on the banner.
(source: Fieldwork, 2017)

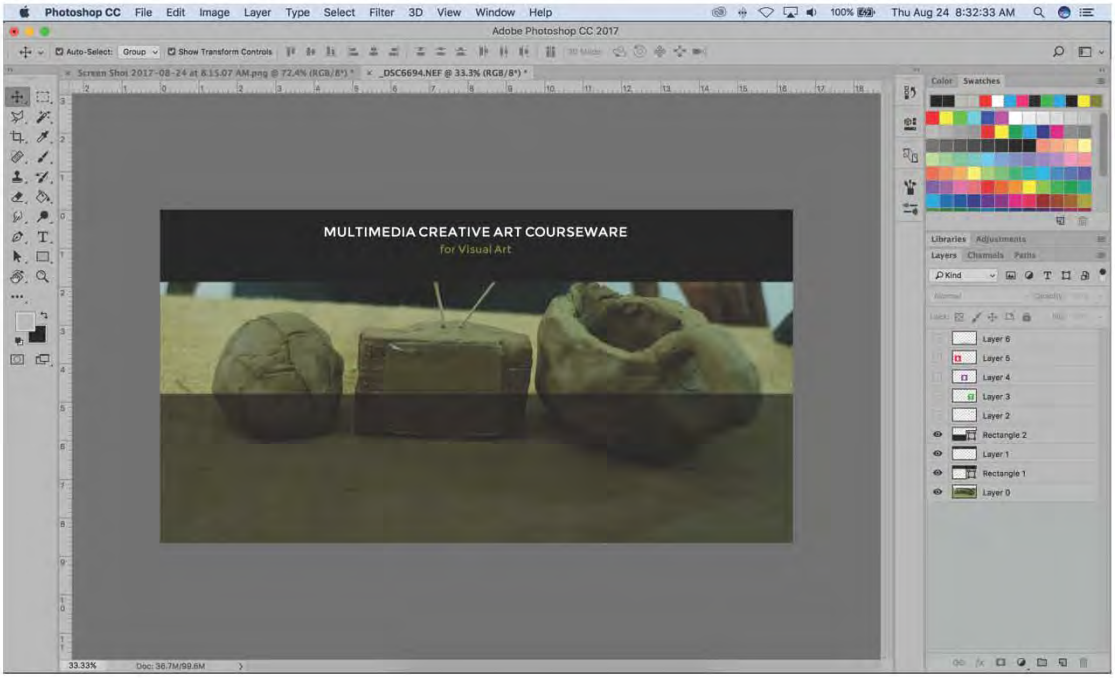

Figure 73. Shows the image with an opaque layer placed on it.
(source: Fieldwork, 2017)

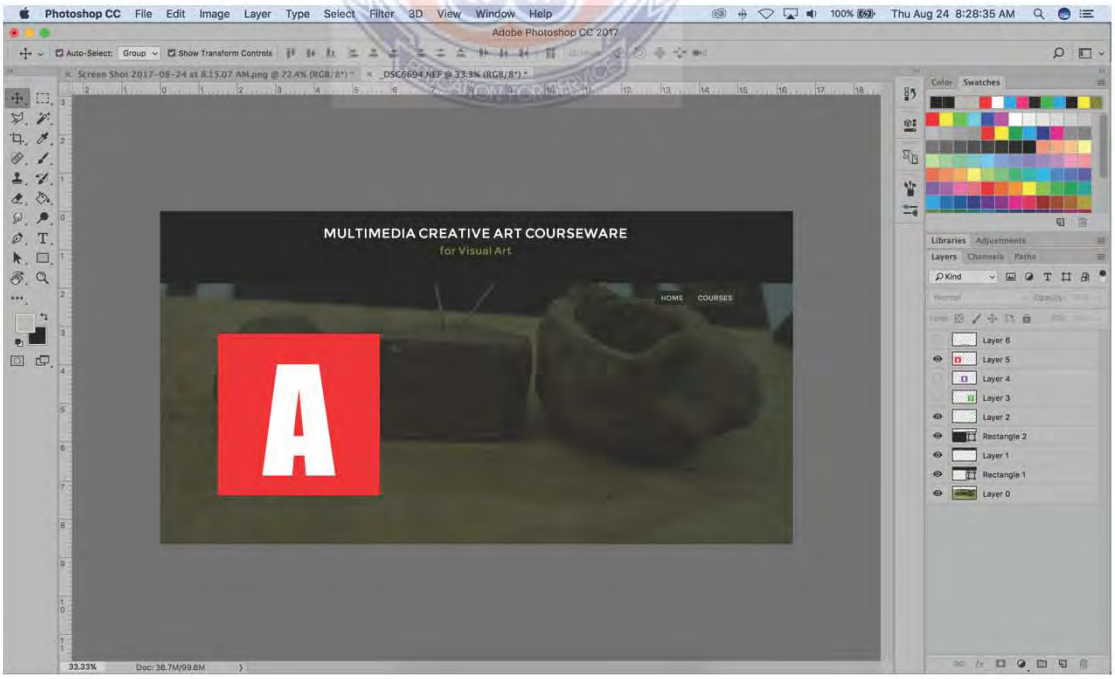

Figure 74. Shows the image with a letter 'A' with red background placed on it.
(source: Fieldwork, 2017)

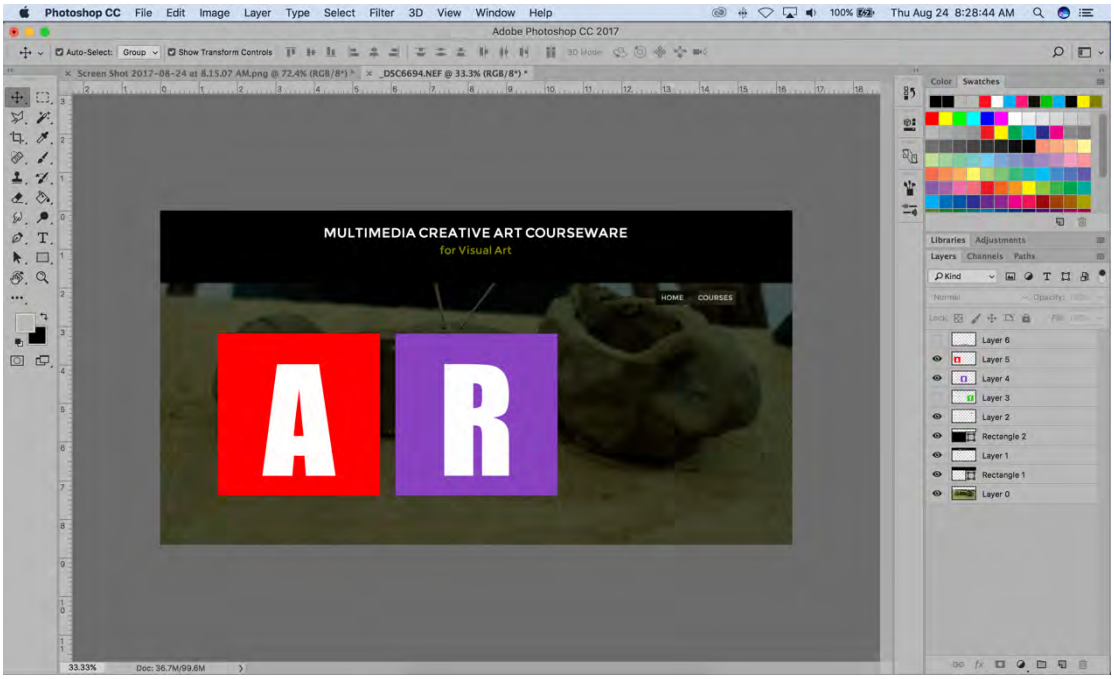

Figure 75. Shows the image with a letter 'R' and violet background placed on it.
(source: Fieldwork, 2017)

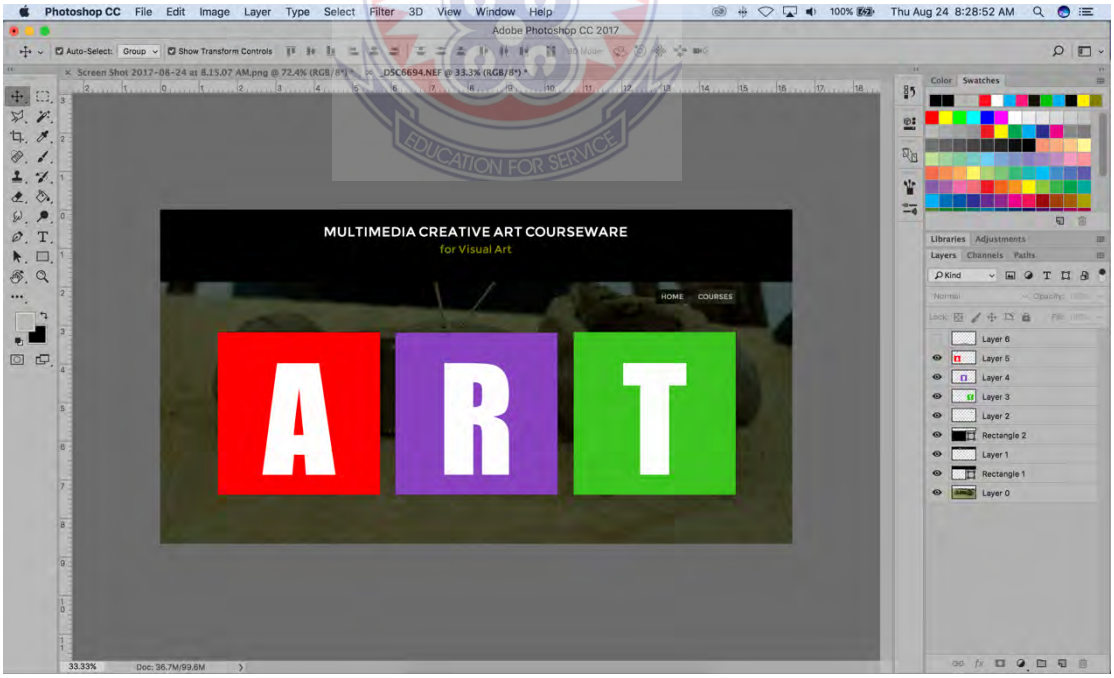

Figure 76. Shows the image with letter 'T' and green background placed on them.
(source: Fieldwork, 2017)

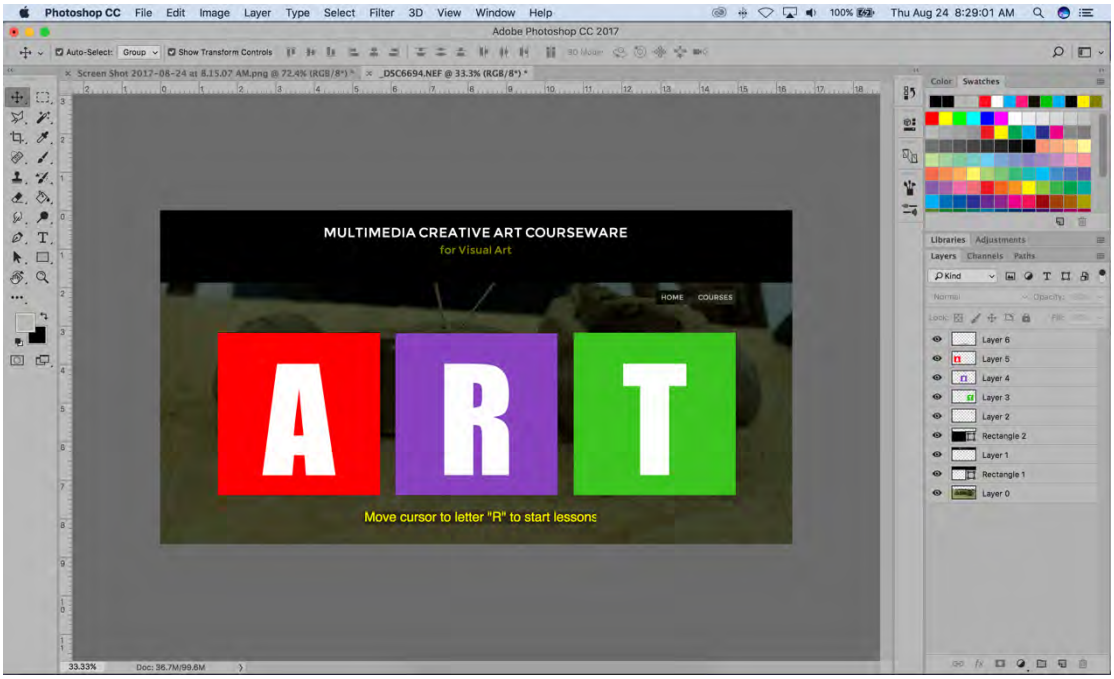

Figure 77. Shows the image with an instruction below the letters A, R, and T
(source: Fieldwork, 2017)

Figures 71 -77 displayed the chronology of how still graphic assets were placed onto the primary 2, term 3, unit 5 image that was used as the background of ART page in Adobe Photoshop. All these assets placed from figure 72 - 75 were sliced using the slice tool in Photoshop to make these assets handy for transfer from the current software (Adobe Photoshop) into another software called Adobe Dreamweaver. Figure 76 shows the sliced graphical user interface of the multimedia courseware to be packaged and transferred into Adobe Dreamweaver for further development.

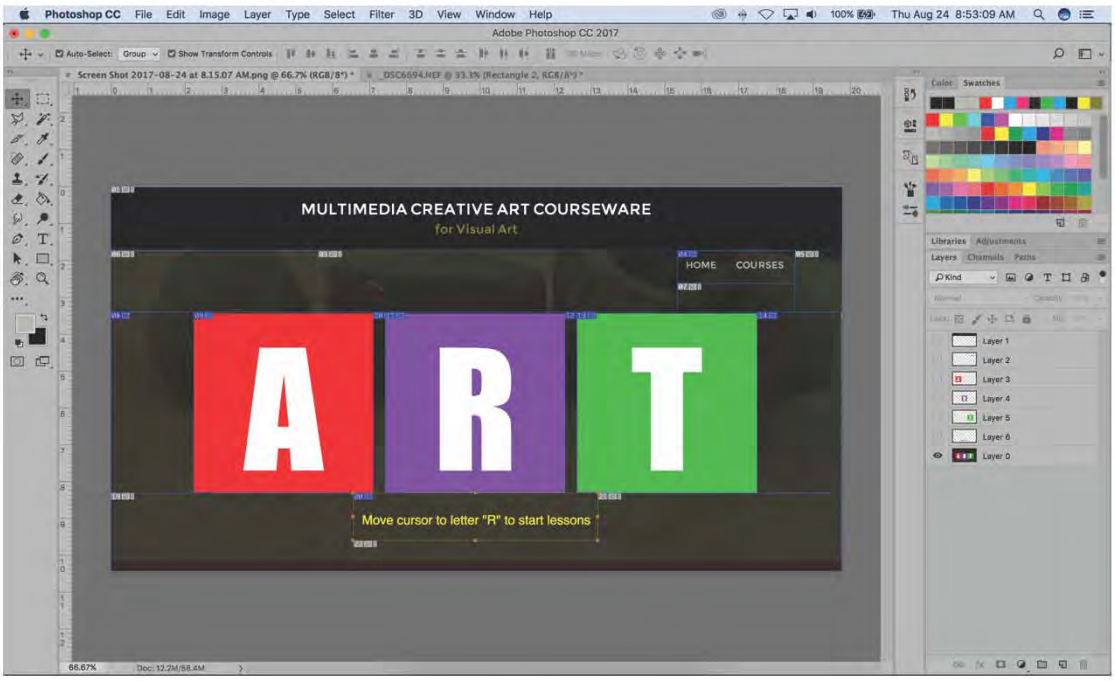

Figure 78. Shows the sliced GUI for the multimedia courseware
(source: Fieldwork, 2017)

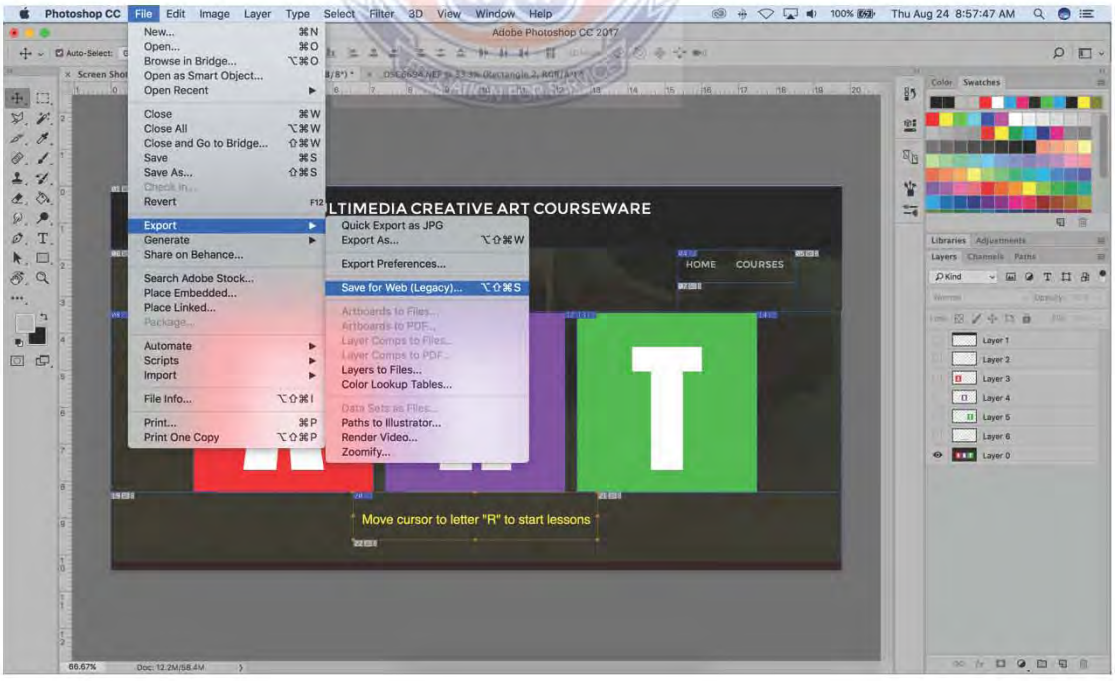

Figure 79. Shows step 1 in exporting for web in Adobe Photoshop
(source: Fieldwork, 2017)

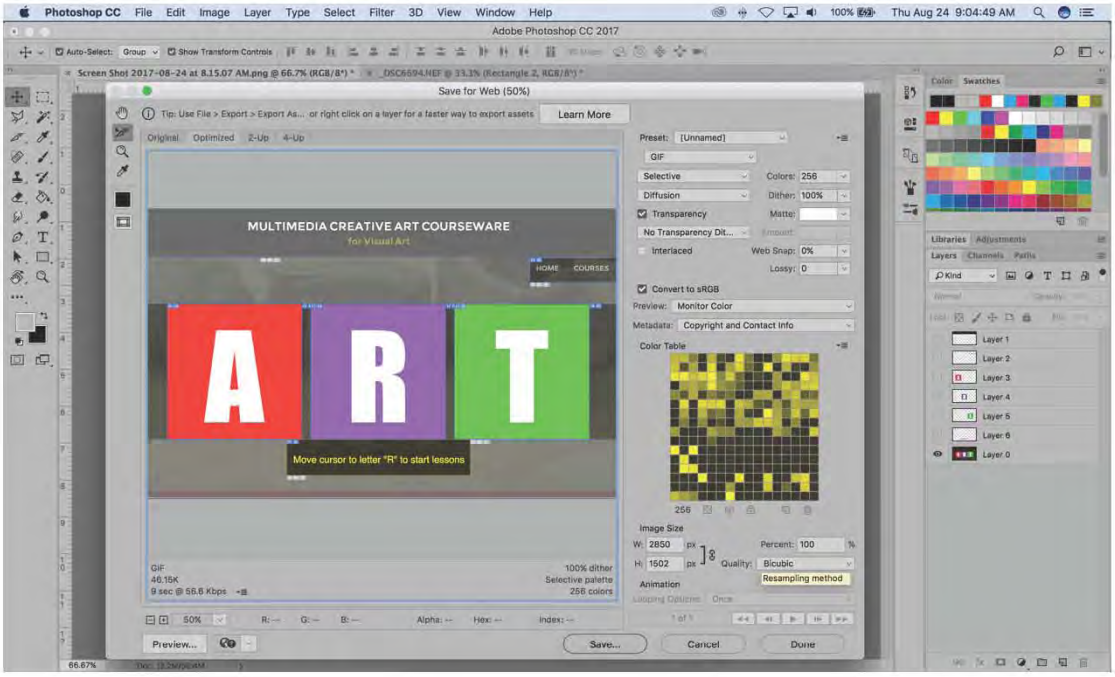

Figure 80. Shows step 2 in exporting for web in Adobe Photoshop
(source: Fieldwork, 2017)

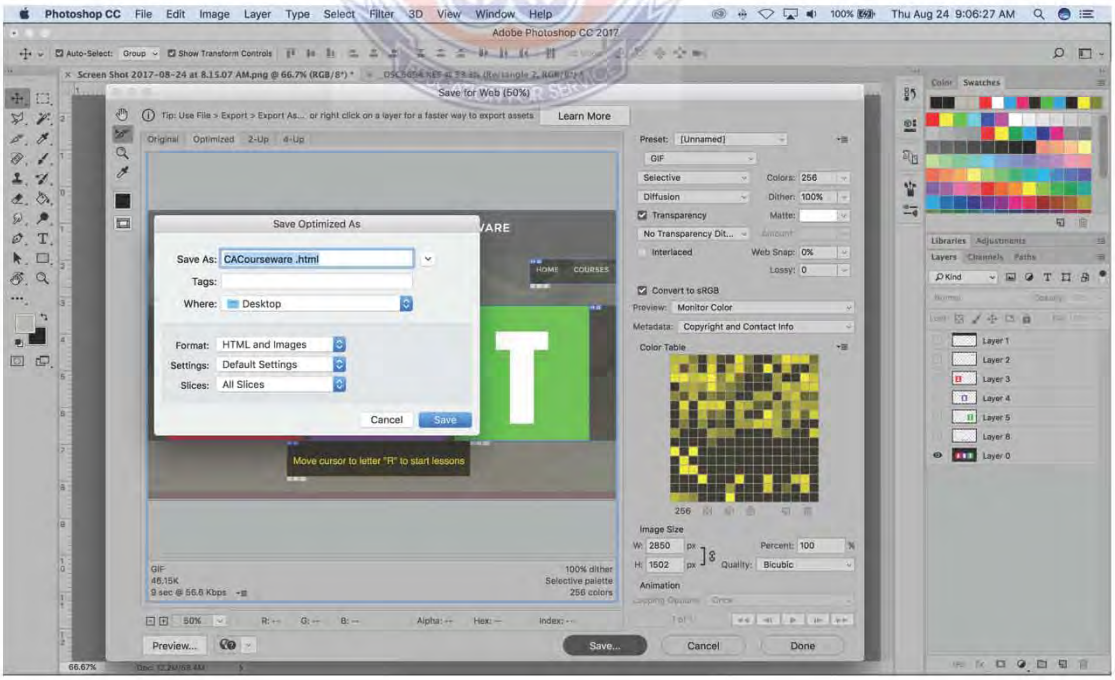

Figure 81. Shows step 3 in exporting for web in Adobe Photoshop
(source: Fieldwork, 2017)

The figures 78- 81 shows the commands and processes of exporting files to be saved for web in Adobe Photoshop. When this process is successful, the file will be packaged into a folder that will be exported into Adobe Dreamweaver as root folder for the image meant for Dreamweaver. Figure 81 shows a packaged folder from Adobe Photoshop ready to be exported into Adobe Dreamweaver.

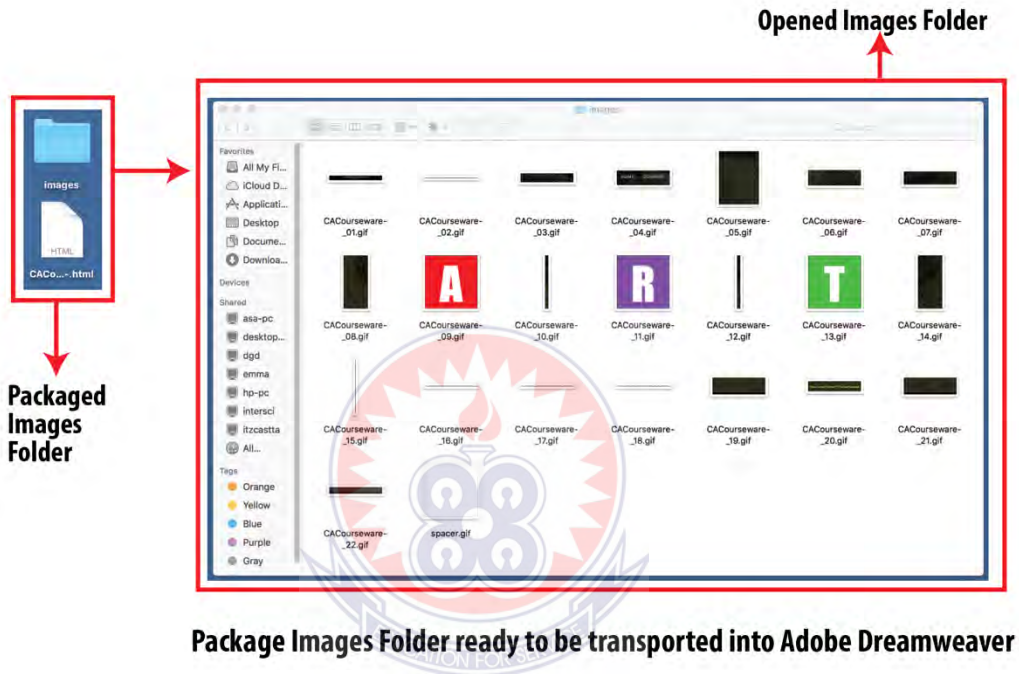

Figure 82. Shows sliced and packaged images file ready for export into Dreamweaver
(source: Fieldwork, 2017)

4.7.3 Adobe Dreamweaver for Courseware Development

Adobe Dreamweaver is an application used by web designers and developers to create websites and applications for use across multiple targets using browsers on devices, and tablets. Web designers use Dreamweaver for creating website prototypes using web-friendly artwork. Anytime Dreamweaver CC 2017 is launched, figure 83 is displayed to indicate that the software has been started and processing to open.

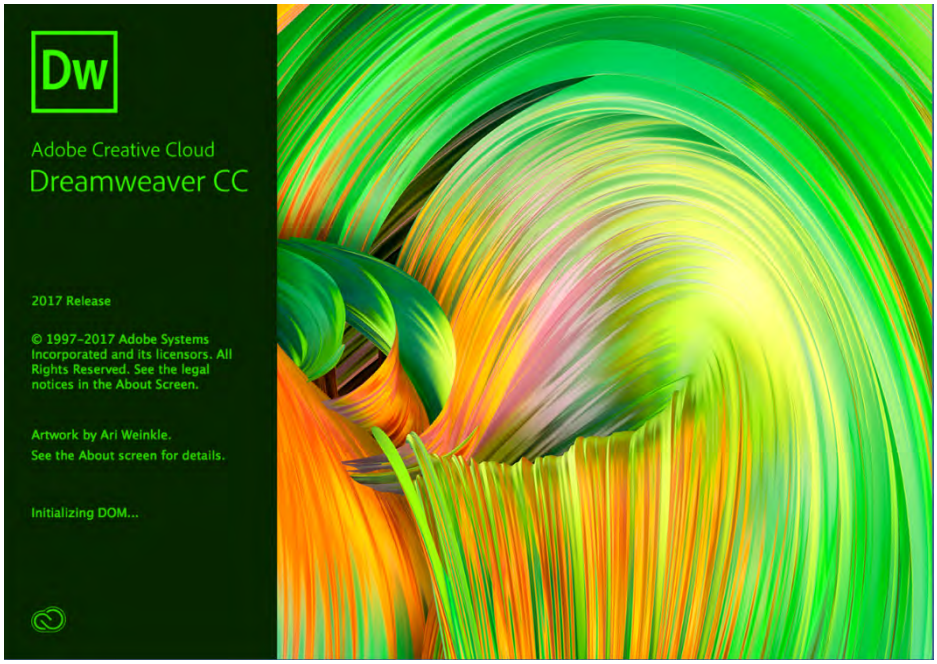

Figure 83. Shows the boot screen of Adobe Dreamweaver CC 2017
(source: Fieldwork, 2017)

Figure 84 displays the graphical user interface (GUI) of Adobe Dreamweaver 2017. The GUI contains variety of panels, tools panel, presets and workspaces designed for different purposes and users. These panels, tools panel, presets and workspaces give the user in-depth information about how to use the various assets in producing a simple website.

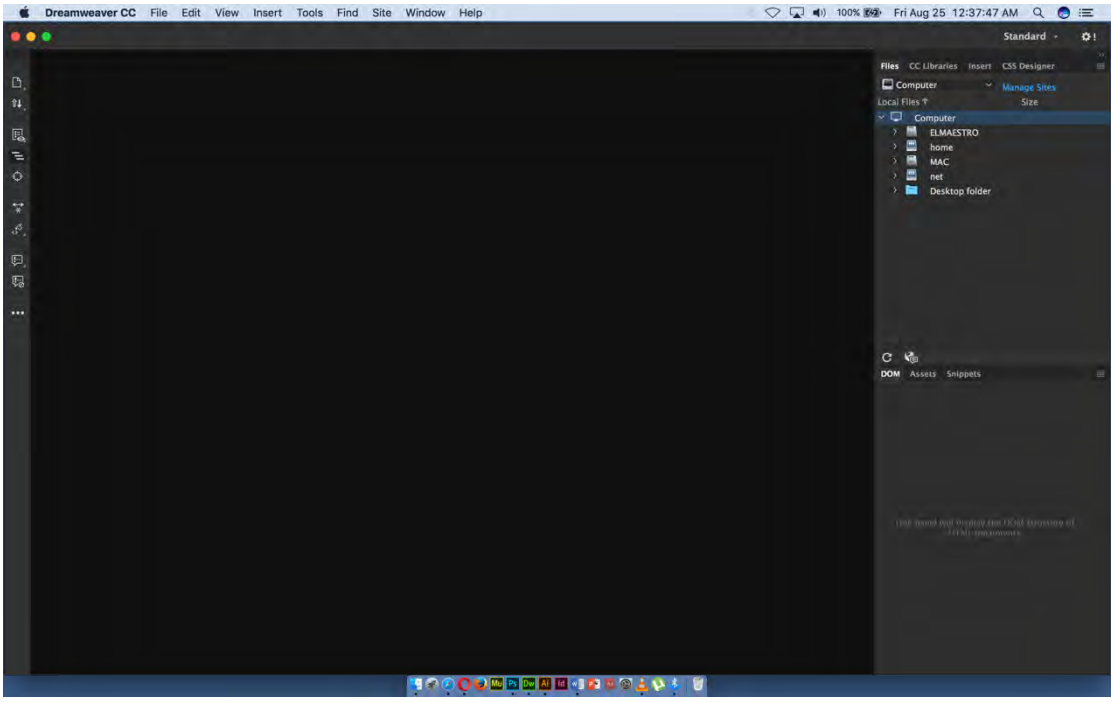

Figure 84. Shows the Graphical User Interface of Adobe Dreamweaver CC 2017
(source: Fieldwork, 2017)

Figure 85 provides users of Dreamweaver with the very basic document settings that needs to be provided before the commencement of any new file. The dialogue box is divided into three main sections although put into one window. These three main sections (starting from the left) are; New Document / Starter Template / Site Template, Document Type *(</>HTML, {}CSS, etc.)* and Framework (Document Title, Document Type and Attach CSS). These settings are programmable property settings associated with the appearance and behaviours assigned to elements by using controls.

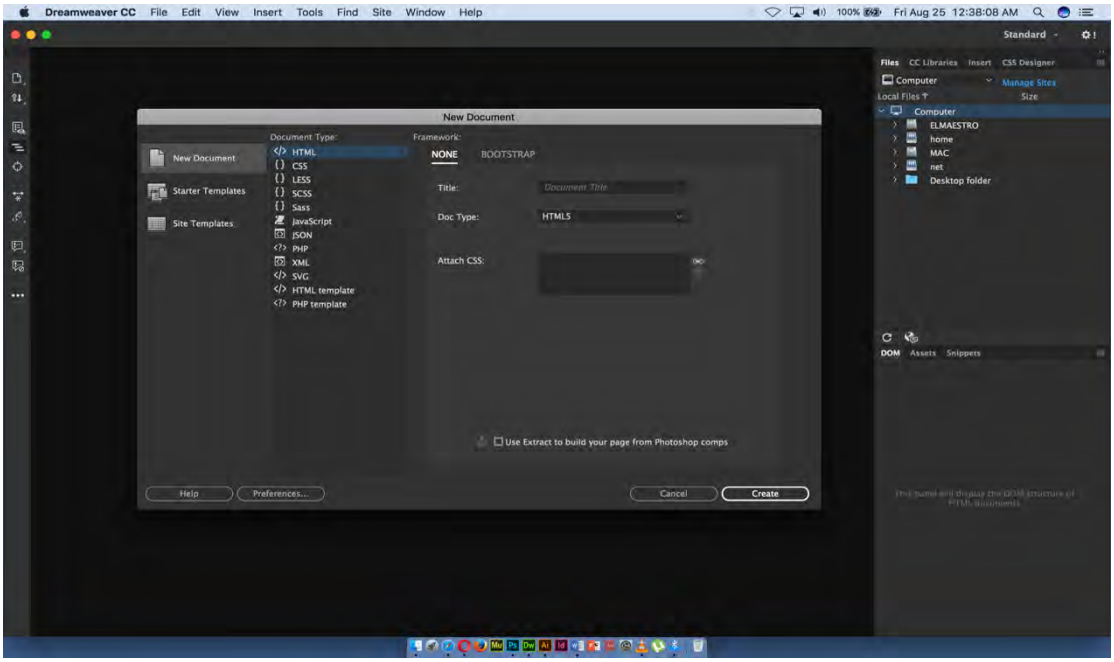

Figure 85. Shows the new document dialogue box of Adobe Dreamweaver CC 2017

(source: Fieldwork, 2017)

Figure 86 shows a new document with a split view (consisting of the design and coding views respectively). In this split view window, any element put into the design view (white part of the working area) generates an appropriate and corresponding code in the code view (grey part of the working area) further manipulation.

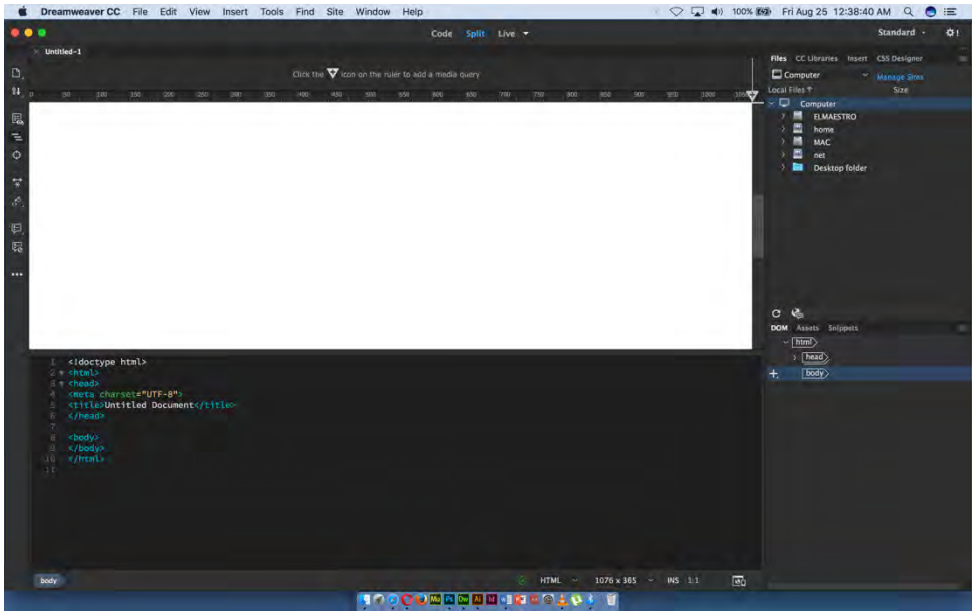

Figure 86. Shows the new document of Adobe Dreamweaver CC 2017
(source: Fieldwork, 2017)

4.7.3.1 Courseware development and coding

To start operations in Adobe Dreamweaver, the sliced and packaged images in figure 82 were imported into Dreamweaver. These sliced images were placed in a folder named images on the desktop with its corresponding CACourseware.html file. The CACourseware.html file was double-clicked in order to cache the sliced image files into the Dreamweaver and that is displayed in figure 87.

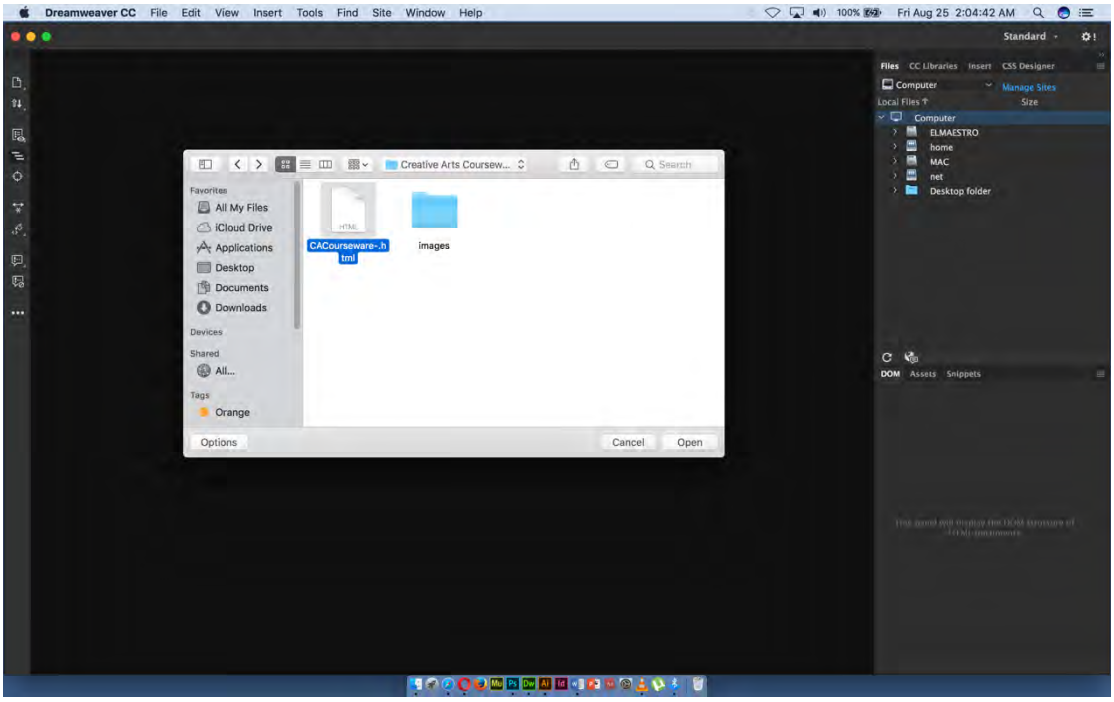

Figure 87. Shows how the sliced images were imported into Dreamweaver
(source: Fieldwork, 2017)

Figure 88 shows the sliced imported images in a split view in Adobe Dreamweaver. The individual images that make up the homepage (also known as the index page or .index) are displayed in the design view and with each image's corresponding code provided in the code view as shown in figures 88 and 90 respectively.

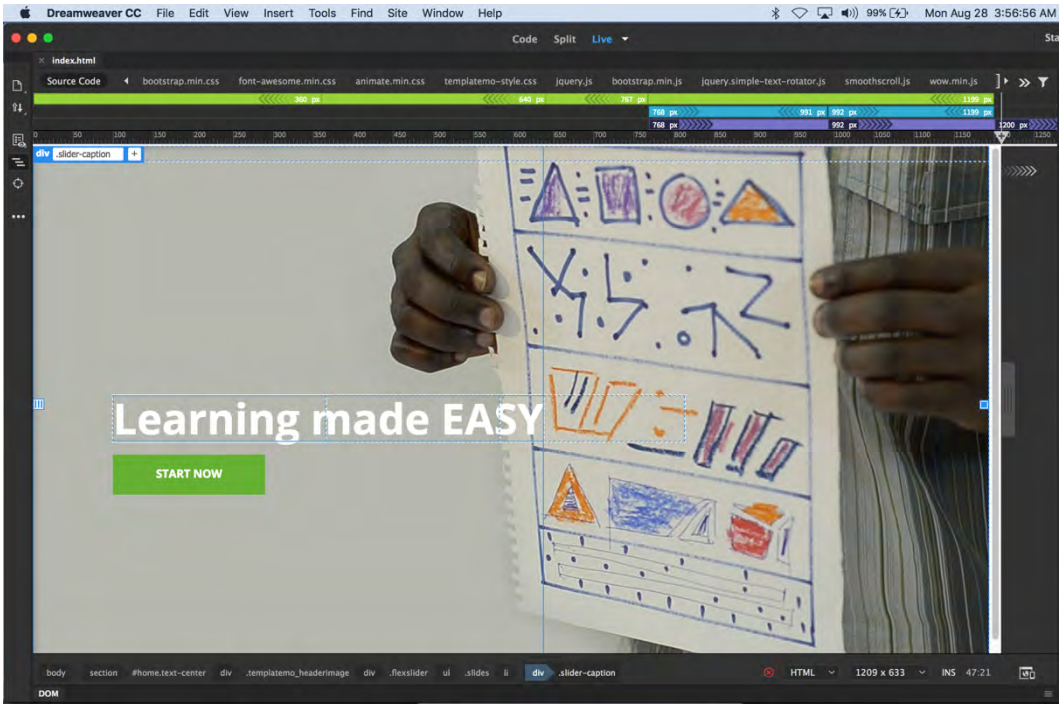

Figure 88. Shows the index page in Adobe Dreamweaver.
(source: Fieldwork, 2017)

Figure 89. Shows the button links for index page in Adobe Dreamweaver.
(source: Fieldwork, 2017)

Figure 89 is the button that allows users entry into the courseware. Start button 'A' as labeled above is the default state of the button link and 'B' is the hover state of the same button. The difference between label 'A' and 'B' is that, on the default state (A) the colours displayed are a green background and white text whilst on the hover state (B) displays a white background and green text.

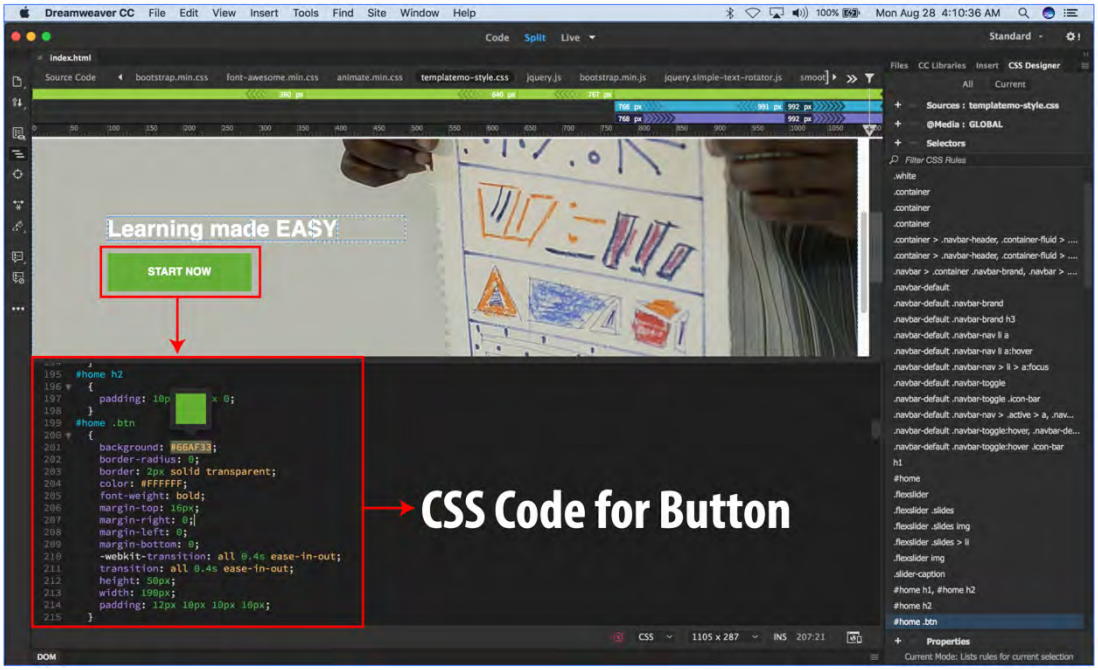

Figure 90. Shows the Cascading Style Sheet (CSS) for button links on index page.

(source: Fieldwork, 2017)

Figure 90 displays the Cascading Style Sheet (CSS) codes for the start button. The CSS codes add additional properties and behaviours (such as background colour, border, text colour, webkit transitions, etc.) to the text and convert them into link buttons.

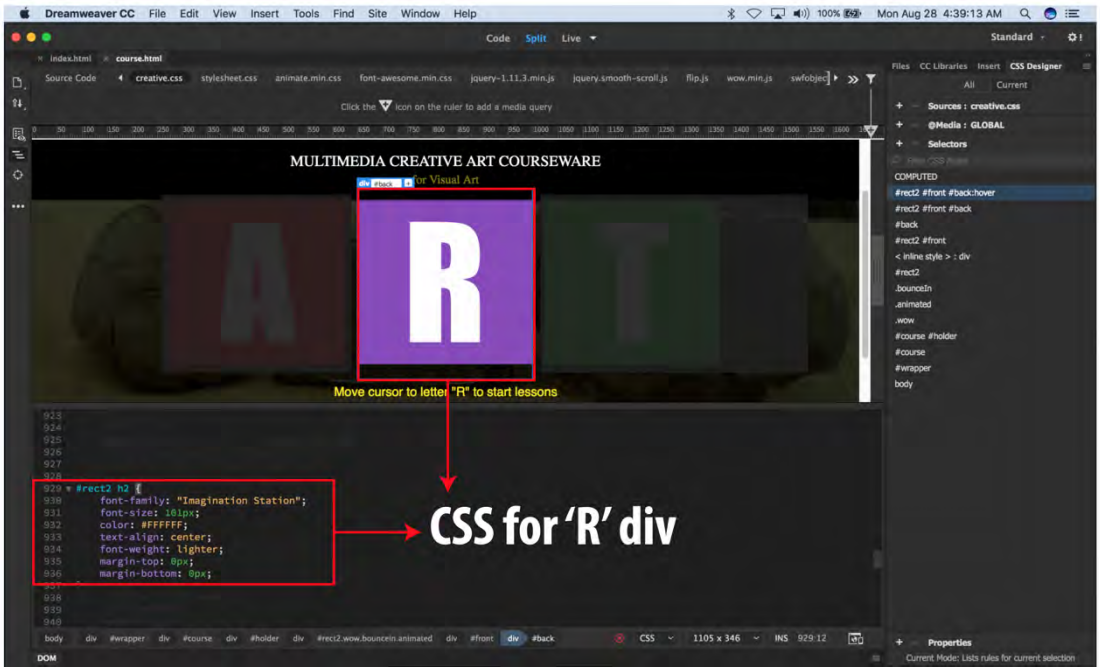

Figure 91. Shows the Cascading Style Sheet (CSS) for the 'R' div in Dreamweaver.
(source: Fieldwork, 2017)

Figure 91 displays CSS codes for the 'R' div with properties such as font family, font size, text colour, text align, etc. These codes regulate the behaviour and appearance of the assigned div.

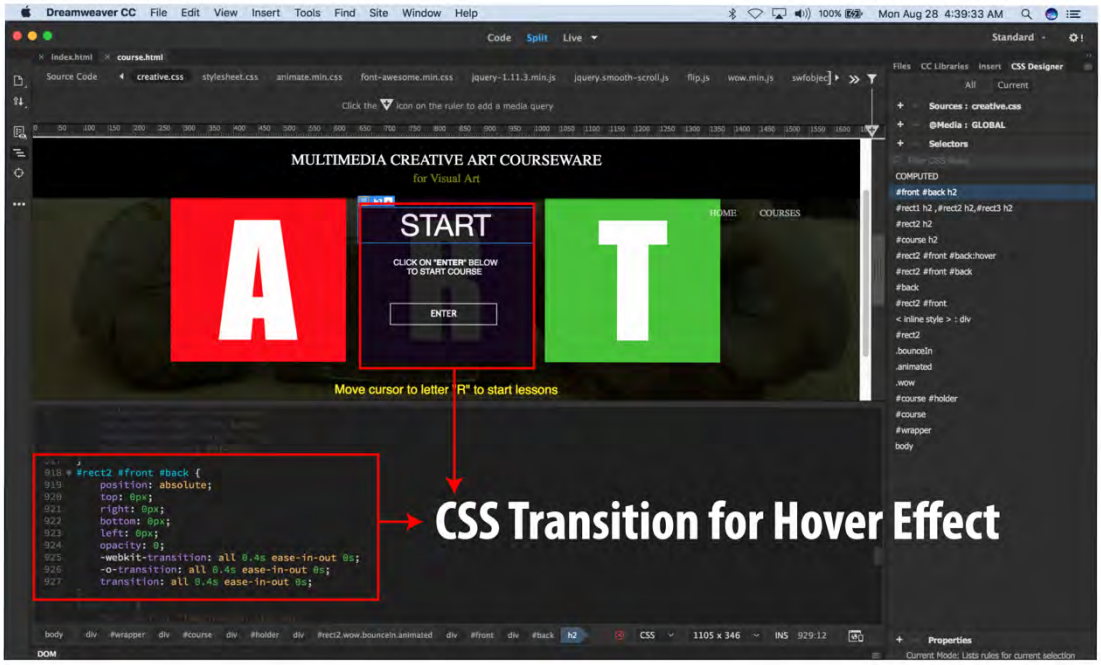

Figure 92. Shows the Cascading Style Sheet (CSS) transition for 'R' div Hover Effect.
(source: Fieldwork, 2017)

Figure 92 shows the CSS transition code for the Hover Effect on the 'R' div. These codes include properties such as absolute position, opacity, webkit transition, etc. and were meant to trigger the hover effect on the 'R' div.

Figure 93a. Shows the Cascading Style Sheet (CSS) for 'Primary 1' div.
(source: Fieldwork, 2017)

Figure 93b. Shows the Cascading Style Sheet (CSS) for 'Primary 2' div.
(source: Fieldwork, 2017)

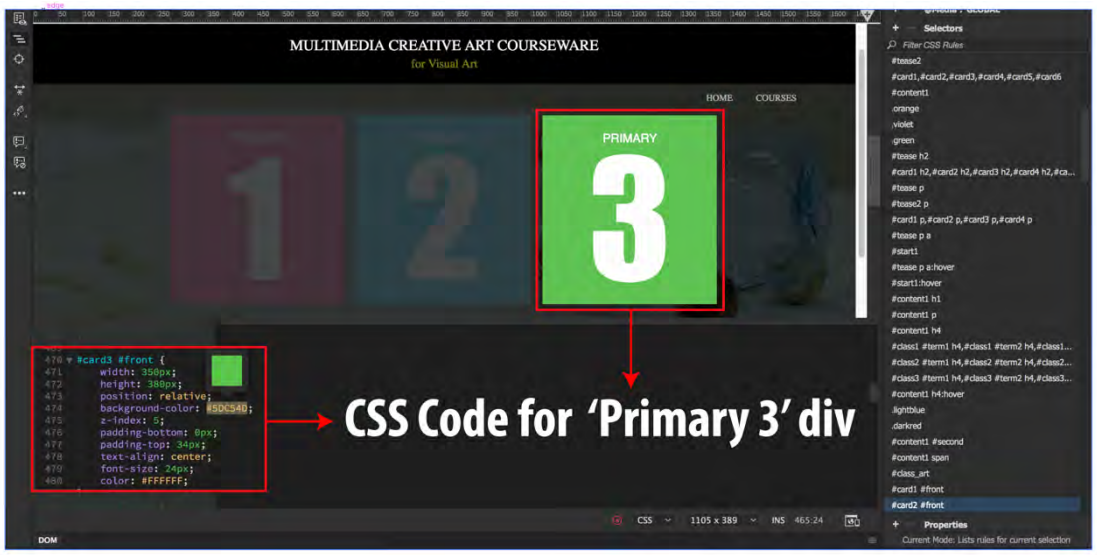

Figure 93c. Shows the Cascading Style Sheet (CSS) for 'Primary 3' div.
(source: Fieldwork, 2017)

When the courseware is entered by clicking the 'R' div (figure 91), figures 93a, b and c are displayed as a single interface containing divs for Primary 1, 2 and 3. This interface allows users to access videos for Primary 1, 2 and 3 respectively. The individual divs that make up the interface are displayed in the design view and with each div's corresponding code provided in the code view as shown in figure 91a, 91b and 91c respectively.

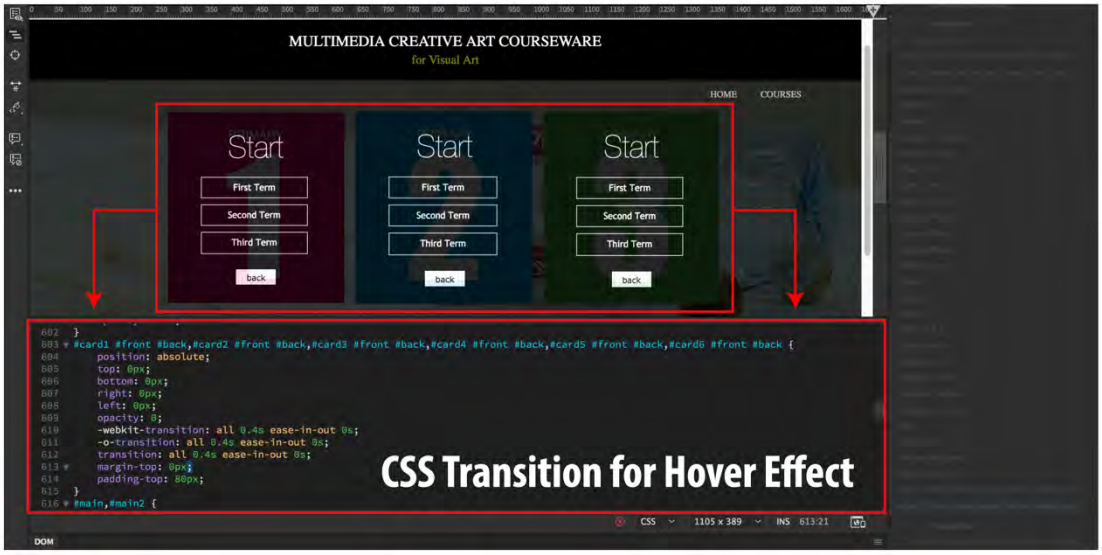

Figure 94. Shows the CSS transition for 'Primary 1, 2 and 3' Hover Effect.
(source: Fieldwork, 2017)

Figure 94 shows the CSS transition code for the Hover Effect on Primary 1, 2, and 3 divs. These codes include properties such as absolute position, opacity, webkit transition, etc. and were meant to trigger the hover effect on the Primary 1, 2, and 3 divs.

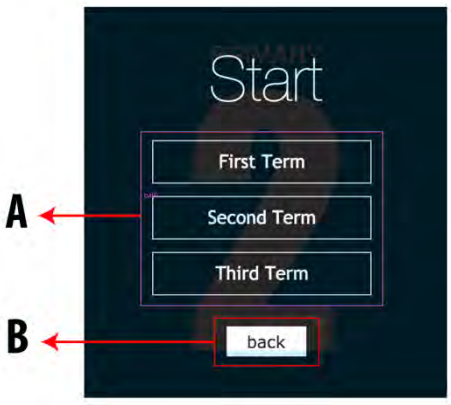

Figure 95a. Shows the labelling for the Hover Effect links
(source: Fieldwork, 2017)

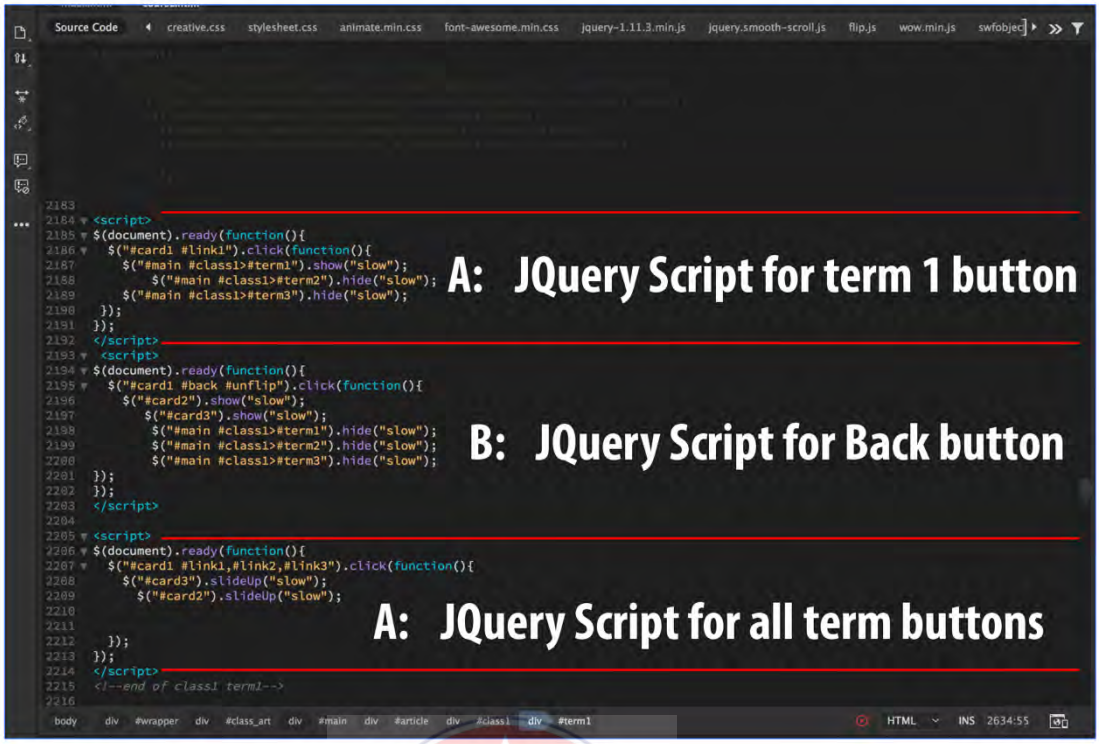

Figure 95b. Shows the JQuery Scripts for the Hover Effect links
(source: Fieldwork, 2017)

Figure 95a shows all the terms and back buttons for a particular class. Each term button (e.g. first term) allows access into the video lessons for that particular term. The back button allows the user to step back the process of entry into other classes (e.g. back to primary 2 or 3 if user is in primary 1). On the other hand, figure 93b shows the JQuery Script that trigger the actions of figure 94a buttons.

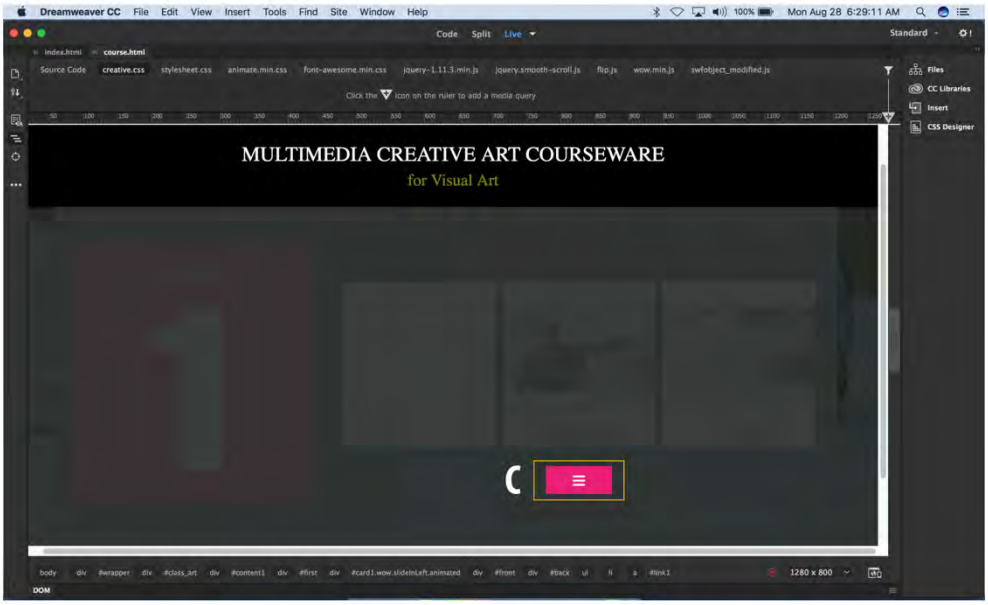

Figure 96a. Shows the labelling for the 'More Videos' button.
(source: Fieldwork, 2017)

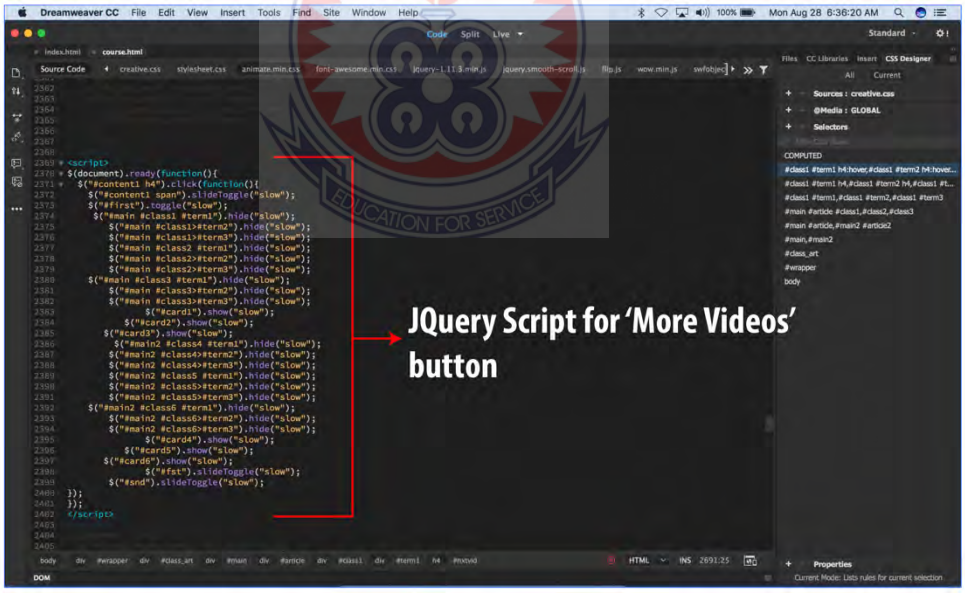

Figure 96b. Shows the JQuery Script for the 'More Videos' button.
(source: Fieldwork, 2017)

Figure 96a shows the more video button. When button 'C' is clicked, other hidden video lessons are made visible for users to access. These hidden video lessons are

normally continuations of the first set of displayed video lessons. Figure 96a's actions are triggered by the JQuery Scripts displayed in figure 96b. All actions from figures 96a to 96b are repeated for the other classes (in primary 2, and 3 respectively).

4.8 Data Analysis

4.8.1 Pre-Production Investigations (Background information of participants)

This research was conducted in seven basic schools in the Effutu Municipality in the Central Region of Ghana. Twenty-one teachers in the lower primary sections of the selected schools during the 2016/2017 academic year, participated in this research. Table 1 shows the breakdown of the respondents in the study.

Table 1: Background information of study participants (N=21).

Variables		N	%
Age	20 – 25	5	23.8
	26 – 30	3	14.3
	31 – 35	7	33.3
	36 – 40	3	14.3
	41 – 45	0	0.0
	46 – 50	3	14.3
Gender	Male	5	23.8
	Female	16	76.2
Educational Background	SSSCE/WASSCE	5	23.8
	Vocational/Technical/Commercial	0	0.0
	Middle School (MSLC)	3	14.3
	College of Education	9	42.9
	Polytechnic	0	0.0
	University	4	19.0

Variables		N	%
Length of time teaching Creative Arts	0 – 5 years	13	61.9
	5 – 10 years	5	23.8
	11 years and above	3	14.3
Type of Training for teaching Creative Arts	Professional	2	9.5
	Non-professional	1	4.8
	No Training	18	85.7
Classes in which participants teach	Class 1	7	33.3
	Class 2	7	33.3
	Class 3	7	33.3
Access to syllabus, approved textbooks and activity books	Yes	5	23.8
	No	16	76.2
Use of approved textbooks and activity books	Yes	5	23.8
	No	16	76.2
Frequency of using approved textbooks and activity books	Once a week	2	40.0
	Twice a week	3	60.0
	Thrice a week	0	0.0
Access to other resources for teaching	Yes	0	0.0
	No	21	100.0
Frequency of teaching Creative Arts per week	Once a week	15	71.4
	Twice a week	6	28.6
	Thrice a week	0	0.0
A multimedia courseware is needed for effective teaching of Creative Arts	Strongly Agree	17	81.0
	Agree	4	19.0
	Neutral	0	0.0
	Disagree	0	0.0
	Strongly Disagree	0	0.0
Total		**21**	**100.0**

Source: Field report (2017)

From Table 1, it is shown that the respondents of the study comprised five males (23.8%) and 16 females (76.2%), with an average age of 33 years who taught in classes 1 to 3. Each class level (classes 1, 2, and 3) had seven teachers representing 33.3%. Additionally, the participants in this study had their educational backgrounds ranging from Senior High School Certificates (SSSCE/WASSCE) to University Degree (First Degrees). Five of the participants had SSSCE/WASSCE certificates, three had Middle School Leaving Certificates (MSLC), and nine had certificates from Teacher Training now Colleges of Education. The remaining four participants had university degrees.

With respect to the length of time in teaching Creative Arts, it was found that 13 participants have been teaching creative arts for five years or less. Another five have been teaching between six and 10 years, whiles the remaining three participants have been teaching for more than 10 years. Also, on the issue of training to teach creative arts, it was observed from the Pre-Production Investigations data that only two participants had been trained professionally to teach aspects of creative arts. One participant had some form of non-professional training, whiles the remaining 18 had no form of training to teach any aspect of Creative Arts.

Furthermore, 16 of the participants, revealed that they did not have the syllabus, textbooks or activity books that are approved for teaching creative arts. The few participants (5) who said they had the approved books for teaching also indicated that they used them for their lesson preparation and delivery, out of which two use them at most once in a week, and the remaining three use them at most twice in a week. Additionally, all the 21 participants stated that they do not have any other

books or resources (such as courseware) for teaching creative arts. It was also observed that 15 of the participants teach creative arts at most once in a week, and six of them indicated that they teach twice in a week. Also, the result shows that over 81.0% participants agreed that a multimedia courseware that appropriately interprets the creative arts syllabus was needed for effective teaching of the subject. Table 1 provides a breakdown of the background information of the participants of this study.

4.8.2 Post- Production Investigations Results

After the researcher introduced the courseware to the participants as an intervention to the problem, data was collected from the participants. This was to test the efficacy of the courseware, to determine whether it achieved its purpose or not. The results that were obtained are presented and discussed under three broad themes – appropriateness of content, ease of use, and usefulness or impact.

4.8.2.1 Appropriateness of content of the Courseware

The data obtained from the participants revealed that the content of the courseware was well structured and was according to the Creative Arts syllabus. Of the twenty-one participants who were asked to rate the courseware, fourteen of them strongly agreed that the courseware was structured according to the syllabus. Another six agreed with the statement, whiles one participant was undecided about the statement. This suggests that the courseware design and development was done in a manner that followed the approved syllabus of the Creative Arts, and it adheres to the laid down principle of design which states that in designing courseware and educational

material of this kind, references should be made to the approved syllabus or course content (Bent and van den Brink, 2013).

The result further showed that the terminologies used in the courseware were thoroughly explained to the very minimum levels of understanding of the participants. This was observed when 81.0% of the participants, strongly agreed with the statement which sought to find out if the terminologies used in the videos were explained at their level of understanding. Another three of the participants agreed, whiles one participant remained undecided with their opinion on this statement. It is obvious that the use of the approved syllabus and textbooks for the design and development of the courseware resulted in the situation where the terminologies were defined and explained at the understanding of the participants. This issue was considered quite relevant to the study, especially in view of the fact that as many as over 85% of the participating teachers had no training for the teaching of Creative Arts. This suggests that when courseware designers and developers refer to and use approved subject syllabus and textbooks, they are most likely to cover all content that are considered to be very important.

Again, data collected from the participants of this study reveal that the courseware actually does what it purports to do. This was noted by all the participants, with 18 of them strongly agreeing with the statement, and three also agreeing. The views expressed by the participants on this issue seem to submit that when a courseware is designed with reference to approved subject syllabus, its content validity is highly likely to be obtained. Teye (2014) has noted that, when the content of a courseware is valid, it actually achieves the outcomes that it is meant to achieve.

4.8.2.2 Ease of use of the courseware

In terms of the ease of using the courseware, it was found out that participants reported that the courseware was very easy to use. This conclusion was reached based on the results of the analysis of the data collected from participants. For instance, 14 of the participants noted their strong agreement with the statement that navigating the courseware was easy for them. The remaining seven participants also agreed that it was easy to navigate the courseware. Also, 20 out of the 21 participants agreed that the creative arts multimedia courseware is easy to use, with only one participant showing indecision for this statement. Furthermore, all 21 participants were of the view that the quality of the videos and sound used for the courseware was very high, whiles majority of the participants also agreed strongly that the colours used for the courseware was good, the remaining six also agreeing with the above statement. It is evident from the outcome of this study, that when courseware designers and developers follow the laid down principles of design, with reference to the choice of appropriate colour schemes, appropriate typography, good layout, audible sounds, and quality video recordings, users of the courseware will find it easy to use. It is important to note that when end users find a piece of technology (such as multimedia courseware) easy to use, they are highly likely to adopt the technology for use (Teye, 2014; Davis, 2003, 1989).

4.8.2.3 Usefulness/Impact of the courseware

Another theme that emerged from the data was on the usefulness or impact of the courseware on the participants' lesson preparation and delivery. From the data, it was found out that the multimedia courseware had immensely improved the

understanding of the participants. This was evident from the fact that all the participants stated their agreement with the statement that their understanding of the creative arts had been improved upon their interpretation with the courseware and was confident in its potency to impact positively on lesson preparation and delivery. This outcome corroborates the findings of earlier studies by Mayer (2005a) and Mohler (2001) which states that, the use of multimedia courseware in education helps to boost the levels of understanding of users. This implies that it is very important that educational institutions consider the adoption and use of multimedia courseware in teaching and learning if they are interested in the attainment of higher educational goals.

Also, nearly all the participants (90.5%) held the strong view that the courseware could be very useful in assisting them in teaching the Creative Arts. The remaining 9.5% were also in support of the assertion that the courseware is very useful and would be impactful on their teaching, thereby enhancing the pupils understanding of the concepts (Li & Kang, 2014; Li, 2009; Yu & Zhang, 2001). This outcome confirms the findings of Stemler, (1997) who noted that, the use of multimedia courseware for teaching is very useful. It is therefore not surprising that all the participants declared their eagerness and willingness to recommend the courseware to their colleagues and institutional management boards for possible adoption and implementation in their teaching and learning. This confirms the point that when users adopt a piece of innovation and find it successful, they are likely to recommend it to other users, as noted by the theory of diffusion of innovation (Rogers, 1995).

Summarily, the results of this study signal a strong indication for the need of a multimedia courseware that is designed and developed in line with the principles of design, and which adopts the approved syllabus as a guide in selecting the relevant and appropriate content, in the Creative Arts pedagogic considerations. It is obvious that all well-meaning instructors and facilitators of the programme are open to the adoption of well-designed teaching and learning materials that would assist them to effectively teach the Creative Arts in Ghanaian Basic Schools.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Overview

This chapter, presents a summary of the work done. It also draws conclusions and make recommendations based on the findings.

The focus of this study was to design and develop a multimedia courseware for Creative Arts teachers in Ghana. In the light of this, the study went through three rigorous processes, thus, finding approved and appropriate contents to design and develop the multimedia courseware; searching for appropriate tools and materials that will expedite the production of both courseware and video; and finally testing the efficacy of the multimedia courseware through pre-production and post-production investigations.

The study was an Art-Based research which involved series of studio practices and hands on manipulation of tool, materials and various electronic devices. Twenty-one participants who were all basic school teachers in the Effutu Municipality were engaged in the various processes of the study. These respondents were sampled from seven schools (both public and private schools) and in each school, three lower primary teachers were engaged for the study. Data was collected through practical activities documentary review and questionnaire (pre and post-production investigations). Data collection was based on the three major stages of the production, namely; the pre-production investigations, the project design and execution, and the post-production investigations.

5.1 Summary of the study

5.1.1 Availability of Creative Arts Content

In finding out whether there was enough content for teaching and learning Creative Arts (Visual Arts component) in the Basic Schools, the study revealed that there was enough content in both syllabi and textbooks for teaching and learning. This outcome was revealed after a rigorous documentary review of the approved textbooks and syllabi. The document review revealed that, there were five major thematic components of Visual Art in the Creative Arts curriculum. These components are Graphic Design, Ceramics, Sculpture, Painting and Sewing. All these components require very special knowledge and skills in order to teach the components associated with the Creative Arts contents. These components can further be broken down into two and three-dimensional art forms. Two-dimensional arts are the art forms that have no depth and therefore cannot stand on their own like plaited chord works, direct and indirect prints made on loose sheets, drawn and coloured works on flat surfaces (e.g. paper), paper montages, etc. Three-dimensional art forms are made with solid materials such as clay, bottles, glass, wood, hard cards, etc. and as such has depth and can stand in-the-round without any support.

Another issue that emerged from the study concerning textbooks and syllabuses was that, most teachers do not have the approved textbooks and syllabuses from the Ministry of Education for teaching the subject (Creative Arts). As revealed by the study, 16 out of 21 teachers who admitted that they had no access to neither the Creative Arts syllabus nor the textbooks noted how their ability to deliver effectively had been adversely affected. It was also noted that the availability of Creative Arts syllabi and

textbooks were dwindling in the Basic Schools in terms of access, with most of the available ones either tattered or stolen. These factors adversely affect the zeal and enthusiasm of the teachers, therefore making them teach the subject once instead of twice or thrice a week. The data gathered during the study confirmed that fifteen out of twenty-one teachers teach Creative Arts once a week. Data accrued from this initial investigation provided fertile grounds for the design and production of the multimedia courseware for the teaching and learning of Creative Arts in Schools.

5.1.2 The Multimedia Courseware Production Processes

The success of the multimedia courseware's design and development was largely hinged on the appropriate use of elements such as fonts, colours, layout, interactivity which constituted the assets of the courseware. The choice of using Open San Font was key to the development of the courseware because of its universal acceptability in developing software and application which are mostly displayed on screens of electronic devices (both handheld and desktop screen displays). Colours employed for the design and development of the courseware was informed by the colour contrast and readability theory. This approach helped in choosing appropriate colours that would not disturb the eyes during a long close-up screen display. In terms of layout, there was a deliberate attempt to arrange almost all assets to be displayed in the courseware in a symmetrical balance. This approach was necessary in order to help end-users locate assets (such as buttons, links, etc.) in an easy manner.

The focus of designing and developing this multimedia courseware was to facilitate and promote very positive and deep teaching and learning outcomes for Creative Arts teachers in Ghana. With this idea as the fulcrum for operation, the courseware production was conducted in four distinctly rigorous phases namely; pre-production, production, post production and courseware development. The pre-production phase focused on everything one has to do before commencing a video shoot or production. During this stage, seven huge tasks were addressed. These tasks were idea development, researching into relevant trends in video productions, searching for appropriate contents and scripting them for video shooting, discussing very germane issues with crew and actors, how to arrange equipment to achieve desired shots, designing the set and hunting for locations.

The production stage was one of the most hectic and time-consuming stages of the entire multimedia courseware production. Regularly, crew and actors were briefed and guided through their scripts in order to get the best shots out of their practical lesson delivery. These briefings took most of the production time because of concerns about reducing errors during shooting. Consumables like batteries for both microphones and cameras, bulbs for lightening were purchased and changed frequently to avoid mishaps during shooting.

Post production was the most herculean task among all the stages of the production. This stage consisted of four major procedures; file transfer and arrangement, video editing (using Adobe Premiere Pro and Adobe After Effect), rendering and video compressing. Two cameras (EOS 7D Canon) were used for close-up and wide-angle shots. This meant that at least two video files were made after each shooting session.

These files were transferred from both cameras to storage drives for arrangement and editing. The stored files were transferred into two unique software, beginning with Adobe Premiere Pro used for cutting, pasting and joining close-up and wide-angle videos using subtle transitional effects. Next, Adobe After Effect was used for adding lower thirds and other textual assets to the edited videos. The footages were produced using very high resolutions which therefore made the files too heavy for smooth streaming online. To address the weight issues, two auxiliary software known as Adobe Media Encoder and Handbrake were used to compress the weight into a lighter file size for online streaming.

The courseware production stage was another hectic task in the entire production. This stage was necessary because the produced videos were meant for online streaming which meant that there was need for a vehicle or container to hold all the fifty-two videos into one unifying piece of courseware to be hosted online. Adobe Dreamweaver was used as the software for the courseware production. During the courseware production stage, there was the need to employ some coding systems like JQuery, HTML (Hypertext Markup Language) and CSS (Cascading Style Sheet) to trigger some actions and behaviours to display. When the courseware was ready, all the videos were hosted on YouTube and their Uniform Resource Locators (URL) linked to the frames designated for displaying videos. The combination of all these above procedures made the designing and development of the multimedia courseware successful.

5.1.3 Usefulness/Impact of the Courseware on Respondents

This study was embarked upon to aid generalist teachers who are obviously not trained in Creative Arts to acquire the knowledge and skills of teaching Creative Arts (visual art components) with ease and confidence. The designing and development of this multimedia courseware followed very stringent principles to make sure that there was enough user-friendliness in the usage of the courseware. Before testing the usability and user-friendliness of the multimedia courseware, respondents were allowed to use the courseware for one term before the post-investigation was administered to them. After the duration of one term trial elapsed, respondents' views were solicited on the effectiveness of some components of the multimedia courseware such as the ease of navigation, the ease of understanding the terminologies used in videos, appropriateness of colour scheme, and the quality of sounds and videos. Data gathered from the post-intervention investigation revealed that, all respondents were satisfied with the user-friendliness or ease of use of the multimedia learning system for teaching Creative Arts.

At the completion of the multimedia courseware, respondents were asked to share their views on the impact the courseware had on their lesson preparation and delivery. Data collected revealed a massive unanimity on the potential of the courseware to improve the knowledge and sharpen the skills of the respondents in Creative Arts lessons (visual art component) preparation and delivery. Respondents further expressed their readiness to recommend this multimedia courseware to their colleagues and institutional management board for possible adoption and implementation.

5.2 Conclusions

Based on the outcomes of the study it could be concluded that generalist teachers are not able to teach the Creative Arts (visual arts components) because they are not trained to teach the subject. This is besides the fact that there were little or no approved textbooks and syllabus to assist them in preparing and delivering the lessons effectively in the sampled schools. These teachers teach once a week, (for a period of 45 minutes) because they lack the knowledge and skills to start and sustain the interest of pupils during contact hours. Additionally, these generalist teachers take very little interest in the proper handling and keeping of textbooks and syllabus, thereby leaving most of their books tattered and some stolen.

Meanwhile, the five major thematic components identifiable in the textbooks and syllabuses of Visual Art, (namely Graphic Design, Ceramics, Sculpture, Painting and Sewing) require training and expertise for effective and beneficial facilitation. For generalist teachers to speak so highly of the multimedia courseware as a welcome and commendable idea therefore comes as no surprise. The conclusion drawn from teachers' satisfaction about the courseware points to the relevance in its execution procedures which drew largely from their concerns solicited at the earlier stages of the study. Some components of the multimedia courseware that were of interest to the respondents were the ease of navigation, the ease of understanding the terminologies used in videos, the appropriateness of the colour scheme, font styles, layout, and the high quality of sounds and videos. Multimedia courseware in this regard has the capacity of giving the generalist teachers the opportunity to acquire some of the knowledge and skills they have been lacking since the introduction of Creative Arts as

a subject of study in basic school in the 2007 Educational Reform in Ghana by the Anamoah-Mensah Committee.

The successes chalked in the designing and development of the multimedia courseware is largely attributed to the strict adherence to and keen consideration of key design components. These include appropriateness of fonts (like San Serif Fonts e. g. Open San Fonts, Montserrat, Impact, etc.), harmonious contrast in colour schemes, simple and straightforward layout styles and less dramatic transitional effects for very smooth and subtle transitions between pages and slides. These considerations resulted in the appropriateness of the various assets used to design and develop the multimedia courseware, therefore led to a successful completion of a very user-friendly learning system for Creative Arts teachers in Ghanaian Basic Schools (refer to appendix A for web address). The respondents who were the end-users of the multimedia courseware also rated its efficacy very high because of the novelty the courseware brought to the teaching and learning of Creative Arts in their various basic schools. In their opinion therefore, getting such learning systems as supplementary learning materials will boost their confidence in handling other challenging subjects that pose problems to them during their lesson preparation and delivery.

In conclusion, therefore, multimedia courseware designers and developers should make it a point to use appropriate subject matter content in their courseware development projects. Also, user-friendly interfaces should be designed by following the principles of hierarchy in font, alignment and colour, to make their Graphical User Interfaces easy to use and free from usability issues.

5.3 Recommendations

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

- Teacher training institutions should train their teachers to effectively and efficiently teach the creative arts by focusing on the five major thematic components identified in the Visual Art textbooks and syllabi (namely Graphic Design, Ceramics, Sculpture, Painting and Sewing). Also, designers and developers of multimedia courseware should design and develop courseware using relevant and approved contents.

- In designing a Graphical User Interface for a multimedia courseware for basic schools, the multimedia and pedagogical principles of courseware development should be followed. This will make the courseware easy to use, thereby enhancing its acceptability.

- Courseware developers should be employed and funded by the Government to produce more multimedia learning systems and courseware for various subject areas for all educational levels in Ghana. Interesting multimedia courseware should be designed and developed and also introduced to all generalist teachers in all Ghanaian Basic Schools with special attention paid to principles like; ease of system navigation, simple and basic use of language and terminologies, attractive and reader-friendly colour schemes, high quality sounds and videos. When the above-mentioned principles are applied to multimedia courseware

production, generalist teachers and other interested end-users will acquire the requisite knowledge and skills to teach Creative Arts at all levels of academia.

- Additionally, all courseware designed and developed for academic purposes should be pilot tested to ascertain its strengths and weaknesses before full deployment. When done properly, this will enable courseware developers to identify and meet the needs of the system's end-users, and also ensure that the end-users accept and use the courseware for its intended purpose.

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APPENDIX A

COURSEWARE WEB ADDRESS

creativeartsmc.com

APPENDIX B

PRE- PRODUCTION OPINIONNAIRE

Topic :
Multimedia Courseware for Creative Arts Teachers in Ghanaian Basic Schools.

Your views are kindly solicited in this study to gather needed information about the extent to which available Creative Arts contents (syllabus, activity books and textbooks) are used to aid lesson preparation and delivery. The researcher appreciates your time and value the information you will provide in this study on the topic *Multimedia Courseware for Creative Arts teachers in Ghanaian Basic Schools.* All responses on this questionnaire will be treated confidentially.

1. Age 15-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐
   41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐ 60+ ☐

2. Gender Male Female

3. Educational background
   JHS
   SSS/SHS
   Vocational/Technical/Commercial
   Middle School
   Teacher Training/College of Education
   Polytechnic
   University
   If others specify……

4. How long have you been teaching Creative Arts?
   1- 12months 1 - 2years 2 - 4years 5-10years 10years +

5. What type of training?
   Professional Training (Teacher Training/College of Education, University)
   Non-Professional Training (In-Service Training [School Based / Circuit Based], Workshop, Seminar, Symposium)
   Non (no form of training)
   If others, specify……

6. What Class do you teach? 1 ☐ 2 ☐ 3 ☐

7. Do you have the Creative Arts syllabus, textbook and activity books?

Yes No (GO TO QUESTION 10)

8. Do you use these documents mentioned in question 8 for your lessons preparation and delivery?

Yes No (GO TO QUESTION 11)

9. How often do you refer to these documents for your lesson preparation and delivery?

Once a week Two times a week Three times a week

Specify……

10. Do you have other books for Creative Arts lessons?

Yes No (GO TO QUESTION 13)

11. If Yes? Specify……

12. How often do you teach Creative Arts per week?

Once a week Two times a week Three times a week

Specify……

13. A multimedia courseware that appropriately interprets the Creative Arts Syllabus is needed for the effective teaching of Creative Arts in Ghanaian Basic Schools?

	Agree		Strongly Agree		Neutral		Disagree		Strongly Disagree

APPENDIX C

POST- PRODUCTION OPINIONNAIRE

Topic : Multimedia Courseware for Creative Arts Teachers in Ghanaian Basic Schools.

Your views are kindly solicited in this study to gather needed information about the extent to which the Creative Arts Multimedia Courseware has helped to improved your understanding in Creative Arts (Visual Art). The researcher appreciates your time and value the information you will provide in this study. All responses on this questionnaire will be treated confidentially.

Instructions: Please tick the appropriate space that best describes your response to the questions below.

NO	QUESTIONS	STRONGLY DISAGREE	DISAGREE	NEUTRAL	AGREE	STRONGLY AGREE
1	The Creative Arts Multimedia Courseware is structured according to the Syllabus.					
2	Navigating the Creative Arts Multimedia Courseware was easy.					
3	The Multimedia Courseware has improved my understanding of Creative Arts (Visual Arts) activities.					
4	I will recommend this Creative Arts Multimedia Courseware to other colleagues.					

5	The Creative Arts Multimedia Courseware is easy to use.					
6	Terminologies used in the videos were explained to my level of understanding.					
7	The Creative Arts Multimedia Courseware does what it purports to do.					
8	The Video quality is good.					
9	The Sound quality is good.					
10	The Colours used for the Creative Arts Multimedia Courseware is good.					
11	The Creative Arts Multimedia Courseware can assist me in teaching the Creative Arts (Visual Arts) effectively.					