

**TECHNOLOGY-ENHANCED TEACHING AND LEARNING: A CASE OF THE
FACULTY OF ART IN KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

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DECLARATION

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

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ABSTRACT

Integrating technology into the teaching and learning environment has been a challenge for Ghanaian Universities. Delivery of instructions is mainly instructor-led, with partial or no student-lecturer electronic connection and the undergraduate departments at the Faculty of Art, Kwame Nkrumah University of Science and Technology are not an exception. Based on this, the researcher adopted a technology-enhanced course model (hybrid course model) that facilitated teaching and learning in large class sizes. The Educational design research under qualitative research design was used. Questionnaires and interviews were used to examine students and lectures proficiency, resources and readiness for teaching and learning with identified technologies. Convenience, purposive and proportional stratified sampling techniques were adopted; sampling 251 respondents—246 second year undergraduate students and 5 lecturers. The introduction of technologies into the classroom encouraged active learning by engaging students in the process. Technological additions to the teaching environment included Tablet PCs, wireless network access and social learning platforms. These individual technologies had the potential to change the classroom dynamics and fostered new teaching and learning approaches. Hence the introduction of the hybrid course model boosted student-instructor interactivity, students became motivated active learners and level of student engagement was increased. The data analysis revealed that, there is a high potential of using digital technologies to augment the traditional teaching method with the end objective of increasing the level of student engagement, motivation and interaction in large classes.

DEDICATION

I dedicate this project to the Almighty God for His great grace, mercy and faithfulness towards me. To my parents and siblings Dr. McBoafo Foli Annku, Mrs Estella Ama Annku, Dr. Shalom Esinam Annku and Dr. Michael Boafo Annku. To my best friend Sylvester and the wonderful family I have in Kumasi.

KNUST



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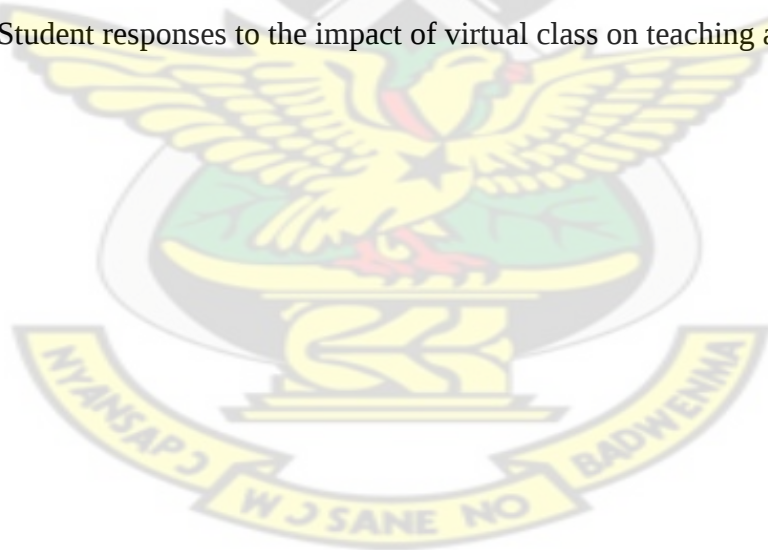


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ABBREVIATIONS

ICT - Information and Communication Technology

ICTs - Information and Communication Technologies

ICT4AD - Information and Communication Technology for Accelerated Development

MOE - Ministry of Education

LMS - Learning Management Systems

KNUST- Kwame Nkrumah University of Science and Technology



CHAPTER ONE

INTRODUCTION

1.1 Overview

The chapter provides the reader with background information on the study, research problems and objectives, nature of the study and its significance. Terms and abbreviations used in this report have been clarified for easy understanding of the content.

1.2 Background to the Study

According to UNESCO (2002), Information and Communication Technology (ICT) now permeates the education environment and strengthens the very success of 21st century education. Furthermore, ICT adds value to the process of learning and to the organization and management of learning institutes.

In order to support teaching and learning through technology, ICT models play an essential role in enhancing the teacher-learner interaction (Alexander, 2003). Ololube et al., (2009) adds that the use of ICT in instruction is vital to the progress and development of higher level education. First and foremost, teaching and learning involve a teacher and student(s). They must communicate, discuss, collaborate, ask questions and seek answers or solutions. Information and Communication Technology models can be used as a component of online, blended, or face-to-face teaching.

1.3 Statement of the Problem

According to Awidi (2008), technology has facilitated online education in many countries but it cannot be said so for African public universities. Integrating technology into the teaching and learning environment has been a challenge although Ghanaian Universities have advanced in building network infrastructure and acquiring computers. Delivery of instructions is mainly instructor-led, with partial or no electronic connection between students and lecturers. Over-burdened teaching, learning and residential facilities in the face of socio-economic pressures to make education accessible to all and also low teacher-student ratios are the problems faced by Ghanaian Universities (Awidi, 2008). The same can be said for the undergraduate departments at the Faculty of Art, Kwame Nkrumah University of Science and Technology. The standard number of students to a lecturer in the University is 40 but a good number of the departments have over 100 undergraduate students registered for various courses hence interactivity and student-lecturer engagement is impaired. Empirical studies reveal that small classes are primarily easier to teach than large classes for achieving long-term learning goals however, University of Southern California (2013) debunks this by saying that it is possible to attain the same goals and reduce students feeling of anonymity in large classes when the right pedagogical approaches are implemented.

Furthermore, digital media have become a part of students' daily life because of the vast spread of digital technology (Bagarukayo, Weide and Mbarika, 2011). Students want to use modern electronic devices on campus because of continuous emergence of new technologies. Based on this, the researcher aims to adopt a technology-enhanced course model (hybrid course model) that can facilitate teaching and learning in large class sizes.

In view of this, the researcher intends to explore ways these technologies can be used to support teaching and learning activities, improve communication, interactivity and engagement at the undergraduate level at the Faculty of Art. Here the researcher was the instructional technologist/designer and the lecturers were the subject area specialist. The researcher noticed how interaction and engagement was impaired in large classrooms and the lecturers concurred that students interacted less in class and due to the large student number it was difficult to interact with all of them. The researcher then helped to plan an activity with the lecturers that would inculcate the hybrid course model which is a combination of online and traditional face-to-face teaching and learning.

1.4 Objectives of the Study

1. To find out and analyse the various digital technologies accessible to students and lecturers; and their role on instructional activities.
2. To identify and use a learning management system (LMS) that integrates the identified technologies and train lecturers on how they can use LMS to deploy instruction to students.
3. To assess the efficacy of using the LMS identified to deploy instructions and enhance student learning.

1.5 Research Questions

1. What kinds of digital technologies are accessible to lecturers and students and how would the identified technologies enhance teaching and learning?

2. What learning management system can integrate the identified digital technologies to aid lecturers in deploying online course content to students?
3. How effective will the use of the LMS identified be in deploying instructions and improving learning?

1.6 Delimitation

The study is designed to meet the online instructional needs for the undergraduate students (2013-2014) and lecturers at the Faculty of Art, Kwame Nkrumah University of Science and Technology. It is also limited to the selection of one course area in each of the departments as shown in Table 1.1.

Table 1.1 Departments and selected course areas

Department	Courses
Integrated Rural Art and Industry	Product Design
Communication Design	Graphic Design Production
Painting and Sculpture	Digital Art 1
Industrial Art	Metal Casting Processes
Publishing Studies	Publishing Management

1.7 Definition of Terms

Technology: is perceived as the study, development and application of devices, machines, and techniques for manufacturing and production processes.

Digital technologies: are electronic tools, systems, devices and resources that generate, store or process data. These include social media, online games and applications, multimedia, productivity applications, cloud computing, interoperable systems and mobile devices.

Blended/hybrid: refers to learning models that combines the face-to-face classroom practice with online solutions. For example, a teacher may facilitate student learning in class contact and uses the moodle (modular object oriented dynamic learning environment) to facilitate out of class learning.

Web 2.0 tools: are applications that allow users to interact and collaborate with each other in a social media dialogue in contrast to websites where users are limited to only read. Examples of social networking sites, blogs, wikis, video sharing sites, cloud computing services, web applications, mashups and folksonomies

Learning management system: is a software application or Web-based technology used to plan, implement and assess a specific learning process.

Synchronous: means real-time exchange of information with all participants interacting occur at the same time.

Asynchronous: is self-paced and allows participants to engage in the exchange of information without the dependency of each other's involvement at the same time.

Social media: a generic term used to describe Web-based tools that harness the power of collaboration and group interaction.

1.8 Abbreviations

ICT - Information and Communication Technology

ICTs - Information and Communication Technologies

ICT4AD - Information and Communication Technology for Accelerated Development

MOE - Ministry of Education

LMS - Learning Management Systems

KNUST- Kwame Nkrumah University of Science and Technology

1.9 Importance of Study

1. The research brings to light the usefulness and the possibilities ICT modules for effective teaching and learning in the departments of the Faculty of Art.
2. It opens opportunities for more research to be done in the area of technology-enhanced teaching and learning at higher level education in Ghana.
3. The findings also serve as a reference material for interested individuals who would want to acquire knowledge in enhancing teaching and learning with technology.

1.10 Arrangement of the rest of the Text

Chapter Two provides theoretical and empirical review on policies and impact of ICT on education, improving teaching and learning with digital technologies, theories that support technology implementation in the classroom, adult learning theories in the digital age, learning management systems and models for integrating ICT for teaching and learning. Chapter Three includes the methodology adopted for the research. The data analysis was revealed in Chapter Four. Chapter Five entails summary, conclusions and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Overview

This chapter deals with pertinent literature on technology-enhanced teaching and learning. It identifies the policies and relevance of information and communication technologies (ICTs) in higher education. The review deals with the following sub-topics:

- Impact of ICT on Education
- ICT Policies
- Teaching and learning in the traditional classroom
- Improving teaching and learning with digital technology
- Taxonomy of Web 2.0 tools in Education
- Dimensions of digital technology in education
- Learning theories that support technology implementation in the classroom
- Learning styles
- Adult learning theories in the digital age
- Learning management systems
- Models for Integrating ICT for teaching and learning
- Challenges of integrating ICT in teaching and learning

2.2 Impact of ICTs on Education

UNESCO (2009) stated that there is a demand for virtual modes of learning facilitated by ICTs in higher education. ICTs are the hardware and software that enables data to be processed, stored and communicated. ICTs can be used to access, process, manage and present information and control events and communicate with others (Joshi, 2014).

Joshi further explained that internet usage is gradually moving up in higher education. Using the internet daily has become an essential activity for most people and creating an outstanding chance for teachers and students at all levels to explore best the usage of digital technologies. Tikam (2013) opines that ICTs affects every aspect of education from teaching to learning, assessment and evaluation. It facilitates research and scholarly communication. Tikam categorized the roles of ICT for developing an effective learning environment into the following:

- Teacher - explains core content concepts and addresses misconceptions;
- Networker - links a learner with the peers and experts and develops collaborative atmosphere;
- Guide - providing tailor made instructions to meet individual needs;
- Stimulant - fosters analytical thinking and interdisciplinary studies;
- Online learning - facilitates learning through digital mode;
- Mobile learning - offers independent space and flexibility that comes from working away from the learning institute or tutor. It makes education accessible to all, irrespective of geographical barriers or resource constraints.

Reddi (2012) supports the view that the revolution of ICT has made education accessible to all especially adult learning. Reddi added that ICT allows a learner to relate to the

medium and its content, boosts interactivity and promotes mobile learning. ICT can serve multiple teaching functions and different audiences and there is instant delivery of information to the rich and poor (inclusive education). Youssef and Dahmani (2008) explain that ICT constitutes an input in the student learning process that should help produce better learning output. ICT use can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day. Researchers argue that the use of ICT can positively transmit knowledge to students. Furthermore, ICT use can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase learning through communication. According to vdMerwe (2005), firstly the use of ICT in higher education allows a shift from a teacher-based approach to a student-based approach. Youssef and Dahmani (2008) explain that since the usage of ICT leads to asynchronous learning the class size does not matter. Using computers and the internet, students have more time to interact. They are not constrained by the available face-to-face time where their understanding and participation depend on the number of students. Thirdly, the value of the network depends on the number of users. Therefore, the number of students may have a positive effect on online courses. This result depends on the teacher's motivation and student characteristics.

Recent research has pointed out the importance of transforming teaching in order to integrate ICT effectively. ICT is seen as a spur of change in schools and classroom because it provides opportunities to shift from teacher-centred to student-centred learning. In turn, ICT could also increase the pedagogical repertoire of teachers. This teacher effect is most likely to improve the outcomes of disadvantaged students because

it attends to individual needs and provides a variety of curriculum and assessment strategies to encourage student competencies across a range of learning outcomes (Youssef & Dahmani, 2008). The use of hardware and software technologies for effective administration of information can be defined as Information and Communication Technology. These technologies are used to communicate, create, store and share specific tasks. ICT has become an integral part of every individual of the 21st century. Inventions in science and technology has enriched the speed of acquiring knowledge, communication, networking, dissemination of information, interactivity and changing the ways of teaching and learning. The available tools in ICT are helping everyone to fulfil their needs in this new age of technology where learning process can be carried out at anyplace and anytime. Teachers have access to plan lesson and network with other teachers. Students accept more responsibility for their own learning and assessment, developing skill in the process. Students use computers to browse the internet to look for information and project information. Teachers use ICT in research for preparing teaching materials; participate in online forums and online conference whereas researchers use ICT tools to collect and analyse data.

2.3 ICT Policies Worldwide

As stated by UNESCO (2010), ICT is progressively utilized by higher education institutions worldwide. ICTs are emerging as a part of on-campus delivery as well as open and distance modalities of higher education delivery. Agbetuyi and Oluwatayo (2012) add that ICT is now regarded highly and hence has become a major factor driving the socio-economic development of every nation. It now plays a major role in education,

learning and research in general therefore there is a need for every country to set policies to implement its proper usage. UNESCO's aim is to meet the personalized learning needs of all children, youth and adults by 2015. To achieve this goal UNESCO partnered with Microsoft in 2009 and their shared goal is to help remove barriers to digital inclusion and enable students and teachers around the world to understand the full potential of technology. They are of the view that technology has a vital role to play in building up 21st century skills, broadening access to education and in personalizing the learning experience to adapt teaching to the unique needs of each learner. The goals outlined in the agreement are executed in partnership with other government, civil society and private partners in support of the common goals of promoting socio-economic development and an equitable knowledge society around the world. Microsoft is collaborating in three of UNESCO's four core pillars: education, culture, as well as communication and information. Joint programs seek to leverage ICT to:

- Develop universal standards for teacher training on the integration of ICTs in the classroom;
- Create teacher networks for the exchange of teaching best practices, pedagogic learning methods and content material;
- Provide resources and tools designed to make it easier to both access and apply technology in education (Microsoft - UNESCO Partnership, 2009).

2.3.1 ICT Policies in Ghana

According to Mangesi (2007), the most advanced in the deployment and use of ICTs in the country is the Ghanaian tertiary education sector. All the country's major universities have their own separate ICT policies. These policies enable students to have access to 24-hour computer labs with broadband connection. However, not all tertiary institutions in the country enjoy this facility and there are cases where the computer facilities are run by private sectors as cyber cafés on campuses.

The Ministry of Education (MOE) in 2008 stated that in the last few years a number of reports, policies and initiatives have underlined the role of education and training in the wider development agenda of the country. The policy stated that villages, community access points, all levels of education, public libraries, health centres, hospitals as well as all local and central government departments must be connected to a number of access points with ICTs (MOE, 2008, p. 10). The main goal of the plan was to ensure that ICTs were to be integrated into the schooling systems. The focus of this transformation was to:

- Change the management of education in order to overcome weaknesses inherent in current models of schooling.
- Ensure that ICTs are harnessed to make the educational system more productive and efficient.

This was to improve the quality of education and training and make the educational system responsive to the needs and requirements of the economy and society. The mission of this policy was to express the relevance and effectiveness of using ICTs in the

education sector, with a view of addressing current challenges and equip Ghanaian learners, students and teachers to meet the national and global demands of the 21st Century. The fundamental objective of the policy was to ensure that the Ghanaian education sector provided adequate opportunities for Ghanaians to develop the necessary skills regardless of the levels of education. The overall policy goal was:

- To enable graduates from Ghanaian educational institutions to boldly and innovatively use ICT tools and resources to develop essential skills and knowledge needed to be active participants in the global knowledge economy by 2015 (MOE, 2008, p. 18).

The policies goal as adopted from the National ICT4AD Policy document was to:

- Include quality education and training at all educational levels and expand access to education, training and research resources and facilities by modernising the educational system;
- Provide universal basic education and improve the level of basic computer literacy in the country;
- Expand and increase access of ICT to secondary and tertiary education (MOE, 2008, p. 13).

2.3.2 ICT Policies of the Faculty of Art-KNUST

The assumed role of ICTs in education is evident in Kwame Nkrumah University of Science and Technology's institutional policy documents. These policies argue that using

ICTs will add to the value of education, improve teaching and learning, contribute to transformation and encourage innovation. However, very little is known about how these arguments play out in practice or about the ways in which ICT is supporting teaching and learning at the Faculty of Art KNUST. The Faculty of Arts policy statement on ICTs is to enhance training in ICTs for students and staff following these two objectives:

1. To provide adequate logistics and facilities for ICT training.
2. To encourage staff and students to use ICTs for teaching, learning and doing research.

Access to ICTs and encouragements alone does not ensure its use, nor does it determine the added value for education. At national and institutional levels, educational policies and regulations have been established to support the educational use of ICT. In schools, teachers and administrators are attempting to find the best ways to yoke ICTs to support teaching and students' achievement.

2.4 Teaching and Learning in the Traditional Classroom

Mbodila and Muhandji (2012) propound that traditional teaching and learning involve the direct flow of information from teacher to student. Traditional pedagogy can also be defined as a pre-technology education context in which the teacher is the sender, the educational material is the information and the student is the receiver of the information.

Tomei (2012) also referred to traditional teaching and learning as teacher-guided instruction that places the student in a submissive role rather than an active learning position, requiring firm compliance to the teacher's directions. It is based on the theory

that the teacher knows best what the student should learn. Typically it is based on already made learning materials, fixed deadlines, assessment tasks and conditions determined by teachers. In terms of the delivery medium, the teacher can deliver the message via the speech, chalk and chalk board or marker and white board method. In this type of teaching, the teacher directs and proposes activities (what, when, how a subject is learned and tests what has been learned), students are only to listen and follow instructions.

In this method, the learner's skill, knowledge and practice is of little value therefore students learn what society expects of them. Teachers and students in most institutions agree that the conventional lecture approach (traditional face-to-face) in classroom is of limited effectiveness in both teaching and learning (Mbodila & Muhandji, 2012).

Marx (2014) adds that in a traditional classroom setting, one lecture or assignment is given to all of the students and the teacher expects the same outcomes for everyone. In a traditional classroom the same set of instructions and tools is used for everybody by the teacher thus differential learning styles and the theory of multiple intelligences are not considered. In a traditional mathematical classroom, the teacher puts a question on the board and assigns answer sheets to students to solve it; this type of teaching speaks only to linguistic and logical intelligences neglecting the other domains of learning.

2.4.1 Limitations of Traditional Teaching and Learning

There are several limitations of using the traditional ways of teaching and learning. This technique of teaching is a one way flow of information in which the teacher often talks at length and expects that when a question is asked, the students must reproduce the same

thing said. Mbodila and Muhandji (2012) identified the following flaws of traditional teaching and learning:

- Teaching and learning is focussed on theoretical method rather than practical aspects hence less practice in real time situations;
- There is not enough interaction with students in the classroom;
- No creativity because learners reproduce what the teacher told them over and over again;
- Less integration for students, the teacher is the only individual who talks and gives commands.

In this unconventional era, ICTs offer different techniques available that have impact on teaching and learning than traditional pedagogy. The sub-topics that follow explain the implication of ICT in education and diverse approaches ICTs can be used to make the teaching and learning environment a learner-centred environment and encourage problem-based learning.

2.5 Improving Teaching and Learning with Digital Technology

When teaching, it is important to keep students motivated and engaged. This can be done with both traditional lectures or with active learning and collaborative techniques and this is where technology-supported teaching comes to play. The type of usage of digital technology is dependent on the subject matter. Chetty (2013) propounded that technology has the ability to transform education by extending the learning space beyond the four

walls of a classroom. Although the four walled classroom will continue to play a leading role in education over the coming years, technology offers a variety of learning opportunities beyond the physical limits of school. With the rapid growth of mobile devices, we are already witnessing the emergence of flexible, open learning environments that enable circumstantial, real-time, interactive and personalised learning.

Digital technology is good for mass communication (posting or sending out announcements), boost student-lecturer interactivity, student-student interactivity as well as lecturer-lecturer interactivity. Also digital technology makes content available and enable students to interact with content. It is suitable for making course-related resources from the web available to students. Digital technology can be good for handling the details of a large class's lesson that would otherwise occupy too much time during the class meetings (e.g., collecting and returning homework and papers, posting test score distributions and making announcements). Digital technology tools are essential in doing meaningful work in many fields. New technology and communication tools, enabled by a participatory and collaborative web (web 2.0), have gradually blurred the boundaries between formal and non-formal education, with much learning now taking place outside traditional classrooms (Chetty, 2013). Students ought to be introduced to and taught to use discipline-specific software. Simulations and demonstrations provide important additional ways to engage students. Using technology is a way to support different learning styles. With the help of technology, a course website can be designed to disseminate hand-outs that are too complicated to copy from the board or projection screen. Better still the instructor can interact with students on a micro blogging platform. However, there are several other micro blogging platforms available, some of them

specialized for industrial use (e.g. Yammer) and for education (e.g. Edmodo). According to Sapiens (2013) with technology, teaching and learning is improved since learning becomes interesting; it engages and challenges students with new interactive methods, it increases collaboration therefore students can work and team up with people in other locations. Distance learners can join online classes. Digital technology improves skills such as digital learning, communication, collaboration, building teams, mobile learning, attentiveness to details, planning, valuing diversity, problem solving, self-direction and social presentations. Lastly, instead of carrying lots of hardcopy books, electronic forms of the books and projects can be contained on portable technologies such as laptops, tablets or smart phones.

There are other reasons why technology is a great addition to the classroom and has influence on teaching and learning in higher education. It is useful because many students have to work their way through college to support themselves while receiving an education, the reason being their schools and jobs are not in the same town; so with the use of digital technologies it is much easier to schedule a more flexible way of making knowledge accessible to all through e-learning. Moreover, it is believed that using digital technology for learning enhances the students' learning interest and motivation since it is easy to use and enables students learning outside the classroom. Today's students engage in learning activities in different spaces, time and situations (Bagarukayo, Weide and Mbarika, 2011).

2.6 Traditional Pedagogy verses Pedagogy enabled by ICTs

Traditional school syllabi have a tendency to highlight the addition of knowledge over the application of knowledge and many school systems miss the mark to adequately training students in digital citizenship and literacy (Chetty, 2013). From a number of literatures reviewed the researcher came up with Table 2.1 which points out the very differences between traditional and ICT-enabled pedagogy.

Table 2.1 Differences between Traditional and ICT-enabled pedagogy

Traditional Pedagogy	Pedagogy Enabled by ICTs
Teacher-centred instruction	Student-centred instruction
Primarily words and text	Multimedia
Activities are prescribed by the teacher	Activities are determined by the learner
Students analyse individually	Students work in teams
Delivery of information	Exchange of information
One path to finding solutions to problems	Multiple paths to finding solutions to problems
There is no link between theory and practice	Integrates theory and practice
Teacher-directed	Student directed
Focus on facts and knowledge	Critical thinking and problem solving

2.7 Taxonomy of Web 2.0 tools in Education

Web 2.0 is a ground-breaking way of creating, collaborating, editing and sharing user-generated content online. It is seen as a concept that takes the network as a platform for sharing information and collaboration on the World Wide Web (Discovery Education, 2014). Web 2.0 applications allow users (students and teachers) to interact and collaborate with each other in a social media dialogue in contrast to websites where users

are limited to only read. Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites, cloud computing services, web applications, mashups and folksonomies(Thanuskodi, 2011).

2.7.1 Categorisations and examples of Web 2.0 tools

Discovery Education (2014) categorised Web 2.0 tools into presentation, video, mobile and community tools all of which serve several educational, administrative, social and communication purposes. Table 2.2 throws more light on them with examples.

Table 2.2 Categorisations and examples of Web 2.0 tools (Source: Barton Essel, 2013)

Categories	Examples
Presentation tools: Upload, create, edit and share creative presentations anytime, anywhere.	Slide Share, Prezi, 280 Slides, Picsviewr.
Video tools: makes it easier than ever to integrate video into shared projects and presentations.	Animoto, Photo Peach.
Mobile tools: Perfect for podcasting, blogging, media sharing, quizzes and more, these clever apps turn cell phones into smart teaching tools.	Poll Every Where, Phone.io.
Community tools: From wikis to social networks, this range of tools enables teachers and students to communicate, collaborate and share work.	Edmodo, Google Docs, Dropbox.

Web 2.0 as a collection of tools and social media enables to educators to engage students and enhance needed skills in media literacy, technological proficiency, communicating effectively and interact, think creatively and team up. However mobile and community tools will be considered in this research. The community tools will aid lecturers to share works, communicate and work together with other lecturers and students whereas the

mobile tools adept apps will turn smart phones into teaching and learning tools, which will harness anyplace and anytime access to education.

2.8 Dimensions of Digital Technology in Education

Technology is essential and has dimensions which are being used and explored by many educators for effective teaching and learning, making knowledge accessible to all. These features are; virtual, online/e-learning, blended/hybrid educational programs and mobile learning programs.

2.8.1 Virtual Education

Wise GEEK (2014) stated that an array of teaching formats that do not involve students and instructors to work together in person, at least not in the same room refers to virtual education. According to Vitangcol III (2002), the application of ICTs to course delivery and tuition, and the provision of learner services such as prior learning assessment and programme planning is virtual education. According to Molnar et al. (2013), virtual education takes many forms which include:

- Require students and teachers to be online at the same time (synchronous education);
- Allow students and teachers to visit online courses at their own convenience (asynchronous education);

- Others combine online work with traditional, in-person classroom instruction (blended instruction).

2.8.2 Online Education

Is the use of ICTs and electronic media in teaching and learning. It happens in or out of the classroom and requires no face-to-face encounter with the teacher. It can be self-paced (asynchronous) or instructor-led (synchronous) and is appropriate for distance learning and teaching (Mohawk College, 2014).

2.8.3 Blended/Hybrid Education

This combines online and traditional face-to-face where seat time is replaced by online learning activities so that they reinforce, complement and elaborate one another (Learning Technology Center, 2014). According to Piper (2008), there are three key features of hybrid courses:

- Web-based learning activities are introduced to complement face-to-face
- seat time is reduced, although not completely eliminated
- Web-based and face-to-face components of the course are designed to interact pedagogically to take advantage of the best features of each.

2.8.4 Mobile Learning

This a learning process that does not limit the learner to a specific location as it is in the traditional classroom setting but provides flexibility in terms of location and time with the aid of mobile devices, thus learning is done anywhere and at any time. With technologies such as mobile phones, e-readers, smart phones, MP3, electronic notebooks and netbooks, iPod, personal digital assistants, kindle, laptops and tablets learning can be made mobile. Boyinbode and Akinyede (2008) opine mobile learning as the point where mobile computing and electronic learning intersect.

2.8.5 Delivery Models

There are two general delivery models for communicating: asynchronous and synchronous. Each has its advantages and disadvantages but they all allow students and teachers to collaborate and learning real time or self-paced. Synchronous means real-time exchange of information with all participants interacting occur at the same time, whereas asynchronous is self-paced and allows participants to engage in the exchange of information without the dependency of each other's involvement at the same time. Examples of synchronous are face-to-face conversations, Skype conversations, instant messaging or live chats and virtual classrooms where everyone is online and working collaboratively at the same time. Asynchronous uses technologies such as checking email, discussion forum, blogs and wikis. The researcher seeks to employ the hybrid system which does not entirely wipe out the traditional face-to-face but explores the

possibilities of combining face-to-face with online teaching and learning and the delivery mode will mostly be asynchronous.

2.9 Learning theories that support Technology Implementation in the Classroom

Learning theories raise questions such as how does learning happen? What does it entail? What influences students' development? The word learning usually means to think using the brain (Sincero, 2011). Though there are many more learning theories such as behaviourist and cognitivism to mention a few but literature was reviewed on constructivism and connectivism and its link to pedagogical integration of technology. For the purpose of this research, constructivism and connectivism are looked at because they emphasise the benefit that adult learners learn best from experience. Moreover, they want to be actively involvement in thinking critically and solving problems regarding a learning activity which is found relevant and engaging. Also the research intends to use a learning platform that can boost interactivity, enable lecturers to engage students and disseminate information.

2.9.1 Constructivism

According to The University of Sydney, (2014) the theory proposes that humans construct knowledge and meaning from their experiences. Constructivism is not a specific pedagogy it is based on student's active involvement in problem-solving and critical thinking regarding a learning activity which is found relevant and engaging. Knowledge is constructed by testing ideas and approaches based on prior knowledge and

experience. Although there are many learning theories that can apply and integrate technology more effectively, there is a close connection between technology and constructivism. According to Gilakjani, Leong and Ismail (2013), constructivism states that learning takes place in contexts, whereas technology refers to the designs and environments that engage learners hence the implementation of each one benefiting the other. Constructivism is teaching with an approach that seeks opportunities for students to analyse, investigate, collaborate, share, build and generate based on what they already know. In teaching, the quality of the teacher determines student performance. This is even more significant when applying constructivism. They further explained that the teacher's knowledge, beliefs, and actions all affect the success of the learner. The valuable quality of a teacher applying pedagogy based on constructivism is the instantaneous and intuitive vision of the pupil's mind as it gropes and fumbles to understand new ideas. Teachers should correct the knowledge a learner constructs, therefore promoting the development of powerful and effective constructions. They must direct the student to provide experiences that can question or expand upon their previous learning. The role of the teacher in a constructive class is to be one of many resources that the student should learn from, engage students in experiences that challenge previous conceptions of their existing knowledge, allow students to respond to lessons and seek explanation of students' initial responses, give students some thinking time after posing questions, encourage questioning, encourage discussion among students, encourage and accept student autonomy and initiative, be willing to let go of classroom control, promote student leadership, collaboration, location of information and taking actions as a result of the learning process, encourage students to suggest causes for events and situations and

encourage them to predict consequences, extend learning beyond the classroom, not separating the process of knowing from the process of finding out and insist on clear expression from students because when students can communicate their understanding then they have truly learned. The role of the constructivist teacher is to create a learning environment that is invigorating, interactive, immersive and informative. The role of the teacher is didactic and well-established and the learning that is captured within a constructivist environment is student centred and collaborative. Here the teacher becomes the facilitator or coach. To do this effectively, the teacher needs to be a learner and a researcher, giving teachers the opportunity to work as a learner helps them overcome anxieties about novel situations (Gilakjani, Leong and Ismail, 2013).

2.9.2 Connectivism

According to Siemens, the first point of learning where knowledge is activated through the process of learners connecting and feeding information into a learning community is connectivism. Community is the gathering of similar areas of interest that permits for interaction, sharing and thinking together (Kop and Hill, 2008). Information is disseminated through an information network. Connectivism learning theory, properly applied, has the potential to improve education through the revision of educational perspectives and generate a shift toward learner-centred education. The theory allows for instructors to step back from controlling course content and bypass textbooks and bring learners to the forefront in locating, presenting and making sense of relevant knowledge. When knowledge is no longer expert-centred and content and conversations are

continuous, growth and learning can occur for all classroom participants including the instructor (Darrow, 2009).

2.10 Learning Styles

The processes in which students take in information are in different ways hence learning styles are the diverse approaches of learning (Pashler, McDaniel, Rohrer, & Bjork, 2008). The learning styles are: visual, music/auditory, verbal, physical/kinaesthetic, logical/mathematical, social, solitary and naturalist. Figure 2.1 and Table 2.3 best explain the various learning styles.



Figure 2.1 Learning Styles

Source: loving2learn.com

Table 2.3 Learning Styles and how they Learn

Visual	Create visuals (diagrams, comic strips, poster, PowerPoint, webcast or video), graph results of survey and draw a map.
Music/ auditory	Write (song, rap, jingle, rhyme), use instruments to create, create dance.
Verbal	Teach concept, write (instructions, poem, story), create ad, retell in their own words, teach concept mapping and keeps a journal.
Physical/ kinaesthetic	Create game and sport, do experiment, construct a model and build a representation.
Logical/ mathematical	Create code and an outline, make a time line, compare/contrast ideas, design a map, show a pattern and teach concept mapping.
Social	Tell stories or poem, survey others, interview someone, teach a cooperative game, role play and hold a discussion.
Solitary	Research an area, keep journal, write about personal experiences, think about things/events and plan them, create PowerPoint and read a book.
Naturalist	Collect and categorise data materials and ideas, discover and experiment, take a field trip, adapt materials and label and classify.

2.11 Adult Learning Theories in the Digital Age

The Teaching Excellence in Adult Literacy (2011) stated there is no single theory of learning that can be applied to all adults. The literature of the past century has yielded a variety of models, assumptions and principles, theories and explanations that make up the adult learning knowledge base. Conlan, Grabowski and Smith (2003) discuss learning theories related to adult learning. They give active learning, experiential learning, project based learning, self-directed learning as theories related to adult learning.

2.11.1 Active Learning

The Teaching Excellence in Adult Literacy (2011) defined active learning as the use of one or more interactive approaches to education for the purpose of engaging students in their work to acquire and understand knowledge. They further explained that, the active learning classroom is one that de-emphasizes lecture and other teacher-centred forms of instruction in favour of engaged class environments that are learner centred.

2.11.2 Experiential Learning

It involves an undeviating happenstance with the occurrences under study rather than only thinking about the encounter or only considering the possibility of doing something about it (Kolb and Kolb, 2005). It functions on the principle that individuals learn best by experience. Learning is attained in the practice of reflection on daily experiences. Some attributes of experiential learning are as follows:

- Experiential learning is a repeated process involving setting goals, thinking, planning, experimenting and making decisions, and finally action, followed by observing, reflecting and reviewing;
- It uses participants own experience and reflection about that experience, rather than lecture as the primary approach;
- It also encompasses doing something and discovering what it is like, how it made the learner feel, what it meant to the learner, that is the learning becomes the learners own experience and no one else's.

2.11.3 Project Based Learning

Is an active classroom approach in which students discover real-world problems and challenges and acquire a deeper knowledge (Edutopia, 2014). Students work in groups to solve thought-provoking problems that are genuine. Learners decide how to approach a problem and what activities to pursue. Some attributes of project based learning are:

- The learners gather information from a variety of sources and synthesize, analyse and derive knowledge from it;
- The learning is essentially valuable because it is connected to something real and involves adult skills such as collaboration and reflection;
- Learners demonstrate their newly-acquired knowledge and are judged by how much they have learned and how well they communicate it;
- The teacher's role is to guide and advise, rather than to direct and manage student work.

2.11.4 Self-directed Learning

Is a process in which the learners are responsible for their own learning process by analysing their personal learning needs, setting goals, identifying resources, applying strategies and assessing the outcomes (Brookfield, 2009).

2.11.5 Andragogy

Ways in which adults embrace knowledge, skills and attitudes can be defined as adult learning theories. One popular theory is andragogy. According to Cullata (2013), Knowles' theory of andragogy is an attempt to develop a theory specifically for adult learning. Knowles emphasizes that adults are self-directed and expect to take responsibility for decisions.

Keesee (2011) outlines Knowles assumptions about the characteristics of adult learners:

- Adults are internally motivated and self-directed;
- Adults bring life experiences and knowledge to learning experiences;
- Adults are goal-oriented;
- Adults are relevancy-oriented;
- Adults are practical;
- Adult learners like to be respected.
- According to Pappas (2013), Knowles provides an example of applying andragogy principles to personal computer training:
 - Explain why certain skills are taught (functions, commands);
 - Task-oriented instead of memorizing. Tasks should be common tasks;
 - Take diversity into play. Acknowledge different learning levels and experience;
 - Allow adults to learn on their own and from their mistakes;
 - Respect can be demonstrated to you by taking interest and regarding them as colleagues who are equal in life experience.

From the above theories, the one that has direct bearing to the research is andragogy since the research is about finding ways to improve interactivity and engagement to enhance effective teaching and learning amongst adults learners.

According to Lambert et al. (2014), adult learners are becoming more common in higher education institutions. These learners often bring with them experiences and expectations that can significantly affect their educational needs, progress and activity in the classroom. They suggest that instructors in higher educational settings should review their current teaching methodologies in light of the increase in enrolment of adult students. Specifically, pedagogical or instructor-centred approaches tend to be less effective in meeting the needs of adult learners. Additionally, faculty must change their perceptions about the presence and utilization of instructional technologies in meeting student needs. Instructors must consider how technology can influence the development and application of andragogy in the classroom to assist adult learners.

2.12 Learning Management Systems

Learning management system (LMS) is a software application or Web-based technology used to plan, implement and assess a specific learning process. Normally, a LMS provides an instructor with a way to create and deliver content, monitor student participation and assess student performance. A LMS may also provide students with the ability to use interactive features such as threaded discussions, video conferencing and discussion forums (TechTarget, 2014). Examples are: Moodle, Edmodo, Blackboard, Schoology, Decebo, Desire2Learn, Cornerstone and Skillsoft just to mention a few.

There are three main types (open-source, proprietary and cloud-based) of LMS used by instructors to manage e-learning and deliver course materials to students. And while these systems typically share a common purpose to manage and administer a curriculum to a large and sometimes scattered workforce the individual features of each platforms varies (Mindflash, 2015). But for this research, Edmodo was chosen because of it is rated second, its simplicity, the user interface is friendly and quick to learn, cloud-based and also subscription-based. And for the timeframe of the research, a cloud-based one will best suit since the institution was not ready to install a third party application and Edmodo is free.

2.12.1 Edmodo

Edmodo is a LMS that provides a safe and easy way for a class to connect and collaborate, share content and access homework, grades and school notices. One can either sign-up as an administrator, teacher, student or a parent. It has an interface design just like Facebook. Students and teachers can reach out to one another and connect by sharing ideas. Edmodo provides a safe environment where a teacher can create a classroom group for students.

In this virtual group the instructor can:

- Place digital content for students to access or download;
- Create polls for students to vote online;
- Create and grade assignments and quizzes;
- Summaries lessons for students who were absent from class;
- Instructors can delete inappropriate posts;

- Join communities and collaborate other teachers world-wide;
- Each class group is managed and controlled by the teacher.

Students need an access code to join the class. If a student shares the code outside the class, the teacher can change it without affecting students already joined in the group. Edmodo deals with school and teacher concerns about social networking for students in the following ways:

- Students can get help from the entire class;
- Students can communicate to the whole class or to the teacher;
- Place digital content in backpack;
- Take votes online;
- Students can take quizzes, turn in and upload assignments;
- Private conversation between students is not possible so students may only communicate to the whole class or the teacher. This reduces opportunities for cyber-bullying.

2.12.2 Downside of Edmodo

It is difficult for students to upload work and take quizzes from smart phones. The positives of Edmodo clearly outweigh the negatives.

2.13 Models for Integrating ICT for Teaching and Learning

E-moderating Model: Salmon's model of e-moderating describes a sequence that uses computer to support communication in particular environments and describes the stages of teaching and learning online. Salmon's model primarily supports asynchronous networked learning (Salmon, 2009). All stages contribute to the learning process thus gives and explain the five basic stages in e-moderation as follows:

Stage 1: Access and Motivation

The tutor must make sure that all students can easily access the online sitting. Tutor must ensure there is no technical problem (e.g. with passwords). At this stage technical support is perilous as the student can become effortlessly discouraged. Concurrently the tutor needs to ensure that the students understand the need to put time and effort into the online activity. Adult learners will need to know why they are accessing the online session and what they can obtain.



Figure 2.2 Action and Motivation stage

Source: Illustration by Angood (Salmon, 2014)

Stage 2: Online Socialization

In this stage, students need to become comfortable in the online environment and to socialise with each other. Next, the tutor should emphasise the cooperative nature of the session and highlight how it is about learning from each other.

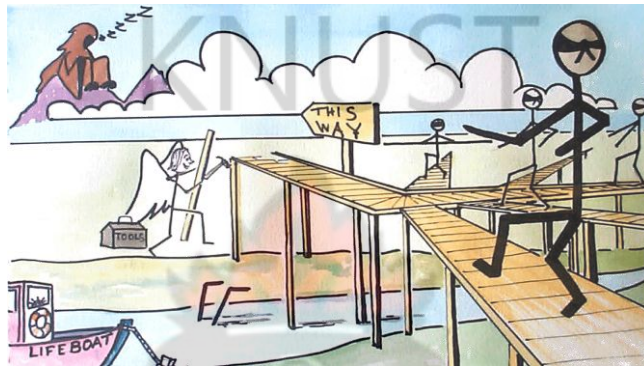


Figure 2.3 Online Socialization

Source: Illustration by Angood (Salmon, 2014)

Stage 3: Information Exchange

Serious class begins here. The tutor defines the learning outcomes of the session and adapts them in accordance to student expectations, then refer to the information that was previously provided. If there is more information to disseminate, it is done here.

Stage 5: Development

It is at this stage where we clearly see Salmon's link to constructivism. Students take responsibility of their learning and become more confident and critical thinkers. This stage is all about reflection and it can be done after the actual session. Here the tutor can also raise awareness of other resources that students can continue to use after the session to learn more.



Figure 2.6 Development

Source: Illustration by Angood (Salmon, 2014)

Laurillard's conversational framework: Mill (2008) explains that the Laurillard's conversational framework is a model for understanding how formal learning works and how best to plan effective learning. Laurillard emphasises that for higher education learning the channel of communication must take place at both a theory and practical levels. Laurillard continues to say that all complex learning involves a continuing cyclic exchange of ideas between teacher and student, which reveals perceptions and the differences between them (Laurillard, 2002). According to Mill (2008) Laurillard's framework divides learning conversation into four phases as:

Discursive/narrative phase: this involves imparting of knowledge to the learner. The tutor presents a new concept and learners enter into a dialogue with the teacher, trying out the idea and questioning and clarifying.

Interactive phase: is when learners interact with teacher-constructed tasks, attempting to put the new concept into practice and getting feedback on their performance.

Adaptive phase: the learners attempt to put their ideas into practice, modify their ideas and adapt their actions in the light of what they have learned, and make their own links between ideas and events.

Reflective phase: in which learners consider their experience, reflecting on their learning, relating the theory back to the practice, adjusting their thinking in the light of reflection and framing future actions to be more successful.

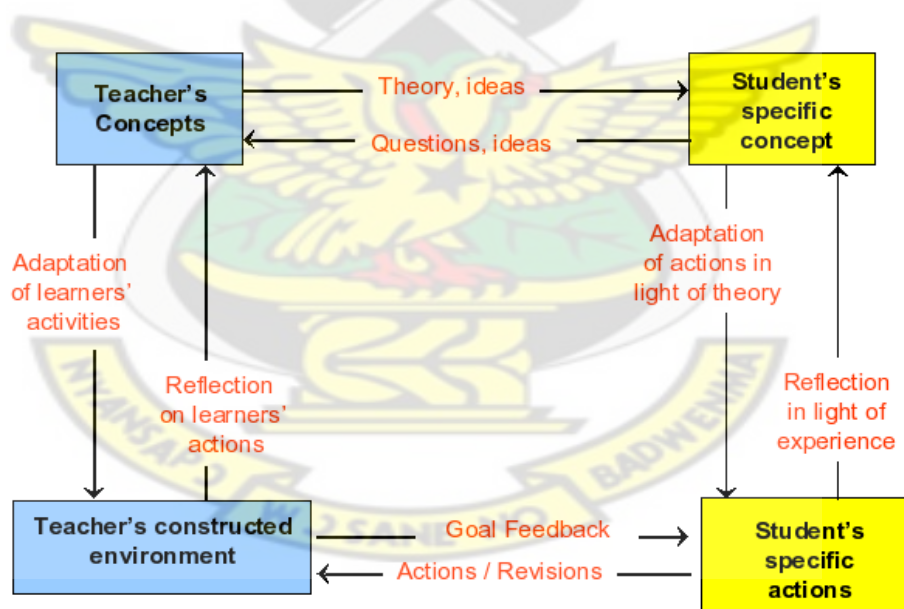


Figure 2.7 Laurillard's Conversational Framework

Source: (Laurillard, 2002)

Atherton (2013) purports that Laurillard's view the pattern of the conversation needs to be:

- The Teacher can set the task goal;
- The Teacher can describe her conception of the subject (or that aspect of it being taught);
- The Learner can describe his conception of it;
- The Teacher can re-describe in the light of the Learner's conception or action;
- The Learner can re-describe in the light of the Teacher's re-description or Learner's action;
- The Teacher can adapt the task goal in the light of the Learner's description or action.

This requires the following features of the teaching-learning system

- The Teacher can set the task goal;
- The Learner can act to achieve the task goal;
- The Teacher can set up the world (control the learning environment) to give essential feedback on actions;
- The Learner can modify his action in the light of feedback;
- The Learner can modify his action in the light of the Teacher's description or his (the Learner's) re-description;
- The Learner can reflect on interaction to modify re-description;
- The Teacher can reflect on the Learner's action to modify re-description.

The conversational frame work presents a new approach, an interactive exchange of ideas between teacher and student that operates on two stages: theoretical and practical level. These stages are joined by each member engaging in the process of adaptation and reflection. E-moderating model states a five-stage process of engaging student's with online communication. It is based on a principle that there things that have to be put in place in order to achieve an effective learning using technology. What is of the essence here is the use of activities, to make students interact with each other and the tutor, rather than only accessing information such as hand-outs and course related material.

Laurillard conversational framework describes the communication process which occurs between the instructors and learners to improve of students' knowledge. Using conversation as the foundation for teaching, the learning relationship becomes more open to both student and teacher. One setback with e-moderating model is that the application of this model to blended learning is narrowed as the face-to-face aspect is left out.

2.14 Challenges of Integrating ICT in Teaching and Learning

Teacher's attitude is the key obstructions for ICT not reaching its full potential in the foundation stage. In theory people have the opinion that the teachers who had not experienced ICT throughout their learning tend to have a negative attitude towards it, as they may lack the training in that area of the curriculum. Another important challenge to using ICT in schools is the fact that computers are expensive (Mohanty, 2011). According to Lewis and Goodison (2004) barriers to development in ICT might be summarised as follows:

Lack of Expertise: in spite of widespread experience, to the contrary many academic staff holds a perception that they must be expert in ICT to make use of its approaches to teaching. While the evidence shows that staff with relatively little training, could quickly attain competence in the basic uses of a virtual learning environment. It is also worth mentioning that, up to date staff training in ICT education has focused more on the technology than on pedagogic issues.

Conflicting Priorities: this is inhibiting for many educators, particularly when they feel the pressure to respond to other priorities, including the need to be research-active. Such difficulties suggest a need for academic leaders and managers to provide clear guidance on strategies for responding to seemingly conflicting priorities in ICT in education.

Middle Management: studies suggest that academic managers may in some cases be one of the possible barriers. While a head of department or dean of School may be a driver for change, they may as controllers of budgets and staff time tables also act as uncooperative gatekeepers for the smooth use of ICTs in education.

Threat to Jobs: some educators are anxious that developments in ICT would reduce the need for lecturers and thus jobs. But educators who incorporate ICT in their teaching offer a strong disproof.

Moursund (2005) explains that ICT creates a number of problems in education, such as digital equity, the need for a relatively expensive addition to a school's infrastructure and how to provide appropriate ICTs for education. ICT in education creates problems of how to deal with potential changes in curriculum content, instructional processes, and assessment in a manner that leads to students getting a better education.

Ayeh (2008) adds that ICT can distract learning. This may be particularly noticeable at home, where internet access could be a source of distraction because of chat rooms or online games, reducing the time spent in doing homework or learning. Thus, the impact of the availability of ICTs on student learning will strongly depend on their specific use. This might reduce the students' abilities in terms of problem solving and creative thinking in predetermined schemes but not their ability to come up with independent creative solutions on their own.

According to Delaney et al. (2010), there is nothing inherent in technologies that bring about improvements in learning, although the process of redesigning a course to adapt the content to technology can improve the course and improve the outcomes. In other words, learning is not caused by technology but by the instructional method embedded in the media.



CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter focuses on the research design used to achieve objectives of the study. It includes detailed information on the research design and approach, population for the study, sample and sampling procedure, data collection instruments and data analysis procedures.

3.2 Research Design

Plomp and Nieveen (2009) opine that a research approach suitable to address intricate problems in educational practice for which no clear guidelines for solutions are available is educational design research (EDR). EDR is perceived as the systematic study of designing, developing and evaluating educational interventions, such as programs, teaching-learning strategies and materials.

Educational design research is also referred to as design-based research or design research. EDR addresses educational problems in real-world settings. In contrast to many kinds of educational research, EDR has two primary goals: to develop knowledge and to develop solutions. Like other research, EDR extends theoretical knowledge through data collection and analysis (Educause Learning Initiative, 2012).

Reeves, McKenney and Herrington (2011) also support the fact that EDR provides a potentially practicable alternative to the kind of research conducted in the field of educational technology. Its objective is to develop creative approaches to solve human teaching, learning and performance problems while at the same time constructing a body

of design principles that can guide future development efforts. Educational design research aims at developing empirically grounded theories through combined study of both the process of learning and the means that support that process (van den Akker *et al*, 2006). Educause Learning Initiative (2012) explained that EDR process is embedded in the development of a solution to the problem being tackled. In the past, EDR has been prevalent among learning scientists involved in fields such as computer-supported learning or collaborative learning but lately, it has been adopted in other fields as well, including teacher professional development and curriculum design.

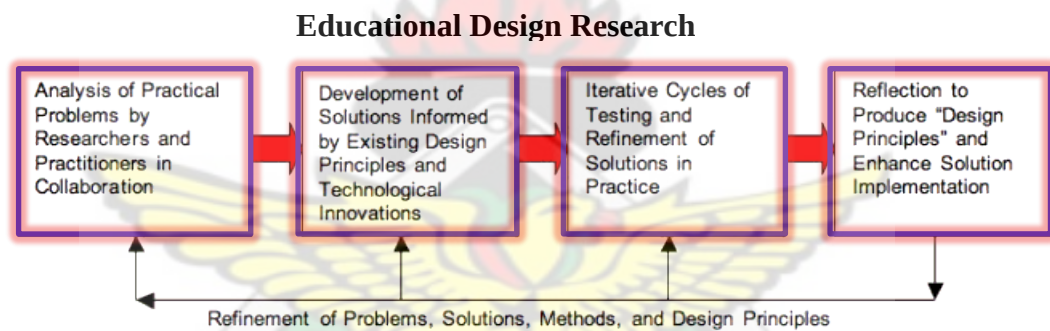


Figure 3.1 Educational Design Research process

Source: (Reeves, 2006)

The researcher therefore employed this approach since the research is addressing an educational problem in practical setting where teaching and learning takes place. The researcher followed the three main phases of EDR by first identifying the technologies accessible to students and lecturers; identify a platform that can factor all identified technologies; educate lecturers and students on how to the use appropriate technologies to deploy instructions and engage students; and evaluate the effectiveness of using the

platform. The researcher also made use of observation, questionnaire and unstructured interviews as instruments for the collection of data.

3.3 Characteristics of Educational Design Research

According to Reeves, McKenney and Herrington (2011), EDR require practitioners and researchers to collaborate in the identification of significant teaching and learning problems. An EDR project could be initiated because a researcher sees an issue that requires attention, such as misleading ideas that obstruct student learning or a teaching repertoire that is ill-suited to certain course goals.

Secondly, EDR engages researchers in the creative activity to develop prototype solutions to teaching and learning problems based on existing design principles. Thirdly, EDR involves the close collaboration of practitioners and researchers in the testing and refinement of both the prototype solutions and the design principles upon which they are based, until satisfactory outcomes have been reached.

Here the researcher was the instructional technologist/designer and the lecturers were the subject area specialist. The researcher noticed how interaction and engagement was impaired in large classrooms and the lecturers concurred that students interacted less in class and due to the large student number it was difficult to interact with all of them. The researcher then helped to plan an activity with the lecturers that would inculcate the hybrid course model which is a combination of online and traditional face-to-face teaching and learning.

Lecturers were educated on how to disseminate assignments, hand-outs and quizzes, students and lecturers were taught how to communicate and interact on the learning

management model (Edmodo) to enhance effective teaching and learning. After the hybrid course model was introduced and experienced, the researcher then evaluated the students and lecturers to test its efficacy.

3.4 Advantages of Educational Design Research

Educational design research is a practical approach to solving real problems in practice and to advancing theoretical understanding as well. According to Collins, Joseph and Bielaczyc (2004), EDR was developed to address several issues central to the study of learning, including the following:

- The need to address theoretical questions about the nature of learning in context.
- The need for approaches to the study of learning phenomena in the real world rather than the laboratory.
- The need to go beyond narrow measures of learning.
- The need to derive research findings from formative evaluation.

Educational design research enabled the researcher to address theoretical questions about teaching and learning in real large classrooms settings and how best it could be practically solved using digital technologies.

3.5 Disadvantages of Educational Design Research

- Data is collected through direct encounters, such as interviews or observations and so it is time consuming.

- Design studies tend to be lengthy and told best in fine-grained detail. This is difficult to do well within the space limitations of most academic thesis.

The researcher directly observed the classes for two weeks and interviewed lecturers as well as other stakeholder. Also the data was described in narrative form which was time consuming.

3.6 Reasons for Adopting Educational Design Research

This research is focused on determining how technology is involved in teaching and learning at undergraduate level at the Faculty of Art-KNUST. There was a need to look at how education works by testing conclusions related to theories of teaching and learning, how technology can be related to student performance, assessment, social interaction, instructional design and content deployment by lecturers. Hence the need to adopt EDR approach for this study because it is a research approach appropriate to address problems in educational practice.

3.7 Population

Yount (2006) opines that population consists of all the possible cases (persons, objects, events) that constitute a known whole. The population for the study was lecturers and undergraduate students who had registered for the 2013/2014 academic year at the Faculty of Art, KNUST Kumasi as Table 3.1 brings to bare.

Table 3.1 Population

Departments	Number of second years	Lecturers
Integrated Rural Art and Industry	228	11
Communication Design	178	13
Painting and Sculpture	101	17
Industrial Art	143	20
Publishing Studies	167	13
Total	817	74

The accessible population for students was second year undergraduate lecturers and students offering core courses because they are usually large classes.

3.8 Sampling

Convenience and purposive sampling were used to select five lecturers because of convenient accessibility and proximity to the researcher and it will enable the researcher to answer the research questions that guided the study. In order to get unbiased representation of the population, proportional stratified sampling design was employed to access the population. The method employed constitutes a population with definite strata; each stratum is distinctively different which makes the strata heterogeneous in nature. Consequently, each category in the population is treated as a stratum.

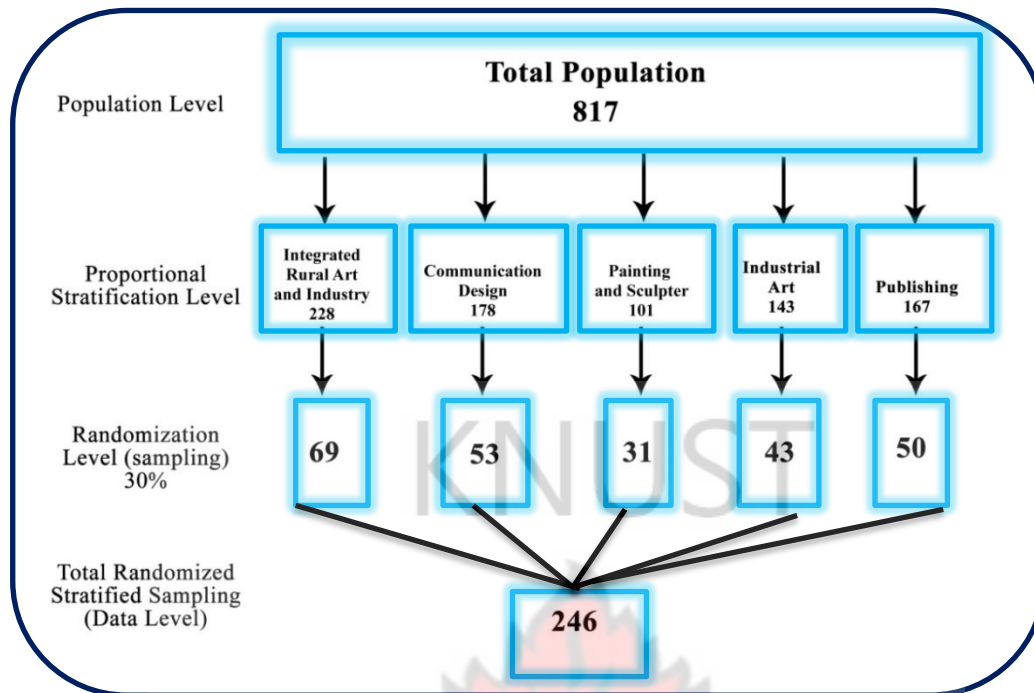


Figure 3.2 Stratification of accessible population for students

Source: Developed by the Researcher

For sample size, it is important to identify a satisfactory sample size for a good representation of the population for study. According to Barton Essel (2011), the larger the sample, the better it is. Barton Essel offered the following guidelines for selecting a sample size:

- For a fewer population less than 100, survey the entire population.
- For a population size is around 500, 50% should be sampled.
- If the population size is around 1500, 20% should be sampled.

Based on the population, the researcher selected 246 undergraduate students, representing 30%, as the accessible population (Figure 3.2) which is buttressed by Annku (2006) who

stated that, the minimum percentage for any major research consideration is 30%. This statement assertively authenticated the sampling and sample size.

3.9 Instrumentation

Hsu and Sandford (2010) refer to instrumentation as the means by which researchers attempt to measure variables of interest in the data-collection process. There are a number of research instruments but considering the nature of the study and the data required, interviews, questionnaire and observation were combined and found to be most suitable for the purpose of triangulation. Guion, Diehl and McDonald (2013) explain triangulation as the use of two or more methods of data collection techniques in a study to increase its validity. In accordance to this, the researcher adopted the use of interviews, copies of questionnaire and observation as means of collecting primary data for the study.

3.10 Data collection

Primary data collected for this study focused on the undergraduate students and lecturers from five selected departments from the Faculty of Arts. The researchers key instrument of data collection were by means of personal interviews, questionnaire, field notes, conversations, on-site visits to the selected departments and observing practical teaching and learning, how course content was deployed and what technologies are available and being used in some classrooms. Secondary data was gathered from books, journals, online documents, published and unpublished thesis, school records and other documents that related directly to the use of technology in teaching and learning.

3.10.1 Questionnaire: The questionnaire was used to collect data from students. It was designed to cover a wide range of open-ended and close-ended questions (Appendix 1A and 1B). It is a two page questionnaire. It was categorized into two main sections; section A and section B. Like most questionnaires, section A started with demographic information such as the person's name, age, gender and department. This is to uncover what groups there are in the population and also to give a complete picture of the characteristics of each of section. Section B dealt with their responses to questions related to the involvement of ICT in the teaching and learning process and its effectiveness. The questionnaire was given to the supervisor of the research, peers, fellow researchers and students who had similar attributes to test its validity and reliability.

3.10.2 Interviews: Brinkmann explained interview as a conversational practice where knowledge is produced through interaction between the interviewer and the interviewee (Academia, 2014). With an interview guide, interviews conducted for the study were informal and in the form of conversations with lecturers. The interviews which were conducted personally by the researcher primarily sought to find out what technologies were available to lecturers, how it is involved in their teaching and learning, their proficiency in using these technologies, if they had knowledge on any learning management system and how they would like to interact with their students.

3.10.3 Observation: According to Kawulich (2005), participant observation has been used in a variety of disciplines as a tool for collecting data about people, processes and cultures in qualitative research. Kawulich further explained that observations enable the

researcher to describe existing situations using the five senses, providing a written photograph of the situation under study. For this research, observation provided the researcher with first-hand information on real situations in the selected lecture halls with reference to the involvement of technologies available and used in the lecture halls. Technologies such as projectors, laptops, smart phones, tablets and iPads, phablet and how they were used in teaching and learning process.

3.11 Ethical Considerations

Permission was sought from the administration of the selected school and the purpose of the research was clearly stated before field work was undertaken. A letter from the Department of General Art Studies was submitted to the school before observations and interaction with pupils and teachers were started.

3.12 Data analysis plan

The data were assembled, analysed, the facts interpreted, conclusions drawn and recommendations made. The details of this will appear in the next chapter (chapter four).

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Overview

This chapter outlines results of the data analysis, provides discussion of research findings and builds bridges between objectives, findings and relevant literature. It reports and discusses the findings on the various technologies available to undergraduate students and lecturers, a system that can integrate the identified technologies in deploying course content and how lectures and students can be trained on using this platform. Also it identifies the effectiveness of the integration of these technologies in teaching and learning at the various undergraduate departments of the Faculty of Art: Integrated Rural Art and Industry (Stratum A), Communication Design (Stratum B), Painting and Sculpture (Stratum C), Industrial Arts (Stratum D) and Publishing Studies (Stratum E).

4.2 Presentation of Findings

Findings were categorized according to Laurillard's conversational framework. The model develops a set of criteria for the judgement of teaching and learning systems, particularly those based on educational technology. In the discussion phase, there is a conversation between lecturers and students whether it is necessary to use digital technologies in teaching and learning. Interaction phase is where the lecturer creates an environment adapted to the learning task given to students. In adaptation phase, lecturers and students were asked if they were conversant with the environment and how productive it was. Lastly reflective phase, students and lecturers have to reflect on the experience; was it productive (did lecturers and students learn anything new)?

4.3 Discussion Phase

4.3.1 Digital Technologies Availability: To answer objective one the digital technologies identified were categorised into two; hardware and software (Figure 4.2). Also, the learning styles of students (Figure 4.1) and lecturers teaching strategies were observed. This helped the researcher meet the learning needs of the students and help lecturers use appropriate technologies to meet instructional strategies. From observation, the lecture method, demonstration method, discussion method and multimedia content (use of projectors and laptop) were the teaching strategies used by lecturers in the classroom. Looking at the Figure 4.1 the dominant learning styles are visual and physical. Meaning students would learn best from visual displays, learn through a hands-on approach, actively experimenting and exploring the physical world around them. Hence the introduction of the blended approach would meet the learning styles of students and the delivery approaches of the lecturers.

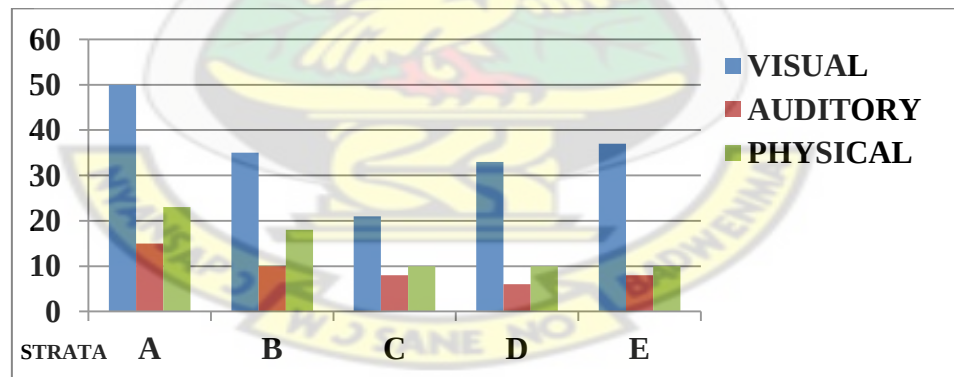


Figure 4.1 Sampled Students Learning Styles

For hardware, the researcher discovered that students use desktop and mobile devices such as smart phones, tablets, Phablet, laptops, desktop Personal Computer and Apple Macintosh. And for software, the social media, open-ended response system, instant messaging and learning management systems (LMS).

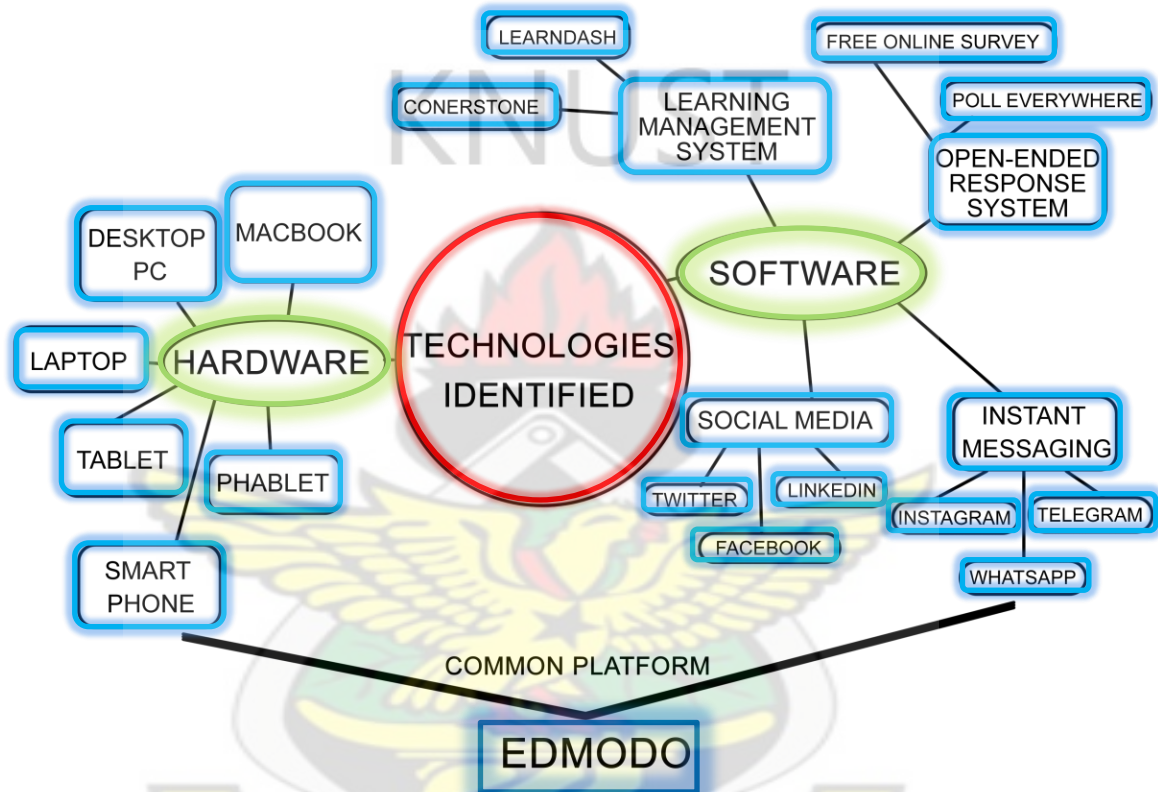


Figure 4.2 Categorisation of Technologies

Source: Developed by the Researcher

Table 4.1 Technologies Available to Students – Hardware

STRATA	Smart phone	Tablet	Phablet	Laptop	Macbook	Desktop PC
A	56	8	1	47		7
B	35	9		33	3	7
C	22	7		26		4
D	24	2		23		9
E	40	5		43	3	6
Total	177	31	1	172	6	33
Percentage	72.2%	12.7%	0.4%	70.2%	2.5%	13.5%

Undergraduate students from the Faculty of Art have available gadgets to access the internet; thus if a virtual environment is introduced they can access it. This is evident that students have familiarise themselves with these gadgets hence lecturers can conveniently engage the students in a virtual environment. Under social media students were on social networking platforms where they interact and share information with course mates and friends.

Table 4.2 Technologies Available to Students – Software

Software	Stratum A	Stratum B	Stratum C	Stratum D	Stratum E	Total	Percentage
Facebook	56	36	27	30	47	196	79.7%
Twitter	29	17	13	20	23	102	41.5%
LinkedIn	3	6	2	3	4	18	7.3%
Instagram	23	18	14	12	19	86	35.0%
Pinterest	0	4	1	3	2	10	4.1%

The common platform available to students were Facebook, Twitter, LinkedIn, Pinterest and others (Skype, Hi5, Tumblr, GooglePlus, Kik, Behance, MySpace, Twoo, Waplog, Circle, Tango, 500px, Path, Vine, Quera, Badoo, Line). For instant messaging, students were on; Instagram, Whatsapp, Viber, ChatOn, Black Berry Messenger and Telegram.

For LMS, two students had heard of Edmodo and Coursera but did not know how to use it. For open-ended response system both lecturers and students had no idea.

4.3.2 Internet Access: students and lecturers need to connect computer terminals, computers, mobile devices and computer networks to the internet, enabling users to access internet services (for example, email and the World Wide Web). Therefore accessibility to the internet was also looked at. From the data collected, students accessed the internet directly connected to local area networks. Others also accessed it using broadband and dial-up access through an internet service provider (Vodafone, Tigo, MTN, Airtel, Glo and Expresso) using a modem.

4.3.3 ICT Proficiency: To make teaching and learning with digital technologies possible, there was the need to evaluate the student's knowledge and proficiency in ICT. Students and lecturers were asked to state how they understood ICT and rate their proficiency ranging from poor to excellent. For understanding of computer software and other applications, 130 students said they were good, 54 ticked neutral, 33 opted for fair and 29 excellent respectively (Figure 4.3).

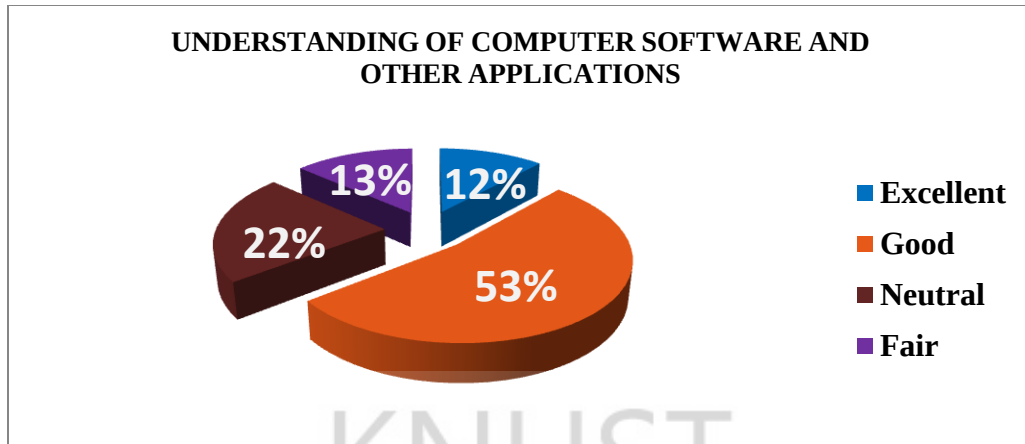


Figure 4.3 Understanding of Computer Software and other Applications

Figure 4.3 shows how students understood the internet and the World Wide Web, 130 students responded good, 28 said neutral, 29 opted for fair and 54 excellent respectively and the rest of the 4 respondents did not respond.

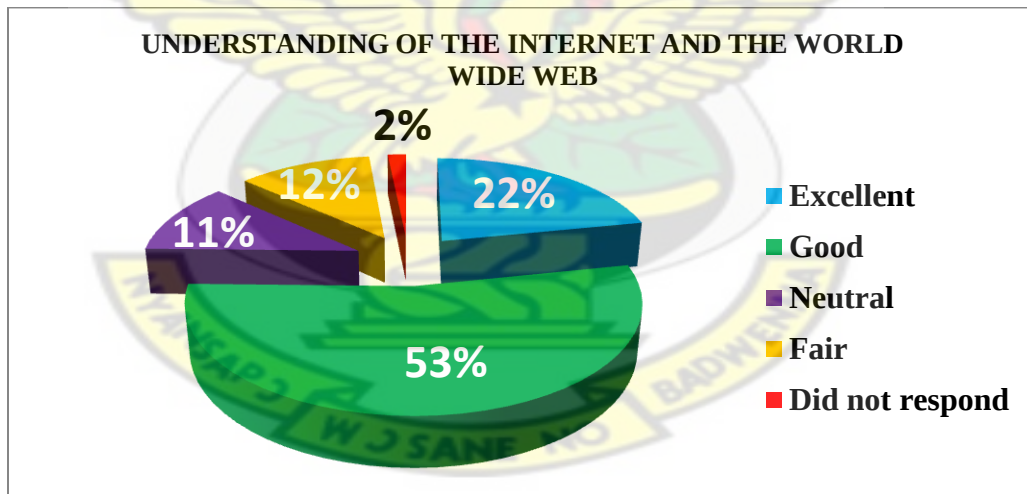


Figure 4.4 Understanding of the Internet and the World Wide Web

Figure 4.4 discloses that, 53% representing the number of students who were good and understood ICT to be using any communication device or application to relay information. Hence, ICT can be used to facilitate teaching and learning because sampled students from the Faculty of Art have a pragmatic knowledgeable of what ICT means.

4.3.4 How the Sample Lecturers access the Internet (What and How)

From the interviews, lecturers had the necessary means to connect to the internet. To access the internet directly, they got connected to local area networks (wired and wireless), dial-up access through the use of modems and broadband.

4.3.5 Technologies available to Lecturers – Hardware

Electronic devices available to lecturers were smart phone, laptop, Apple Macintosh, tablet and desktop Personal Computers. From the interview data all lecturers had smart phones, 3 had tablets, 2 had laptops, one had Apple Macintosh and 3 had desktop Personal Computers.

4.3.6 Technologies available to Lecturers – Software

Interviews conducted revealed that lecturers were in the knowing of what social networking platforms where; they interacted and shared files with colleagues, families and friends. Some of the common platforms were Facebook, Twitter, LinkedIn,

Instagram, Pinterest, Whatsapp and Telegram. From this it is deduced that, if a virtual environment is introduced to enhance teaching and learning, it will not be a difficulty since they are already familiar with social networking platforms and can take advantage of its infinite possibilities. This will enable them to use appropriate social learning platforms to deploy course content and engage students effectively.

4.3.7 How Lecturers understand ICT

Five lecturers were sampled and interviewed for the study. All lecturers were excellent with the understanding of computer software and other applications such as instant messaging. Four responded they had excellent understanding of the internet and the World Wide Web, one responded good. Lecturers also recognised ICT as audio-visuals and the internet that conveys information and processes it using equipment such as computers, projectors, phones, digital camera and smart-board LCD screens. These equipment are used for power point presentations, demonstrations and conducting online examinations for students. Again from the perspective of the lecturers, it is quite clear that, they are inclined with what ICT is all about to some extent. This is encouraging in the sense that if teachers are abreast with ICTs then they can use them to facilitate their teaching.

4.3.8 Students view on including ICTs into Teaching and Learning

Figure 4.5 shows two hundred and fifteen (87%) students support the view that ICTs should be included in the teaching and learning process. Twelve said No, 19 students did not respond. Typically, students are interested in using new technologies like mobile phones, tablets, computers, game computers and social media programs like Facebook, Twitter, YouTube and Flickr. Therefore there is a demand for the creation of tools that enable students to learn according to their current habits, time and at their own pace (Bagarukayo, Weide and Mbarika, 2011). Moreover most students are glued to their laptops and other electronic gadgets preferably to their books.

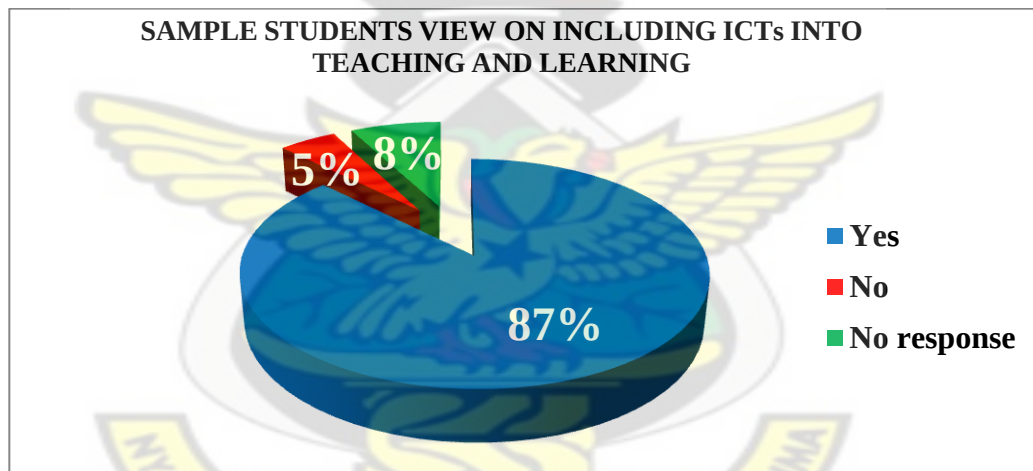


Figure 4.5 Sample Students view on including ICTs into Teaching and Learning

Moreover most students are glued to their laptops and other electronic gadgets preferably to their books. Eighty seven per cent presenting 215 of the students believe that ICTs should be involved in their teaching and learning. They had various suggestions on how it

should be incorporated. The responses retrieved were from students in studio and theory based courses (Table 4.3).

Table 4.3 Response from Studio and Theory based Students on how ICTs should be incorporated into Teaching and Learning

Studio Based Courses	Theory Based Courses
Lecturers should send questions and lecture notes through mails.	Lecture notes, hand-outs, course outline and power point presentations should be put online.
Provision of affordable gargets to students and make internet connectivity available in lecture hall and to access information related to courses.	Lecturers should create blogs to spread information and also for students to access and submit assignments.
Lecturers should use projectors (to project videos, power points, pictures, diagrams, illustrations) and other helping gargets such as stylus to illustrate and personal computers in class.	Lecturers should create and organize online groups for various courses where they can access and grade students works online.
Assignments and other works should be submitted via internet.	By introducing new software and technologies aimed at improving teaching and learning.
Give students equal chance to interact directly with lecturers on social networking platforms.	Making ICT compulsory in the teaching and learning process and hold seminars to explain its importance.

According to Bagarukayo, Weide and Mbarika, (2011), digital media can be used to support learning activities in and out of school in both formal and informal situations. And from the above response from the students, the use of ICTs will provide an audio visual communication that will enrich their knowledge on what is being taught and give a better understanding. Hence, using the internet to source for information in class for discussion will help come into contact with wide and varied source of information about

issues which can help improve student's in-depth understanding of issues in the classroom. The mode of assessments and submission of assignments through the use of ICTs can make things very convenient for the lecturers as well. According to the students, the use of ICTs in teaching and learning will make learning more effective, and accessing information for research and assignments would be easy. On the issue of teaching and learning, social media platforms tend to be more interactive and would enable students to contribute in or outside the classroom from any location.

Instant messaging applications can be used by students to communicate with lecturers and other classmates on course work and submission of assignments without necessarily going to present works to lecturers personally. The researcher believes that these platforms must be used in the teaching and learning environment of undergraduate education to help both lecturers and students work easier, finish quickly and also help to make theories practicable. Information accessing is made easier and faster. Also it helps both students and lecturers to be abreast with new technologies, acquire new skills and improve on them.

4.3.9 Lecturers opinion on incorporating ICT into Teaching and Learning

From interview data lecturers agreed to the fact that ICT has come to stay and it offers many opportunities when it comes to teaching and learning. Comparatively ICT-enabled teaching and learning has an upper hand over the traditional way. ICT offers a variety of learning opportunities beyond the physical limits of school and thus should be included in the teaching and learning process. The reason being that the student population is in height and as such the classrooms should be equipped with:

- projectors to project visuals and power point presentations;
- good sound;
- learning materials should be placed online;
- there should be an electronic means of submitting assignment;
- and internet should be readily made available to students and staff.
- Moreover, the students have acclimatised themselves with these gadgets and social networking platforms on a daily basis.

All the lecturers hold the view that ICTs facilitate and enhance teaching and learning for students understanding. It makes teaching and learning more exciting, interactive, assists in lecture notes sharing from lecturer to students, helps to assess and grade the performance of students and help in lesson preparation. The lecturers stated that the use of ICTs in teaching and learning provides them and their students' easy access to quality information, which provides the ability to clearly explain issues and concepts for better understanding of students and also enables more interactive discussions.

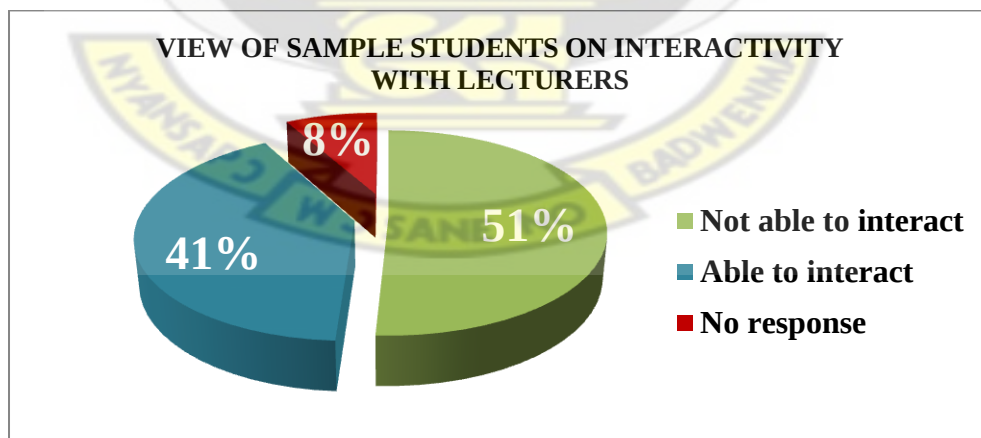


Figure 4.6 Sample Students view on Interactivity with Lecturers

In Figure 4.6, 125 (51%) students said they were not able to interact with their lecturers, 101 (41%) could interact with them and 20 (8%) did not respond. For the 125 students who were not able to interact with lecturers, their responses are as follows:

- lecturers had busy schedules therefore it is difficult seeing them after class;
- others too said the lecturers do not have time for them;
- the students are more than the lecturers so they cannot attend to all of them;
- some do not look approachable and are not friendly with students;
- the majority of them are always in a hurry after class;
- Lecturers are usually not available in their offices when needed by students for clarification on academic work or interactivity.

Other students could not interact with lecturers because they were shy and afraid; others did not see the need and some had no reason at all. What the 101 students; representing 41% of the respondents, meant by interaction was being able to ask questions in class and getting response from the lecturer and visit them in their offices if they had any problem. To interact with the lecturer anytime the need arises, 209 students responded that they would like to have a one-on-one interaction with lecturers, 16 students said they did not want to interact with their lecturers and 20 out of 246 did not respond. The media in which they would prefer included face-to-face in the office, online (Skype, emails), online educational sites, phone conversations, social networking platforms, social blogs and sites for online interaction. 141 preferred face-to-face interactivity and 138 opted for online interaction. More students wanted to interact with their lecturers either by face-to-face or online but for the fact that lecturers are always engaged and have busy schedule they are not able to meet every student. But if a platform is created every student would

have equal opportunity to interact and share information whenever the need arises. Besides anonymity amongst students will be reduced and give students equal access to interact with the lecturer and the lecturer. Also student-student interactivity will also be increased. In this study, the point is not to eliminate face-to-face but to augment it with online teaching and learning approach.

4.3.10 Opinion of Lecturers on Students Interactivity

All lectures responded that they had one-on-one interaction with some of their students in and out of class; they also interact with them online through Whatsapp, Skype, telegram and other social media platforms. They all agreed they would love to have a one-on-one interaction with their students. But due to the student number they cannot attend to them all because they get tired. Two said they only interact with them at their free times. One said after six in the evening there could be no face-to-face interactivity to preserve safety of students.

They all preferred face-to-face interaction with students because it had real impact and that one cannot rely only on online since students can lie. Face-to-face teacher time generally produces better outcomes as compared to only face-to-face or online learning Vega (2013). But due to challenges of getting tired, busy schedules and shyness of some students online is a better alternative.

Another challenge according to the lecturers is that students do not want to talk; one said ‘about 30% only interact in class’ therefore, they would like an online platform to interact so that they can be available to students when the need arises. Online interactivity

appeals to a large number of students because it offers flexibility in participation and convenient (Croxtton, 2014). For this reason two of the lecturers created group accounts on Whatsapp and Telegram respectively to interact with their students and deploy assignments. From the above responses, the lecturers see the need to introduce ICT in the class to boost interactivity, deploy of assignments and course content for students but the appropriate platform has to be used such as social learning platforms where there would be equal access of interactivity with students. All these data was gathered from the interviews conducted for the research.

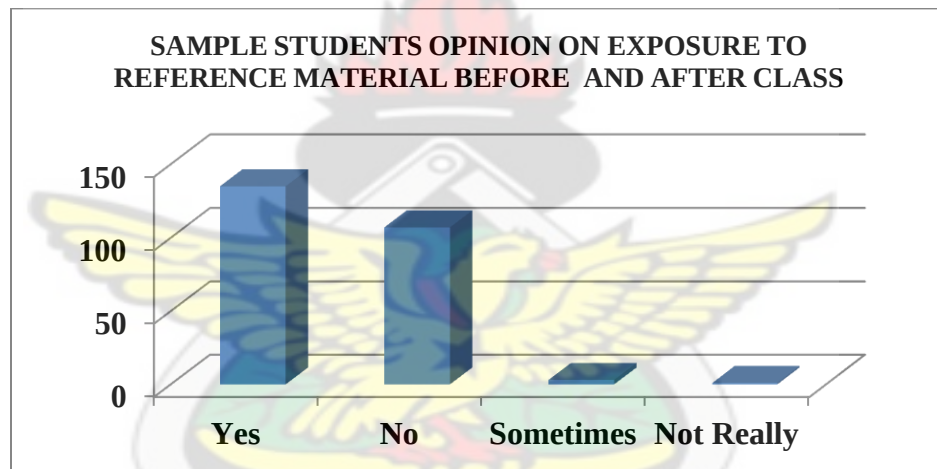


Figure 4.7 Sample Students opinion on Exposure to Reference Material before and after Class

In Figure 4.7, students were asked if they were referred to any reading materials prior to lecture and if exposure to reference materials will boost their interactivity in class. For referral to reading materials 135 students said yes they were referred to reading materials prior to lecture, 107 students said no they were not, 3 said sometimes and 1 said not

really. For exposure to reference materials affecting their interactivity, 170 students said yes it will affect their interactivity in class, 74 said it would have no effect on how they interact in class and 2 said not really.

The above data reveals that most students are referred to reading materials which is good and supports the view that the exposure to reading or reference materials help boost student's interactivity. Pre-reading is a good way to help students prepare for learning in class because students' readiness to learn is an important factor to achieve effective learning (Hwang 2011). Exposure to reference materials boosts interactivity. The reasons being that, most of the time when students do not have knowledge of a study they cannot or will not respond positively to the lecturer but when exposed to it positions the student to ask questions, answer questions and seek for clear explanation in areas not well understood.

It also makes teaching easier thus it makes a lecture interactive and information is shared instead of dictations from the lecturer, it gives a clear idea of what will be taught in class. It facilitates teaching and learning process, serves as a guide for further research and enables students to read ahead of time. Students are of the view that availability of reference materials before class and vice versa save long lecture hours.

4.3.11 Lecturers opinion on Exposure to Reference Material before and after Class

Data gathered from interview revealed that 4 of the lecturers referred students to reading materials prior to class. They also agreed to the fact that exposing students to reference materials improves student's interactivity in class and makes teaching easy. It enables students to ask more questions also. The last lecturer did not give out reading materials

because the students give the impression that they know it all. All lecturers agreed that it will be appropriate to have a way to refer students to important links whenever they find any helpful article online in relation to course content.

4.4 Interaction Phase

To achieve objective two, the researcher had to identify a LMS that can integrate identified digital technologies and train lecturers on how they can use it to boost interactivity and engage students. Interviews conducted revealed that lecturers wanted a platform to combine with the face-to-face system to interact with students and deploy course content.

Out of the 5 lecturers two had taken the initiative to integrate ICTs in their teaching and learning. One lecturer was using Whatsapp to deploy assignments and interact with students. The lecturer grouped the entire class into six different groups and was present in each one of them. The second lecturer also interacted with students and deployed assignments using Telegram but also went by the group system and made enquiries to design a platform or a webpage purposely for interaction, teaching and learning with students.

Telegram and Whatsapp Messenger is an instant messaging subscription service for smart phones. Messages, voice notes, photos, videos, using integrated mapping features and files of all types (Telegram) can be sent to people who are in phone contacts and have these applications installed. For Telegram, groups can be created up to 200 people whereas Whatsapp Messenger can create groups up to 50 people.

Telegram is more secure than Whatsapp because Telegram features two types of chats; ordinary chats that can be accessed from multiple devices and secret chats that can only be accessed from the two participating devices. Messages and media in secret chats have a self-destruct timer that destroys messages after being read. Once the time runs out, the message disappears from both devices and leaves no trace on servers because messages are end-to-end encrypted. Also, secret charts do not allow message forwarding.

Although Telegram and Whatsapp have all these features, they cannot be compared to a learning management system. Telegram and Whatsapp cannot be used to plan, implement and assess a specific learning process. Neither can they provide an instructor with a way to create and deliver content, monitor student participation and assess student performance. In view of this the researcher helped plan an activity (Table 4.4 and 4.5).

The researcher introduced and trained lecturers and students on how to use Edmodo, a platform that can meet instructional strategies and integrate all identified technologies to boost interactivity, teaching and learning hence meeting the needs of undergraduate students and lecturers at the Faculty of Art. Edmodo can be accessed using smart phones, laptops, tablets, phablet, Apple Macintosh and desktop Personal Computer. Also, it is a learning management system that supports open ended response system and a social media platform.

4.4.1 Planning of a Professional Development

Edmodo is a software application used to plan, implement and assess a specific learning process. It provides a safe and easy way for a class to connect and collaborate, share content and access assignments, grades and school notices. Students learning needs were

assessed and lecturers knowledge and skills required to address these needs were identified. The major stakeholders were undergraduate students offering core courses and lecturers at the Faculty of Art. Specific benefit to stakeholders: students and instructors can share ideas and instructors can create a virtual classroom group for students. In this virtual group the instructor can:

- Place digital resources for students to access or download;
- Create polls for students to vote online;
- Lessons can be summarised for students who were absent from class;
- Post assignments;
- Grade students and award badges;
- If a student shares the code outside the class, the instructor can change it without affecting students already joined in the group;
- Instructors can delete inappropriate posts;
- Create a calendar of events and assignments;
- Upload files into the library;
- Each class group is managed and controlled by the instructor.
- In this virtual group students can:
 - Can join the class with access code;
 - Can get help from the entire class;
 - Can take quizzes and turn in or upload assignments;
 - Upload and store files in backpack;
 - Can either communicate with the instructor or the whole class.

Table 4.4 Activity Plan – Lecturers

Department: Lecturer:	Maximum of 2 Hours per day
Objectives	Lesson activities
Create an environment aimed at improving teaching, learning and interactivity.	Sign up to Edmodo and upload an avater.
Create and organise online group.	Generate a code by creating a group.
Lecturer should have a virtual class.	Bring students on board and lock the class after.
Store content material online.	Upload course material into library.
Give quizzes and assignments online.	Create quizzes and assignments.
Assess student performance.	Grade students, create and award badges for motivation.
Boost interactivity and student engagement.	Create posts to encourage interactions, discussions and create polls for students to vote online.
Relay information.	Create alerts and notes.
Collaborate and team up.	Connect with other teachers and communities and interact with the entire class.

Table 4.5 Activity Plan – Students

Department	Maximum of 2 Hours per day
Number of students on role	
Objective	Lesson activities
Join an environment aimed at improving learning and interactivity.	Sign up to Edmodo using group code and upload an avater.
Store content material online.	Upload files into backpack.
Engage students.	Take quizzes, turn in or upload assignments and vote by taking part in polls online.
Relay information.	Create posts, alerts and notes.
Collaborate to boost interactivity.	Join communities and communicate with the instructor or the whole class.

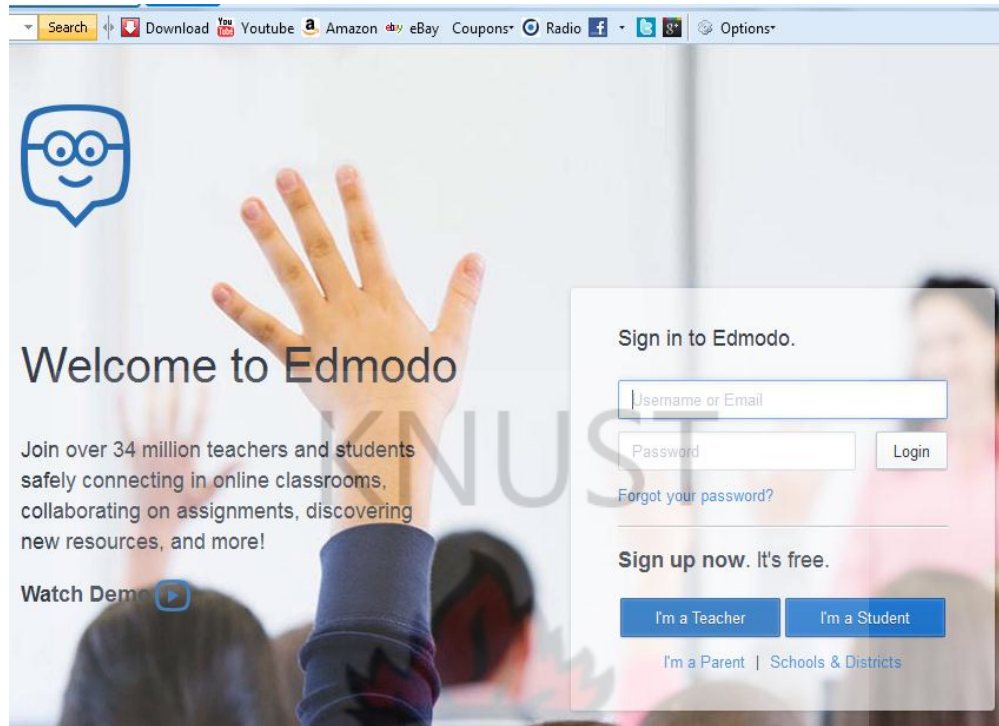


Plate 4.1 Sign up in Edmodo

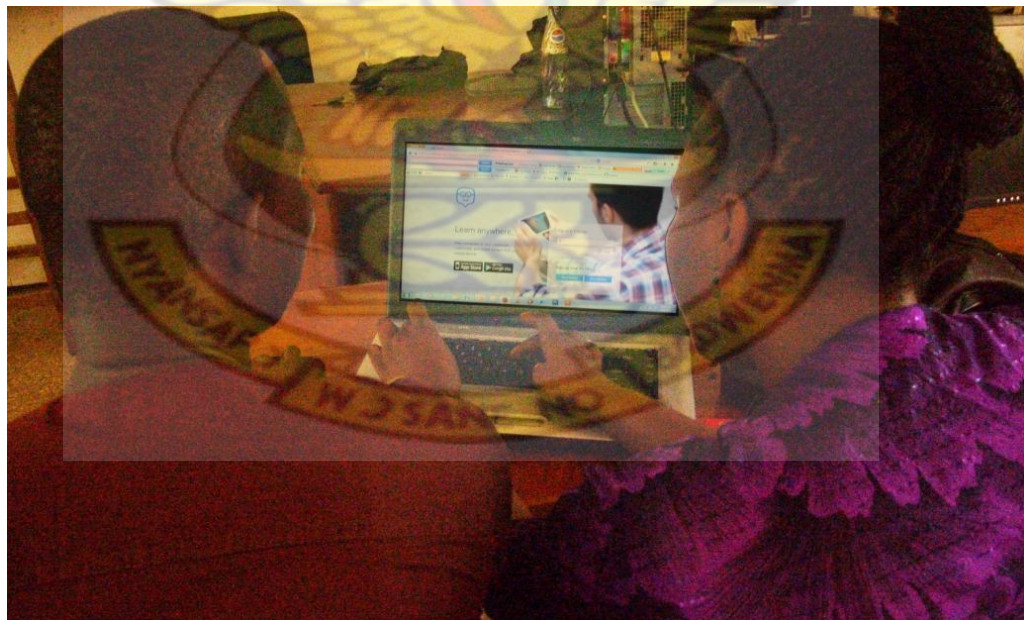


Plate 4.2 Researcher on a one-on-one session with a Lecturer

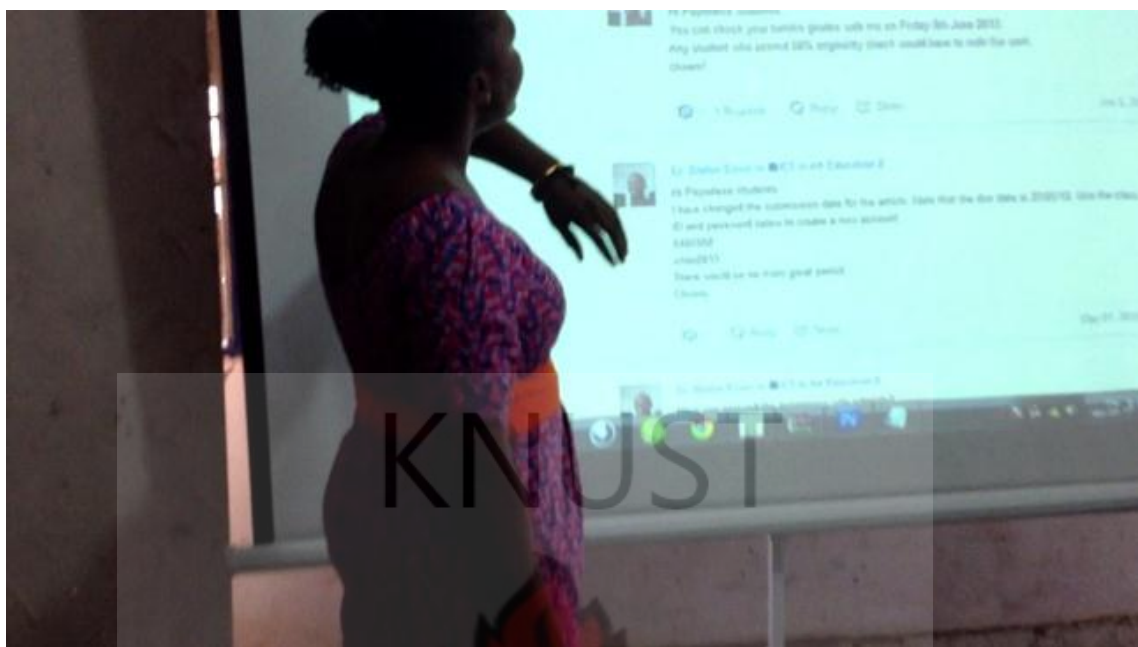


Plate 4.3 Researcher at a workshop training Students on how to use Edmodo (A)



Plate 4.4 Researcher at a workshop training Students on how to use Edmodo (B)

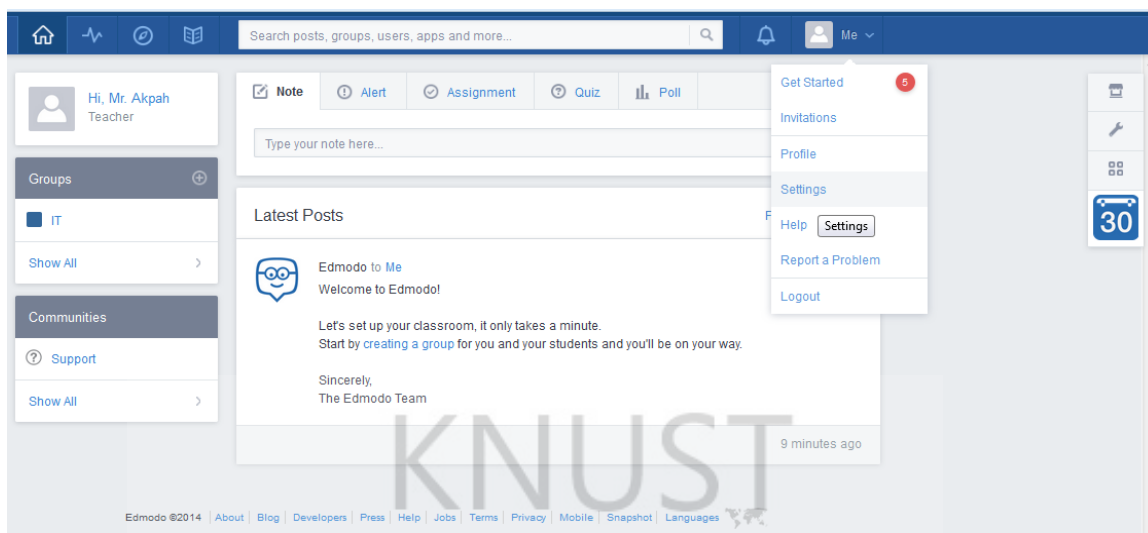


Plate 4.5 Interface of Edmodo

4.5 Adaptation Phase

To evaluate the effectiveness of the LMS, out of the 246 copies of questionnaires administered to students, 229 (93.1%) were retrieved. However, 17 contained missing values. As such, a total of 229 questionnaire representing 93.1% of the total number of questionnaire administered, was used in the analysis (Figure 4.8). All five lecturers were cooperative.

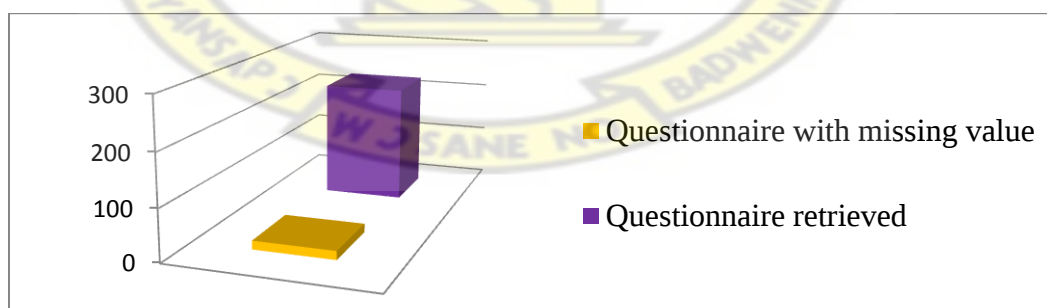


Figure 4.8 Questionnaire administered

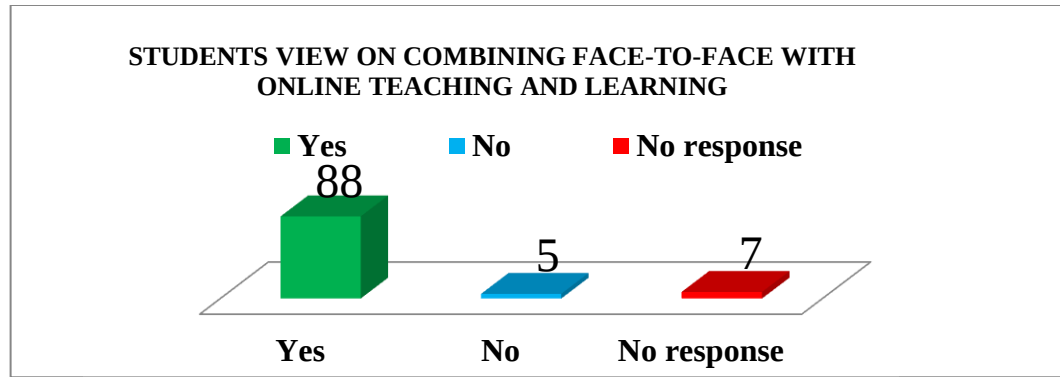


Figure 4.9 Students view on combining Face-to-face with Online Teaching and Learning

In Figure 4.9, students were asked their opinion on combining face-to-face and online teaching and learning 216 (88%) of sampled student population enjoyed it. Their reasons are as follows:

- Innovative and a modern way therefore made teaching and learning interesting;
- Easy interactivity with lectures;
- Great transformation in curriculum and a good step taken;
- Nice experience and encouraged to explore new ways of learning;
- Simple, effective and an improved form of teaching and learning;
- Convenient for both lecturers and students;
- Reduces sitting hours in a traditional classroom so time and energy is saved.

Thirteen (5%) did not enjoy the hybrid class because it was complicated, challenging, not interesting and it forced them to use the internet more than usual.

For the lecturers, they all said it was a revelling experience. They liked the fact that they could blend the two and interactivity and student engagement increased. The reasons were:

- It was convenient and efficient therefore; lecturers should be encouraged to introduce it to students possibly from first year;
- Lecturers and students should be educated on how it improves teaching and learning and more e-learning facilities should be made available to students and lecturers;
- Teaching and learning continued after school, saved time thus should be enforced into tertiary education;
- It helped absent lecturers and favored students (sick, traveled) to be involved making them connected and not disconnected;
- Helped in the application of knowledge and relay of information;
- Encouraged student participation and interactivity therefore reducing anonymity.

Blended courses permit students and lecturers to effectively use the flexibility and convenience of an online course while maintaining the benefits of the face-to-face classroom experience. Also, face-to-face should be combined with online teaching and learning because they complement each other and encourage learning (Abdelmalak, 2013). All lecturers were of the view that, it facilitated and enhanced teaching and learning and made it more exciting, interactive, assists in lecture notes sharing, easy assessing and grading students, helped in lesson preparation. The lecturers said blended learning allowed them to spend less time giving whole-class lessons (Great Schools

Partnership, 2013) teaching and learning was more effective; notes were given online to students prior to lessons which reduced labour and saved time hence increased output.

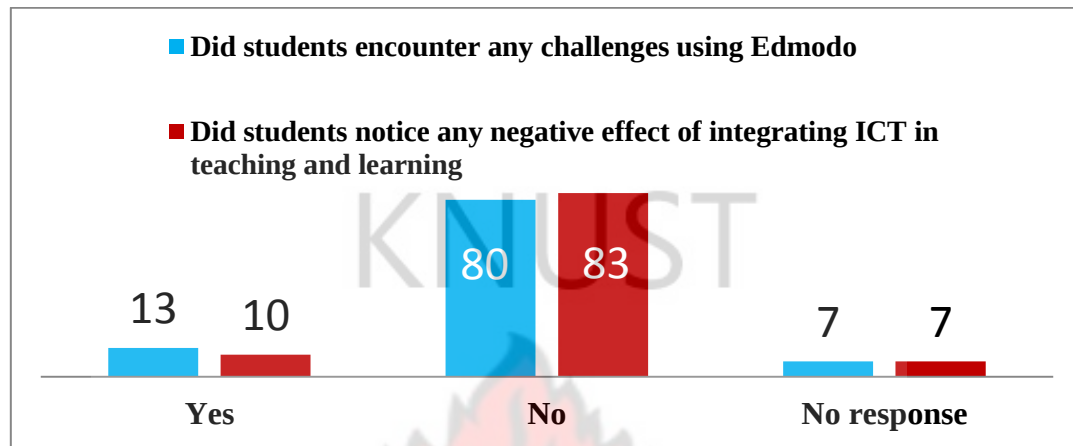


Figure 4.10 Challenges Faced

In Figure 4.10, the blue bars indicate if students encountered any challenges when using the platform. 196 (80%) responded no and the reasons are:

- The interface was simple;
- Interesting and easy to use;
- Availability of good internet;
- The instructions were well laid down therefore making it easy to understand.
- Computer knowledge made it easy to follow prompts and procedures.

Thirty-three (13%) of the student population responded Yes which was expected because it is common to encounter problems when using the internet; problems such as bandwidth. Others had problems logging in because they forgot their user names and password, because students were new to the platform in the beginning, uploading of

assignments was challenging but with time it got better. The challenges got better with time when the students became more familiar with it.

The lecturers responded positively, they said the interface it was no different from facebook and was simple and easy to use. Just like every new system, the lecturers had their fair share of challenges such as grading students and assigning quizzes. When quizzes are set the system automatically marks it and students can see their marks but if it required short answers the teacher has to mark that manually. But as time went on and they continued using it all these problems were addressed and got better but for answering short answers manually is one of Edmodo's defects. The other problems were the normal everyday internet challenges.

The red bars in Figure 4.10 show if students noticed any negative side effects of integrating ICTs in teaching and learning. Twenty-four (10%) students responded Yes and the reason is that it made them lazy; to access the internet was costly and not familiar with the internet made learning difficult. Two hundred and five representing (83%) responded they did not notice any negative side effects but rather it was a revelling and made teaching and learning interesting.

All five lecturers responded that technology in the field of education is a powerful tool and is fast growing so no need to lag behind. They had no negative response to the integration of ICTs in teaching and learning.

4.6 Reflective Phase

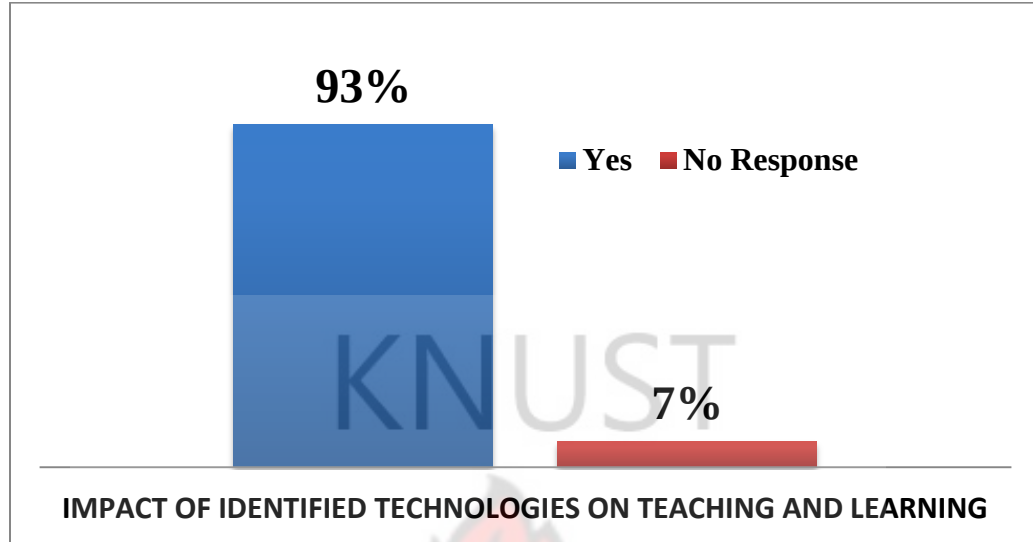


Figure 4.11 Impact of Identified Technologies on Teaching and Learning.

Students were asked if the integration of identified technologies enhanced teaching and learning in anyway. In Figure 4.11, 229 students (93%) responded Yes. Students response about the virtual class were categorised into three sections; acquired skills, improved performance and boost in interactivity (Table 4.6).

Table 4.6 Students response to the Impact of Virtual Class on Teaching and Learning

Acquired skills	Learnt how to take online quizzes ; Submit assignments and attaching documents online; Broadened their scope of learning and teaching.
Improved performance	Improved skills (typing, thinking skills, IT skills, computer knowledge, research, team work and patience, surfing, communication and problem solving) Answering questions in a short time accurately; Increased confidence level in answering questions; Conscious of class activities because had to check online to see if there were new posts and assignments; Made them time conscious and work on schedule in order to meet deadlines; Made work easier in terms of accessing information.
Boost in interactivity	Encouraged students to contact lecturers and other colleagues for clarification when difficulties encountered studying course materials; Made it easy to contribute in class.

Response of lecturers on the impact of virtual class on teaching and learning was:

- Teaching and learning became interesting because it engaged and challenged lecturers with brand new interactive methods;
- Increased collaboration in a sense that lecturers could work and collaborate with other lecturers in other locations and could join online communities in their area of study;
- Gave them and student's opportunity to access the class anywhere and time;
- Improved skills; collaboration, communication, interactivity, valuing diversity and planning.

Lastly one other thing that made the class effective was the awarding of badges to students by lecturers. Although Edmodo has inbuilt badges, a lecturer had the chance to

design one and award to students based on their conduct in and out of the virtual classroom. The badges came with points based on the lecturer's discretion. These badges motivated the students to be homework helpers, present in class always, express ideas, interactive, contribute in class, beat deadlines by submitting assignments on time, study hard to be the best female or male student, overall best student. All these brought about positive vibes in the class which got every student involved because nobody wanted to lag behind.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

The chapter outlines the summary of the study, conclusions drawn from the findings and recommendations.

5.2 Summary

The study aimed at identifying digital technologies available to undergraduate students and lecturers and how these technologies can be used on one platform to enhance teaching and learning at the Faculty of Art. The objectives guiding the research were: to ascertain and analyse the various digital technologies accessible to students and lecturers; and their role on instructional activities; to identify and leverage a LMS (Edmodo) that integrates the identified technologies and train lecturers on how they can use the LMS to deploy instruction to students; and lastly to assess the efficacy of using the integrated LMS identified to deploy instructions and enhance student learning.

Questionnaires, interviews and participant observation were used to collect data for the study from selected lecturers and students. The research involved taking selected students and lecturers through practical training on how to use Edmodo as a blend to the traditional face-to-face to make teaching and learning effective. The literature and this study confirm that ICTs enhance adult teaching and learning. Students and lecturers at the Faculty of Art:

- Have a fair knowledge of what ICTs are about. Students and lecturers have the necessary gadgets to access the internet and are familiar with social networking platforms. Students and lecturers understand computer software and other applications.
- Agreed on the integration of ICTs into teaching and learning because online education for students and teachers is one of the fastest growing trends in education.
- Enjoyed using Edmodo because the interface was friendly and easy to use though there were a few challenges in the early stages.
- Agreed that ICTs engage and challenge students with new and interactive methods.
- Agreed that it improved their skills; digital communication and learning, teamwork, mobile learning, listening, meeting schedule, planning, typing, self-direction, global awareness, information search, etc.
- Agreed the traditional face-to-face be blended with online education since students can work and collaborate with people in other locations and at times outside classrooms.

5.3 Conclusions

It is evident from the research that both undergraduate students and lecturers at the Faculty of Art are knowledgeable about ICTs. Selected lecturers who teach undergraduate students at the faculty are using LMS platforms in teaching and learning.

Besides, not all lecturers have mastery over the identified technologies. This is so because most of these gadgets like sophisticated projectors, phones, smart-board flat-screens, cameras and learning platforms such as Moodle and the like are a bit complicated, hence the lecturers need training to equip them for teaching and learning.

Power failure and unreliable internet access are some of the challenges being faced by students and lecturers in the use of ICTs as a teaching and learning tool. Aside this, the use of the identified technologies in teaching and learning is helping undergraduate students at the Faculty of Art KNUST to make effective improvements in their academic work. The identified technologies have become convenient platforms for both undergraduate students and their lecturers at the Faculty of Art in terms of teaching, learning, interacting and assessments.

Information and communication technologies and blended learning offers opportunities to raise educational standards in schools. Involvement of teachers and students is important and departments will need funding and training. There is the need for direct focus on more professional teacher development.

5.4 Recommendations

The following recommendations can be implemented:

- Lecturers and students must be well trained by the Faculty of Art on how to use ICT gadgets and platforms to facilitate teaching and learning of undergraduate education. Effective training should be provided at a steady stream for educated and experienced personnel capable of guiding future activities involving the

system. Technical staff must be well motivated and adequately supported to maintain an effective teaching and learning environment.

- Currently, the University is reliant on the national electricity grid which provides electricity to the entire University which the Faculty of Art is not an exception. Hence the researcher recommends the faculty should to have its own standby plant as an alternative when electricity power goes off. This is to ensure that lecturers and students can access the ICT platforms for effective teaching and learning.
- To enhance a successful teaching and learning with ICTs, the Faculty of Art could go into partnership with private Internet service providers to support students on and off campus.
- Also, for easy accessibility to the internet, access points should be increased and placed at vantage areas within the faculty.
- For the teaching and learning process the study boosted interactivity, skill was acquired, performance was improved and students took control over learning. Hence continues research in relation to issues in education (teaching and learning process) is necessary, given the volatile and ever-changing nature of modern technology further studies should be done to keep up with the new technologies that will show up in the future.
- Finally, it takes the right leadership at both the national and institutional levels to recognize and treat ICT as a priority in developing a successful learning and teaching environment. Everybody must appreciate the value of ICT and commit to its use. The academic board should be responsible for the development and

implementation of ICTs tools for effective teaching, learning and academic research. Leaders must see ICT as a resource that can improve educational delivery in higher education nationally and worldwide.

KNUST



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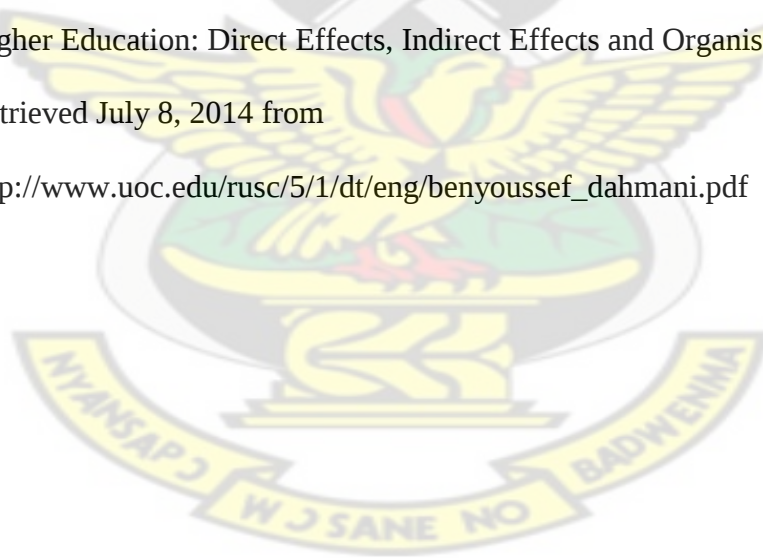
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APPENDIX

APPENDIX 1A: INTERVIEW GUIDE ON TECHNOLOGY-ENHANCED TEACHING AND LEARNING: A CASE OF THE FACULTY OF ART IN KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY supervised by Dr. Harry Barton Essel. This is to seek information from lecturers on the view of integrating Information and Communication Technology in teaching and learning at the undergraduate level in the Faculty of Art-KNUST.

SECTION A

Department..... Gender: Male [] Female []

Which of these age range do you belong?

31-40 [] 41-50 [] 51-60 [] Other (Please Specify) []

SECTION B

Please rate your proficiency in Information and Communication Technology:

	1	2	3	4	5
	Poor	Fair	Neutral	Good	Excellent
Understanding of Computer Software and other applications					
Understanding of the internet and the worldwide web (WWW)					

How do you access the Internet (on and off Campus)

.....

Tick the device(s) you own

Smart phones	Tablet	Phablet	Laptop	Macbook	Desktop PC

Other (Please Specify).....

Which of these social network platforms are you familiar with?

Facebook	Twitter	LinkedIn	Instagram	Pinterest

Other (Please Specify)

Do you have knowledge of any learning management systems? if no [] If yes state.....

Do you think ICT should be involved in the teaching and learning of courses for undergraduate programmes in the college? YES [] NO [] If yes how? If no why

.....

.....

Are you able to have one-on-one interaction with your students? YES [] NO [] If
yes how? If no why

.....

.....

Would you like to have one-on-one interaction with your students anytime the need be?
YES [] NO [] If yes how? If no why

.....

.....

How would you prefer to interact with your students?

Face to face	Online

Please rate your skills in the following domain:

	1	2	3	4	5
	Poor	Fair	Neutral	Good	Excellent
Social Media Platforms such as Facebook, Twitter, LinkedIn, Instagram and Pinterest					

Emailing Services - gmail, Hotmail, livemail, ymail, rocketmail and yahoomail					
---	--	--	--	--	--

Which of these emailing services do you subscribe to?

Gmail	Hotmail	livemail	ymail	rocketmail	yahoomail

How often do you check your emails inbox?

Once a day [] More than twice a day [] Once a week [] Twice a week []

Other (Please Specify).....

Do you refer any reading materials to your students prior to lecture? YES [] NO []

Do you think the exposure of reference materials before class and vice versa affect the
interactivity of your students in class? YES [] NO [] If yes how? If no why

.....
.....

APPENDIX 1B: QUESTIONNAIRE ON TECHNOLOGY-ENHANCED TEACHING AND LEARNING: A CASE OF THE FACULTY OF ART IN KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY supervised by Dr. Harry Barton Essel. This questionnaire is to seek information from undergraduate students on the view of integrating Information and Communication Technology in teaching and learning at the Faculty of Art-KNUST.

SECTION A

Department..... Gender: Male [☐] Female [☐]

Which of these age range do you belong?

16-20 [☐] 21-30 [☐] 31-40 [☐] 41-50 [☐] Other (Please Specify) []

SECTION B

Please rate your proficiency in Information and Communication Technology:

	1	2	3	4	5
	Poor	Fair	Neutral	Good	Excellent
Understanding of Computer Software and other applications					
Understanding of the internet and the worldwide web (WWW)					

How do you access the Internet (on and off Campus)

.....

.....

Tick the device(s) you own

Smart phones	Tablet	Phablet	Laptop	Macbook	Desktop PC

Other (Please Specify)

Which of these social network platforms are you familiar with?

Facebook	Twitter	LinkedIn	Instagram	Pinterest

Other (Please Specify).....

Do you have knowledge of any online educational platforms? If yes state,

if no [].....

Do activities in the lecture hall distract you? YES [] NO []

If yes state the activity and how it distracts you?

.....

.....

Do you think ICT should be involved in the teaching and learning of courses for undergraduate programmes in the college? YES [] NO [] If yes how? If no why

.....

.....

Are you able to have one-on-one interaction with your lecturer? YES [] NO [] If yes how? If no why

.....

.....

Would you like to have one-on-one interaction with your lecturer anytime the need be? YES [] NO [] If yes how? If no why

.....

.....

How would you prefer to interact with your lecturer?

Face to face	Online

Please rate your skills in the following domain:

	1 Poor	2 Fair	3 Neutral	4 Good	5 Excellent
Social Media Platforms such as Facebook, Twitter, LinkedIn, Instagram and Pinterest					
Emailing Services - gmail, hotmail, livemail, ymail, rocketmail and yahoomail					

Which of these emailing services do you subscribe to?

Gmail	Hotmail	livemail	ymail	rocketmail	yahoomail

How often do you check your emails inbox?

Once a day [] More than twice a day [] Once a week [] Twice a week []

Other (Please Specify).....

From the categories below how best do you learn?

Visual (You prefer using pictures, images and spatial understanding.)	Auditory-musical (You prefer hearing sound or music.)	Physical / kinaesthetic (You prefer using your body, hands and sense of touch.)
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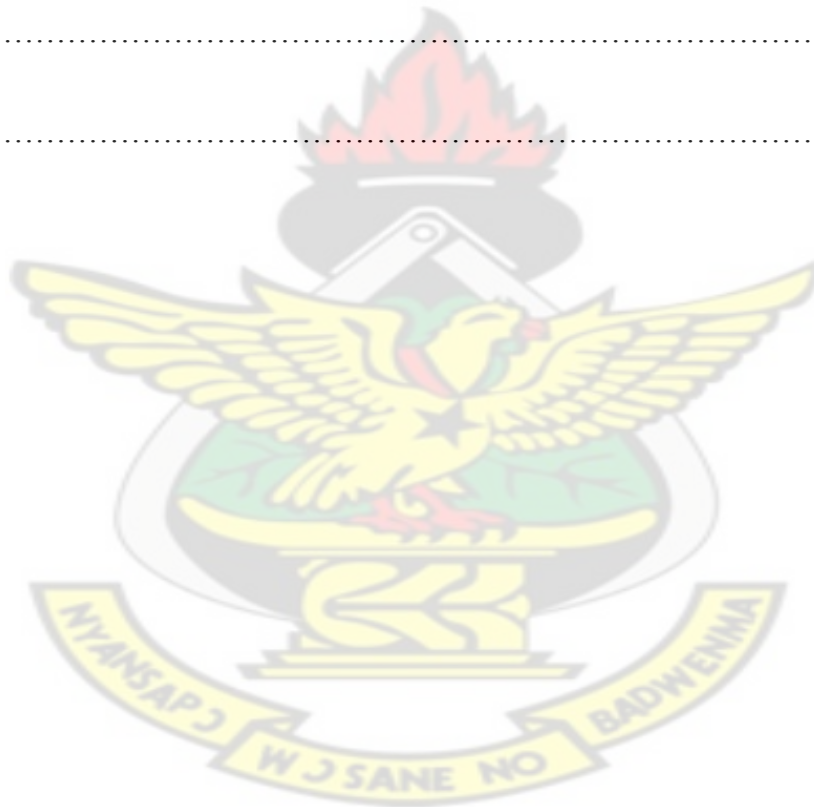
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Are you referred to any reading materials prior to lecture? YES [] NO []

Will the exposure of reference materials before class and vice versa affect your interaction in class? YES [] NO [] If yes how? If no why

.....

.....



APPENDIX 1C: QUESTIONNAIRE ON TECHNOLOGY-ENHANCED TEACHING AND LEARNING: A CASE OF THE FACULTY OF ART IN KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY supervised by Dr. Harry Barton Essel. This questionnaire is to seek information from undergraduate students on the view of how effective blending Information and Communication Technology to the face-to-face lecturing and deploying course content was at the undergraduate level of the Faculty of Art-KNUST.

SECTION A

Department..... Gender: Male [☐] Female [☐]

Which of these age range do you belong?

16-20 [☐] 21-30 [☐] 31-40 [☐] 41-50 [☐] Other (Please Specify) [☐]

Did you enjoy the hybrid system of teaching and learning employed by your lecturer this semester? (Combining face to face and online teaching and learning)

.....
.....

How did you find the use of Edmodo for teaching, learning and deploying course content?

.....
.....

Did you encounter any challenges using Edmodo? YES [] NO [] If yes how? If no why

.....

.....

What are some of the things you have learnt from your colleagues' contributions through the use of the Edmodo platform?

.....

.....

What are some of the skills you have acquired through the use of the Edmodo application?

.....

.....

Do you think there is a need to adopt the hybrid or blended learning system to supplement the face-to face lectures only? YES [] NO [] If yes how? If no why

.....

.....

What do you think can be done to improve the system of blended learning?

.....

.....

Has the integration of ICT in instructional delivery improved or enhanced your learning in anyway?

.....

.....

Have you noticed any negative side to the integration of ICT in teaching and learning of your courses?

.....

.....



APPENDIX 1D: INTERVIEW GUIDE ON TECHNOLOGY-ENHANCED TEACHING AND LEARNING: A CASE OF THE FACULTY OF ART IN KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY supervised by Dr. Harry Barton Essel. This is to seek information from lecturers on how effective blending Information and Communication Technology to the face-to-face lecturing and deploying course content in at the undergraduate level of the Faculty of Art-KNUST.

SECTION A

Department..... Gender: Male [☐] Female [☐]

Which of these age range do you belong?

31-40 [☐] 41-50 [☐] 51-60 [☐] Other (Please Specify) []

Did you enjoy the hybrid system of teaching and learning employed by your lecturer this semester? (Combining face to face and online teaching and learning)

.....
.....

How did you find the use of Edmodo for teaching and deploying course content?

.....
.....

Did you encounter any challenges using Edmodo? YES [☐] NO [☐] If yes how? If no why

.....

.....

What are some of the things you have learnt through the use of the Edmodo platform?

.....

.....

What are some of the skills you have acquired through the use of the Edmodo application?

.....

.....

Do you think there is a need to adopt the hybrid or blended learning system to supplement the face-to face lectures only? YES [] NO [] If yes how? If no why?

.....

.....

What do you think can be done to improve the system of blended learning?

.....

.....

Has the integration of ICT in instructional delivery improved or enhanced your learning in anyway?

.....

.....

Have you noticed any negative side to the integration of ICT in teaching and learning of your courses?

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KNUST

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OBSERVATION CHECKLIST

Department

Lecturer

Date

Time

1. What kinds of technologies were present? If yes how were they used?
2. Was there any link between learning session and previous one?
3. Was the lesson clearly presented and explanations readily understood by students?
4. Were examples related to students' knowledge and interests?
5. Did the lecturer make use of hand-outs?
6. Were audio/visual aids used and were they helpful in conveying the subjects matter and developing understanding?
7. Was the lecturer clearly heard by all students and did lecturer have command over class?
8. Did the lecturer keep to time?
9. Did lecturer have command over subject matter?
10. Did the lecturer present the material in a lively and enthusiastic way and was students' interest in the subject matter sustained or heightened?
11. Did the lecturer facilitate interaction?
12. Were there opportunities for questions or comments and for students' interests, concerns or experience to be drawn upon?
13. Did the lecturer attempt any innovations? In what ways were they successful?
How could they be improved?