UNIVERSITY OF EDUCATION, WINNEBA

ASSESSING THE IMPACT OF E-LEARNING ON STUDENT ACADEMIC PERFORMANCE USING DELONE AND MACLEANS INFORMATION SYSTEM SUCCESS MODEL

DAVIS ASIEDU

A dissertation in the Department of Information Technology Education, Faculty of Technology Education, submitted to the school of Graduate Studies in partial fulfilment of the requirements for the award of the degree of Master of Science (Information Technology Education) in the University of Education, Winneba

AUGUST, 2022

DECLARATION

STUDENT'S DECLARATION

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

SIGNATURE: ……

DATE: ……

SUPERVISOR'S DECLARATION

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

DR. SAMUEL ADU GYAMFI

SIGNATURE: ……..

DATE: ……

DEDICATION

To my wife Comfort Oforiwaa and Children, Liss Davis-Asiedu and Chloe Davis-Asiedu

ACKNOWLEDGEMENT

I would like to express my profound appreciation to my supervisor, Dr. Samuel Adu Gyamfi for his great mentorship and immense guidance through the dissertation process. Doctor May the Almighty bless you.

And to all the lecturers of Information Technology Education department of the College of Technology, Kumasi, I say " thank you" for your wonderful contribution to making this program a success.

I also wish to acknowledge the assistance I received from the headmistress, staff and students of Methodist Girls High School, Mamfe where I conducted the research.

To all MSc. ITE students, Course rep. Solomon, I acknowledge your contributions and say thank you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ICT Information and Communication technology

SHS Senior High School

MOOC Massive Open Online Course education technology

SPSS Statistical Package for Social Sciences

ISS Information System Success

E-Learning Electronic Learning

CRDD Curriculum Research and Development Division

ABSTRACT

The purpose of this dissertation is to use Delone and McLean's Information System Success Model to assess the impact of e-learning on the academic performance of students of Methodist Girls' High School in the Akuapem North Municipality.

The study focused on the constructs of intention to use/use, user satisfaction, system quality, information quality, Service quality and net benefit of the earmarked learning environment. The research also reflects the views of the core subject teachers in the above-mentioned school using the constructs of the Delone and McLean's ISS model to analyse students' and teachers' views on the impact of e-learning on students' academic performance. The study adopted case study design with both quantitative and qualitative methodologies. Participants of the study included the ten core subject teachers and one hundred and fifty students from Methodist Girls' senior high schools who were selected using cluster sampling and Simple random sampling respectively. Questionnaires and tests were used as the main instruments for primary data collection. The study revealed that students have the intention to use e-learning facility in a blended environment in order to enhance extensive knowledge acquisition. However, these academic needs have not been addressed due to lack of some essential components to access the service and also partly due to the rigid nature of the school's timetable. The study recommends that all stakeholders must get actively involved in approving the right e-learning contents and systems for use, those that reflect our unique educational needs as a country.

CHAPTER ONE

INTRODUCTION

1.0. Introduction

The introduction of this work gives brief details of the background to the study, the statement of the problem, the purpose and significance of the study. It also briefly looks at the research questions and limitations and delimitations of the study as well as the organization of the study.

1.1. Background of the Study

E-learning can be defined as a dynamic and immediate learning environment through the use of internet to improve the quality of learning by providing students with access to resources and services, together with distant exchange and collaboration (Jeong & Hong, 2013).

E-learning has become more widely adopted in Africa through the increasing availability of MOOC and the latest educational apps and distance education courses which once seemed impossible is now becoming available (Ghanaweb, 2017). Its implication for Ghana is that e-learning is becoming increasingly popular in Africa and Ghana cannot be left out of this important educational transformation.

Research has shown that implementing any single theory of learning may not be a definitive method to achieving a meaningful result (Sarfo, 2007). There is therefore the need to transform the traditional way of learning to include more modernized way of accessing information in order for our educational system to remain relevant in this modern time as well as being responsive to our current societal needs.

On the main driving force behind the adoption of e-learning, Zhang et al asserts that the changes in learning needs and technology are powering an evolution in modern

education in the era of the Internet since new economy requires more and more people to learn new knowledge and skills in a timely and effective manner (Zhang, Zhao, Lina, & Nunamaker, 2004).

A survey conducted by (Yeboah, Dadzie, & Owusu-Ansah, 2017) to explore the information literacy skills of secondary school students in Ghana with specific focus on students' abilities in finding and evaluating information, the findings revealed that students in the selected schools lack the ability to effectively access information for their academic work. The study also revealed that students in the participating schools lack the basic skills to differentiate good information from bad ones. This finding from the above survey is a true reflection of the situation in some Senior High Schools in Ghana since students have not been well introduced to the culture of online information access.

Students of this day are "digital natives" and as a result of this global environment and their interaction with it, today's learners reason and assimilate information basically differently from generations before them (Mason & Rennie, 2008). This means that using the traditional learning methods alone cannot appeal to the learning needs of these groups; students of today indulge in a lot of online activities from social media to online shopping which are entirely different from the way things were done in the past.

In finding out about successive governments' commitment to the adoption of e-learning in Ghanaian Senior high schools, it was revealed that in 2016, the minister of education reiterated the government's quest to provide 240 e-learning laboratories to aid 240 selected Senior High Schools across the country (Ghanaweb, 2016). In June 2018, the government of Ghana supplied e-learning resources to some public senior high schools as part of the government's e-learning project in which students learn through a link, one of the schools to benefit from such project is Nkoranman Senior High School in the

Tain District of the Brong Ahafo Region (Modern ghana, 2018). This is a clear indication that the government has seen the need to integrate e-learning into our educational system. However, the slow pace of its implementation puts some schools ahead of others in the field of e-learning.

The Methodist High School started in 1984 with the following courses: General Arts, Technical and Business. The school was absorbed by the government into the public system as a day school with hostel facilities and later converted to Girls' School in 2003(Students handbook/prospectus, n.d.); the school's learning environment just like many public Senior High Schools has been without any supplementary or alternate source of learning. In 2017, an e-learning center was set up in the school to play a supplementary role in the way students learn; the school can also boast of a computer laboratory but none of these facilities is being used to provide other learning sources to students; the ICT laboratory doesn't have any internet connectivity and the e-learning center has nothing more than a 32inch TV set and DSTV subscription. In view of the above insufficiencies, students only go to the ICT laboratory during ICT lesson while the e-learning center is used as examination hall or a venue for club meetings.

1.2. Statement of the Problem

"It is expected that the knowledge and skills gained in the ICT course will help students to use ICT in almost all their courses at school" (Curriculum Research and Development Division, 2010, p. ii). The CRDD made this assertion in view of the fact that the world has become a global village where the use of information and communication is eminent.

Despite the numerous benefits derived from modern way of receiving instruction or accessing information, students of Methodist Girls' High School are handicapped in the way they access supplementary information for their academic work. These observations were made during the researcher's work as a teacher in the above-mentioned institution, students learn through the traditional face-to-face means with the school's under-resourced library being the only source of additional information.

Students are mostly seen using teachers' smartphones to have access to internet services for completing their assignments while students who are not confident enough to approach their teachers for such requests, make a duplicate of the work done by these students.

These observations prompted the use of William H. DeLone and Ephraim R. McLean's information system success model which was first introduced in the year 1992 to assess the impact e-learning is likely to have on students' academic achievement of students of Methodist Girls' High School.

1.3. Purpose of the study

The purpose of the study is to find out whether the provision of e-learning services in schools will have any effect on students' academic performance. This was to enable me find out if any significant impact can be measured using the six dimensions of Delone and McLean's IS success model namely; service quality, information quality, intention to use, system quality, user satisfaction, use and net benefits. The outcome of this study would be used to make recommendations for possible full implementation.

1.4. Objectives of the Study

The specific objectives of the study are:

- To assess students' level of readiness and the impact it has on the e-learning setup.
- To assess the impact of e-learning on the academic achievement.
- To measure the extent to which students are satisfied with their current instructional strategy.

1.5. Research Questions

- To what extent will students' level of readiness affect the e-learning situation?
- To what extent will the use of e-learning influence students' academic achievement?
- To what degree is students' satisfaction with the current instructional strategy?

1.6. Significance of the Study

A whole lot of importance can be attributed to this study/research. Below are some of the significances of this study:

In the first place, the study would help teachers of the various subjects to be aware of the impact that e-learning has on the performance of students so that they can facilitate the learning process in their subject areas effectively.

Secondly, the study would be beneficial to the PTA and the Ministry of Education or the Ghana Education Service in formulating relevant policies on provision of e-learning resources in Senior High Schools.

Finally, it will also expose students to other learning conditions that are available to them. Students would be able to identify and select learning conditions that are likely to produce a positive outcome since the learning pace is determined by the learner in the e-learning environment.

1.7. Limitations of the Study

The current study highlights a number of limitations. Firstly, the study did not include all the important areas of e-learning but only focuses on the e-learning activities that influences students' academic performance. Future comprehensive studies may include other modernized ways of electronic learning and provision of reliable internet services in the institutions involved.

Secondly, the existing double track system in Ghanaian senior high school system made it extremely difficult for the researcher to include other year groups in the study since all student may not have the same academic calendar. Therefore, it is hoped that future research may additionally focus on how to use modern software technologies to reach off-campus students and include them in the study.

1.8. Delimitation

The research could have covered the whole of the Akuapem-North Municipality but the researcher limited it to only Methodist Girls Senior High schools in Akuapem-North Municipality of the Eastern Region in order to be able to provide a reliable and affordable internet services for the period of the study.

1.9. Structure of the Study

The report of the research is in five chapters. Chapter one is the introduction. The introduction consists of the background to the study, statement of the problem, purpose of the study, research questions, significance of the study, limitation, delimitation and structure of the study.

Chapter two describes literature review which used theoretical and empirical studies, which deals with other personalities view about the problem under study. Literature on the role of different factors in students' academic performance including the school environment, home and community, teacher, education administration and students-related variables have been reviewed.

The third chapter highlights the methodology that was employed to collect the data for the study. The methodology includes the research design, population, sample and sampling techniques, sampling procedure, and technique for data collection and instrumentation. Chapter four describes the results/findings as well as discussions.

Finally, the fifth chapter summarizes, concludes and gives recommendations for the study/research undertaken.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This section reviews literature on e-learning and its underlying factors. In the first part of this chapter, the concept of e-learning is defined and its scope described. This was followed by the relationship between e-learning and academic performance as well as students' level of readiness, and socio-demographic features of students. Though an attempt is made in this chapter to review some of these factors under the aforementioned headings, it must be reiterated that most of these factors are closely related.

2.1. Theoretical Framework

The emphasis of this study is built upon the connectivism theory of learning, and how learners gain knowledge differently through technology or the internet. Since an information system is a key component in e-learning, the updated Information system success theory/model by Delone and McLean was used to evaluate the learning systems.

2.1.1 Connectivity theory

Educators adjusting to new learning environments may turn to learning theories to serve as a guide to them. If existing theories no longer fully or only partially explicate learning in these contexts, new theories need to be established. These may take its basis from existing theories without neglecting them or totally replacing present theories. "Connectivism is one of the most prominent of the network learning theories that have

been developed for e-learning environments" (Goldie, 2016, p. 1). Commenting on why there is the need to adopt a new learning theory of this digital age, (Siemens, 2004) states that behaviorism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments. These theories, however, were established in a time when learning was not impacted through technology. Over the last two decades, technology has modernized how we live, interact, and acquire new knowledge.

Inasmuch as Connectivism has come under criticism for claiming to be a new theory for network learning while drawing from traditional theories, it is beginning to be recognized by many medical educators due to its claim to provide a lens through which teaching and learning using digital technologies can be better understood and managed (Goldie, 2016).

2.1.2 Updated Delone & Mclean Success information system success Model

According to (Information system success model, n.d.), information system theory is defined as:

> theory which seeks to provide a comprehensive understanding of IS success by identifying, describing, and explaining the relationships among six of the most critical dimensions of success along which information systems are commonly evaluated.

In order to attain a complete evaluation, all the critical dimensions need to be measured and a certain level of achievement made for each of them since a deficiency in any one of them renders the entire model ineffective since they are interdependent of each other (DeLone & Ephraim, 2016). Rammutloa (2017) states that the six initial dimensions of

the information system success model and their relationship were published in the year 1992 to reflect the following construct;

- System quality: which measures the system used for information processing;
- Information quality: which evaluates the outputs from the system;
- Use: manner of system use by users of an information system;
- User satisfaction: the level of user acceptance and use of the information system;
- Individual impact: assessing the impact of information system on the individual user and
- Organizational impact: assessing the impact of information systems on the operational activities of an organization.

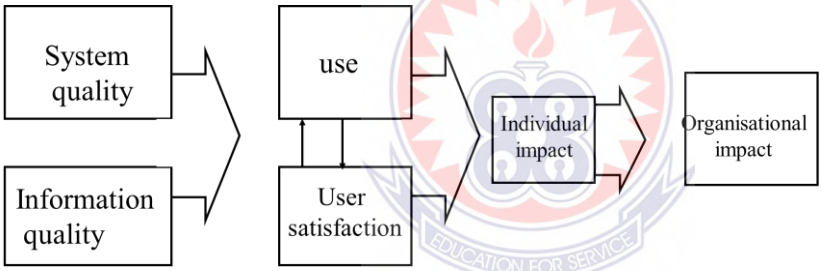

Fig 1: The DeLone and McLean IS Success Model from 1992

The updated Delone and McLean's ISS model introduces "service quality" as one of its quality dimensions and both "individual impact and organizational impact" have been replaced with "net benefit". This was done to meet the changing requirements of variety of newer information systems (Acton, Halonen, Conboy, & Golden, 2009, p. 4). This study therefore uses the updated Delone and McLean's ISS model due to its effectiveness in measuring the success of variety of information systems.

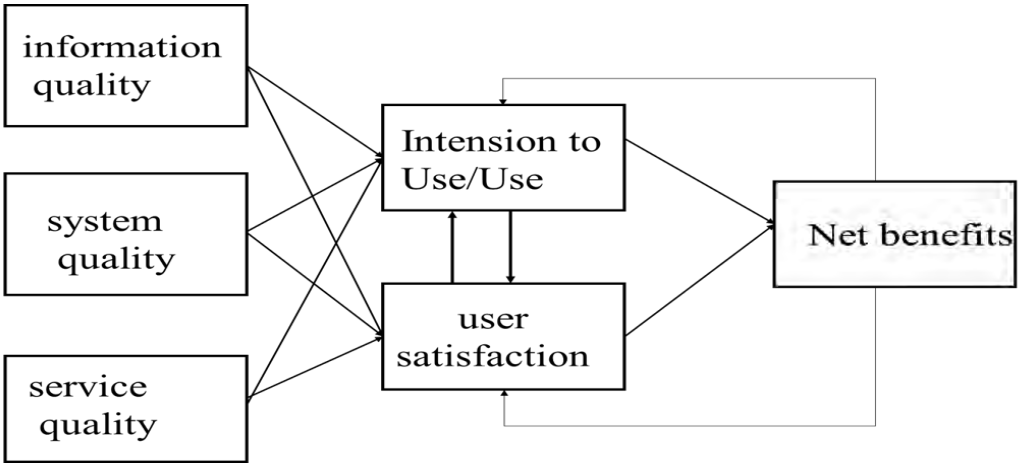

Fig 2: The Updated DeLone and McLean IS Success Model from 2003 (Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan, 2019)

2.1.3 Information quality

The desired characteristics of the output from the system (DeLone & Ephraim, 2016). The Information quality component describes the quality of information that the system provides. The information quality has a direct influence on other dimensions such as user's satisfaction and with the use of the system which in turn has a rippling effect on the overall benefit of the system to the user and the organization as a whole.

2.1.4 System quality

The quality of support that the system's management body offers to its users. The total quality of the system is one of the dimensions which serve as a yardstick for measuring the quality level of an information system. The system quality that has an effect on the degree to which the system is able to provide the needed benefits by way of mediating the usage intentions and user satisfaction dimensions.

2.1.5 Service quality

Together with the information quality and system quality, information systems are evaluated based on the quality of the services it provides. Service quality has a direct

influence on the user satisfaction with the system and usage intention which eventually affect the overall benefits derived from the system.

2.1.6 Use/ Intention to Use

This involves how the actual information system is used, the frequency of use and the use intensions. System usage or intentions are impacted by information quality, system quality and service quality. The purpose of system use construct is to impact user's satisfaction of the information system which tend to influence the usage intentions. The user satisfaction together with the system use influences the net benefits of the system.

2.1.7 User satisfaction

The user satisfaction construct describes the level at which a user is pleased with the information system and this is sited to affect system use which in turn affects the net benefits delivered by the system.

2.1.8 Net Benefits

The value of information system lies in the net benefits it delivers to the user of the system or the organization involved. It also involves the level at which information system is imparting or not imparting the overall success of an individual or a group. Net benefits are affected by system use and user satisfaction.

2.2. Definition of the concept of E-learning

E-learning is defined as a multifaceted construct that can be assessed along six dimensions including system quality, information quality, service quality, use, user satisfaction, and net benefits occurring in three stages (Holsapple & Lee-Post, 2006). Holsapple & Lee-Post further stated the stages of benefits as follows; the first stage is to attain system design success by maximizing the three quality dimensions. The second stage is to attain system delivery success by maximizing the use and user satisfaction

dimensions. The final stage is to attain system outcome success by maximizing net benefits dimension. In the view of the researcher, the first five dimensions are very crucial since they determine the success of the process; however, the researcher finds the benefit factor or the sixth dimension baffling since the success of the first five dimensions automatically comes with its benefits.

E-learning can be considered as a natural evolution of distance learning, which has always taken advantage of the latest tools to emerge in the context of technologies for structuring education (Sangrà, Vlachopoulos, & Cabrera, 2012). The assertion by Sangrà, Vlachopoulos, & Cabrera is a well-known one because, Waits & Lewis defined e-learning as the process of extending learning or delivering instructional materials to remote sites via the Internet, intranet/extranet, audio, video, satellite broadcast, interactive TV, and CD-ROM. (Waits & Lewis, 2003). It can be identified that all the tools mentioned by Waits & Lewis are used for modern day distance learning which makes the two terms similar to some extent.

2.3. Personalized E-learning

The term personalized e-learning according to Lawless, O'Donnell, Sharp, & Wade means: to present each learner with personalized e-learning activities appropriate to their diverse learning needs (Lawless, O'Donnell, Sharp, & Wade , 2015). They further added that the main motivational factor available in e-learning is to present each student with e-learning activities, specifically selected to suit them. In the view of the researcher, the point raised by Lawless, O'Donnell, Sharp, & Wade is good one since no two individuals are the same.

According to Bell & Federman (2013), the instruction received by participants in the e-learning condition is usually not equivalent to that received by their counterparts in the

classroom or contrast condition. In the view of the researcher, Bell & Federman made it seem like an exhaustive investigation has been conducted on both learning conditions but failed to support the assertion with any evidence whatsoever and as a results, the assertion remains highly debatable.

2.4. Information System Success Model as An Evaluation Tool.

According to Delone and McLean, the way we measure the success and the efficiency of an information system has changed over time since its situational use, the purpose and the influence of information technology has evolved tremendously. In view of these, it is very important to understand the basis and growing trend in the field of information system and its implication for the future (DeLone & Ephraim, 2016).

The Delone and Mclean information system success model was used as an instrument to measure the success of electronic health records system in residential aged care in Australia. The findings revealed deficiency in the "*use*" construct of the six dimensions and this was attributed to the compound natures of the use construct which include importance of use, actual use, self-reported use, and depth of use all measuring different things (Yu & Qian, 2018). Yu & Qian added that measurement of use and user satisfaction were dully influenced by users aged forty years and above due to their late training in the use of computers. Since the various dimensions of Delone and Mclean IS model are interdependent, the optimal use of the information system model in this context was not achieved.

In a virtual learning environment, the use of the six dimensions of D&M information system success model offer us the opportunity to use different approaches to evaluate a learning situation descriptively (Acton, Halonen, Conboy, & Golden, 2009). Acton,

Halonen, Conboy, & Golden further states that poor service quality may affect user satisfaction and in turn affect the net benefits of the system. In e-learning situation, weak interaction with a system as a result of bad service quality may lead to reluctance to study on the part of the students. Acton, Halonen, Conboy, & Golden's study reflected positive outcome in the various dimensions however this study was conducted in high income country and the outcome might not be the same for a developing country like Ghana.

A study conducted by Yakubu & Dasuki on the impact of e-learning on Nigerian university students revealed that the study had limited literature due to little work done in the online environment. They further reiterated that there has been a call for developing countries to fill that knowledge gap from developing countries point of view. The study however showed that only five out of the six information system success dimensions were supported due to fact that most universities in Nigerian do not have the e-learning option running in those institutions (Yakubu & Dasuki, 2018). This study was conducted in Nigeria however the target population was university students hence the attempt to replicate this study in Ghana among Senior High School students.

Applying the Delone and McLean's information system success in knowledge management system, Sabri (2014) asserts that there are diverse approaches to Knowledge Management system which include: "Social approach, technological approach, and socio-technical approach", the Delone and McLean IS success model was used because of its multiple viewpoint assessment. From the socio-techno perspective, the various components of the knowledge management system were mapped with the six constructs of the D&M information system success model and a comprehensive evaluation was achieved. The study also proposed a success model framework for use in the field of Knowledge Management system. The study by Sabri

reflects a complete application of the earmarked information system however, this was not done in the field of education and therefore the outcome may be somewhat different; a debate this study seeks to contribute to.

Delone and McLean IS success model in e-library for evaluation purpose is not a new phenomenon. Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan's study on evaluation of digital library in four Malaysian universities highlighted the various dimensions of the information system success model and the weak and strong areas were exposed. In view of this, they recommended the Delone and McLean's model because it has reliability as one of its strengths (Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan, 2019). The reliability factor mentioned in the above study is one of the many reasons why the Delone and McLean's information system success model was adopted as the main evaluation tool for this study.

2.5. What Constitutes Blended Learning

Blended learning provides a context for studying students' engagement while students switch between two learning modes and increase their self-motivation in order to achieve success in the online component of the course. The key factor of the blended learning situation is to improve students' engagement (Garrison & Kanuka as cited in Manwaring, Larsen, Graham, Henrie, & Halverson, 2017) and students ought to go through some negative emotions like frustrations if they want to discover knowledge for themselves. A study by Manwaring, Larsen, Graham, Henrie, & Halverson in two universities revealed that course design and the perception of the student towards the course influences learner's engagement more than any demographic factors that are peculiar to the individual. This study was however conducted in a higher institution of learning where blended learning courses were available hence the need to conduct an

empirical study in senior high school where blended learning is not part of the curriculum.

Self-regulated learning (SRL) is essential in students' performance in a blended or online learning environment (Broadbent, 2017). According Kristanto, every effort in the field of learning is nothing but to bring about quality learning and development in information and communication technology. This is gradually moving learning to an environment that is self-guided centered (Kristanto, 2017). Kristanto further asserts that the use of blended learning is not only ideal for distance courses or students but it can also be integrated into the traditional classroom-based education system. The double-track system currently being run in Ghanaian Senior High school leaves one track of students in the house at every point in time and therefore there is the need to access the impact of e-learning on these students. These would inform the decision of blending the e-learning option with our conventional education system or otherwise.

Various studies try to identify various factors that would provide educators with information about students' performance in order to select the instructional strategies that would help students who are at the verge of failing in a course (Zacharis, 2015). Zacharis further states that online activities using learning management system are able to reflect the outcomes in a blended educational environment. Therefore, provision of resources and connectedness of both teachers and students ought to be prioritized in this environment. There is a growing Interest in the field of blended learning design since concurrent use of face-to-face and online educational activities are known to offer students the opportunity to enhance their learning capabilities (Spanjers, et al., 2015).

Even though Blended learning has been described as a new paradigm in this digital age, blended learning has the goal of arousing the interest of learners and providing support for the learning situation (Boelens, Van Laer, De Wever, & Elen, 2015) and this has

been the aim of most educational researchers. Since the level of learners' satisfaction in the blended learning environment determines the success of its adoption in schools (Chen & Yao , 2016), there are some four critical challenges to overcome in its implementation in order to ensure students' satisfaction (Boelens, Van Laer, De Wever, & Elen, 2015). According to Boelens, Van Laer, De Wever, & Elen, the chalenges include 1) How to incorporate flexibility, 2) How to facilitate interaction, 3) How to facilitate students' learning processes and 4) How to foster an affective learning climate. When all these challenges are addressed well, it proves to be a suitable alternative to face-to-face alone or e-learning alone because of the advantages possessed by each learning environment.

2.6. Impact of E-Learning on Academic Achievement

Determining the relationship between e-learning and students' academic achievement, Fonseca, Marti, Redondo, Navarro, and Sanchez (as cited in Rashid & Asghar, 2016) indicate that through the use of technology in learning, students are capable to achieving a greater level of direct engagement with the wished-for content which in turn enhanced total achievement. It further reveals that technology was extremely interrelated with student motivation, and also found important connection between technology-based learning and academic achievement. The numerous downloads made by students online gives them ample information which can be used offline for studies purpose; a study organized by Yu & Jo revealed that factors such as the number of downloads students made for their online studies among others were found to be contributing factors to students' academic achievement in an online learning environment (Yu & Jo, 2014). Online learning situations are characterized by the autonomy of the learner, and therefore, self-regulation turn out to be a critical factor for

learners who are to take advantage of the benefits of these learning situations. To support this assumption, researchers have verified that Self-Regulated Learning element of e-learning is a predictor of academic achievement in technology-mediated learning environments (Greene & Azevedo as cited in Kassab, Al-Shafei, Salem, & Otoom, 2015).

Many academic and corporate skills training institutions are today making significant strides towards use of more interactive e-learning approaches to successfully improve general performance of college students and their employers. In many advanced economies, several academic institutions make use of very interactive e-learning that positively influences students' performance (Soleymanpour, Khalkhali & Reayatkoonandeh as cited in Mothibi, 2015). The study further revealed that in today's vastly globalized world, the use and application of information and communication technology (ICT) in teaching for learning has resulted in notable accomplishment in improving students' academic performance in many academic disciplines and faculties (Zameni, Nasimi, Rezayirad & Ghanbarpoor as cited in Mothibi, 2015).

The fundamental influence of blended learning on the performance of a student can be defined as the difference between the performance of a student after being a participant of a blended learning activity and the performance of that same student if he or she participated in a traditional learning activity. By doing this, we would be assured that no confusing factors are manipulating the difference in performance (Deschacht & Goeman, 2015). However, it must be noted that this study doesn't always turn out positive some students report negative effects on performance (Xu & Jaggars, as cited in Deschacht & Goeman, 2015) and other studies show problems with learner retention

capability in online and blended learning environments. Compared to traditional class-based education, the dropout levels seem to be significantly higher in this environment.

2.7. The Role of Students' Readiness in E-Learning Situation.

Inasmuch as e-learning has proved to be an exciting way of learning, the challenge was that not every student possessed the prerequisite computer skills to enable them to benefit from e-Learning environment. It is recommended that, students should be equipped to embrace diverse ways of learning rather than relying solely on traditional face-to-face learning (Coopasami, Pete, & Knight, 2017). Coopasami, Knight & Pete added that a small-scale study of selected nursing students on the factors that have contributed to students' perceptions of e-Learning in view of the fact that the learning areas used were previously taught in a traditional manner in the classroom. The study found that the participants were not technologically ready to satisfy the e-Learning requirements. An in-depth investigation was required to identify those who do not have the necessary technological skills to profit from e-Learning and to come up with curative measure to address this need. If the participants are deficient in any skills, it should be determined whether they are given ample time to react positively, or if program adjustment is required. Similarly, Ali (as cited in Coopasami, Knight & Pete,2017) study amongst tourism and hotel students in Egypt reveals that students must have a certain level of computer skills or technological skills to enable them to survive in an e-Learning environment since these skills are crucial in the online situation.

According to Youssef, Dahman, & Omrani (2015.p 2), students may face several challenges that may require a specific ability to use ICT successfully a term known as 'e-skills'. More student's participation needs to be encouraged to use these tools and

enhancing it uses are a first step towards an improved performance as far as e-skills are concerned. varying learning approaches need to be applied in order to increase the students' involvement level as well as promoting learner independency in classroom interactions. Regarding students' maturity level, Youssef, Dahman, & Omrani propounded that older learners are less likely to have all the e-skill types compared to relatively young ones (17-19 age group). Considering this assertion, the older students are more likely to have skills that allow them to operate computers than skills that allow them to use ICT to solve problems (e-skills). Pertaining to time spent surfing on the Internet for learning purposes and its relationship with e-skills, the assertion still holds that the more the student spent time surfing, the higher the possibility of having tactical e-skills compared to operational skill increase. Encouraging students with the help of incentive to spend more time on the internet for Information Technology related courses increase their probability to acquire e-skills.

About prior computer skills in e-learning, Pandit (2015, p. 22) asserts that common justifications for limited use of technology to support instructional activities include "lack of computer skills" and "computer intimidation". Pandit further reports that a prior computer skill can help learners to effectively locate sources for supplementary instructional material using the technology of the internet and multimedia network to develop additional learning materials, this may lead to an expansion in instructional resources aimed at broadening the knowledge and skills acquired. It implores educators to create dynamic learning environment technology to offer a learning situation that is colorful, engaging, exciting, interactive and energetic as a means to motivate learners to take a tour into the world of technology to discover knowledge for themselves.

A study by Edumadze, et al on Distance Learning students at the University of Cape Coast (UCC) revealed that success factors such as basic computer skills, online skills, software application literacy, internet access and cost are factors crucial to the successful implementation of e-learning for Distance Education students of the University of Cape Coast. The study however revealed that Digital Classroom courses does not involve learning isolated skills in technology or using any particular application but rather transferring those acquired knowledge and skill into realities and applying them to real world projects to improve a student's comprehension of any curricula whereas the learned objectives are for the student's lifelong success. The study again reflects the fact that most of the distance education students have various fundamental computing skills and regular internet access. However, most of these DE students were reported to have little or no experience with Learning Management System (LMS) tools and majority of them were unwilling to fund their own e-learning activities. The study then recommended ICT and e-learning skills training as a solution to reduce or minimize the identified deficiencies (Edumadze, et al., 2017). In the view of the researcher, the participants of the above study are older students in a higher learning institution. However, the participants of this study are senior high school students who might not have daily exposure to technological tools except the opportunity offered by ICT lessons as one of the taught subjects at the senior high school level.

The definition of computer competence has evolved in time in agreement to the advancements and the growing needs in the field of information technologies. While definitions highlighted computer programming in 1990s, in 2000s the definition has shifted its focus to skills regarding software and web usage. This is a clear indication

that peoples' perception in relation to computer competence have changed over a period of time (Baturay, Gökçearslan, & Ke, 2017)

An institution needs to be prepared in terms of provision of sufficient technical infrastructure to support e-learning tools in order to be able to adopt e-learning tools. Moreover, instructors and learners must possess the skills that are required to utilize e-learning resources. Instructors on the other hand also need to plan their course to incorporate e-learning elements efficiently into the instructional process. For e-learning to be successfully implemented across an institution, several factors such as the accessibility of technology, and how lecturers and students are supported to acquire the necessary skills to use that technology (Qureshi, Ilyas, Yasmin & Whitty; Adelabu, Adu & Adjogri; Smedley as cited in Aldowah, Ghazal, & Muniandy, 2015). Additionally, Aldowah, Ghazal, & Muniandy reports that Yemeni students at the Senior High School level are required to go through training to acquire the prerequisite skills in critical areas such as computer skills and learning of English language in order to prepare them for the e-learning environment.

Students' readiness for e-learning has an important connection between the efficient use of electronic learning resources and the learner's age. similarly, there is an important connection between the benefits of the electronic learning resources and learner's age; between "technological anxiety" in electronic learning resources and age (Camilleri & Camilleri, 2017, p. 21). A study according to Huptych, Martin, Zdenek, & Jakub reports that learners in the 30+ age group had significantly high level of involvement with the learning resources. The reason is that their interaction with these resources started earlier hence their ability to reach higher effort prior to the exam (Huptych, Martin, Zdenek, & Jakub, 2018). Another study according to Muilenburg & Berge reported a vast number of works in the field of technology integration challenges reflect some

remarkable differences in learning experience, motivation, and attitude linking to age and ability to use technology (Muilenburg & Berge as cited in Al Gamdi & Samarji, 2016) and older students has significantly high level of involvement with the learning resources due to their earlier interaction with these resources (Huptych, Martin, Zdenek, & Jakub, 2018).Other new studies have revealed that socio-demographic factors still stands as solid predictor of learner's academic achievement (Stegers-Jager, Steyerberg, Lucieer, & Themmen, 2015).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Overview

The aim of this study is to analyze the impact of e-learning on the academic achievement of students using Delone and McLean's information system success model.

This chapter considers the methodology and research design adopted for the study. It also highlights the population, the sample and sampling procedure and the instrument employed in gathering data and how the data was analysed.

3.2. Research Design

The research design used for this study is case study design with both quantitative and qualitative methodologies. Stake as cited in Bryman (2012) defines, case study research as the one "concerned with the complexity and particular nature of the case in question". This design was used for this study because it the involves comprehensive and thorough examination of a case (Bryman, 2012).

The e-learning service may have the tendency to transform the learning situation in our Senior High schools hence the need to conduct a case study to assess the level of impact it is likely to have on students' academic achievement before an informed decision can be made on its implementation.

The study uses pre-test, post-test and the Delone and McLean's ISS model as the main tools for assessment. The pre-test was used to test the previous knowledge of the participants of the study, post-test to measure their level of achievement whereas the Delone and McLean's ISS model was used to evaluate the online learning systems.

Both qualitative and quantitative methods were used in this research based on the merits possessed by each method. Not only active researchers but also more and more research methodologists pointed to the value of blending qualitative and quantitative methods across a varied research problem (Morgan, 2007).

Mixed method research employs both approaches repeatedly or simultaneously to create a robust research conclusion than either method individually. Overall, combined quantitative and qualitative methods permit examination of more complicated features and relations of the human and social world (Malina, Nørreklit, & Selto, 2010). The mixed method allows writers to collect and present intricate data without being exposed to the limitations offered by either of them.

3.3. Population of the study

The focus of this study was on the main track students of Methodist Girls' High School, Akuapem-Mamfe and ten (10) tutors drawn from the core subject areas in the above-mentioned School. The total number of students in the earmarked track is seven hundred and twenty-six (726). The researcher used the school he is currently working in for this research. This group was targeted because of observations that were made as students had to go beyond the confines of the school rules to beg their teachers to use their personal mobile phones to complete their assignments and to access information that may not be available at school library.

3.4. Sample Size and Sampling Techniques

Representing against population with a subset of it is termed as sampling (Etikan, Alkassim, & Abubakar, 2016). According to Sharma (2017, p. 749), Sampling can also be defined as a technique (procedure or device) employed by a researcher to

systematically select a relatively smaller number of representative items or individuals (a subset) from a pre-defined population to serve as subjects (data source) for observation or experimentation as per objectives of his or her study.

In view of this, the researcher saw that targeting the entire population would not help considering the investigative nature of this study; instead, part of the population was sampled for the study.

Nevertheless, a number of one hundred and fifty (150) students and ten (10) tutors were considered for the research in the earmarked institution.

The population was divided into ten (10) clusters(classes) based on students' course of study after which systematic random sampling method was used to select the sample units in each cluster. The systematic random sampling is a probability or unbiased sample in which each member of the population had an equal chance of inclusion in the study (Bryman, 2012). The method helped the researcher to identify and enumerate the finite population for the study. Fifteen (15) students were required from each cluster (class) for the study; in view of this, the number of students in each cluster was divided by fifteen (15) to obtain the sample fraction that is k= n/15 where (k) is the k^{th} student and (n) the number of students in each cluster. The data was obtained at Methodist Girls' High School, Akuapem-Mamfe in the Akuapem-North municipality of the Eastern Region.

3.5. Data Collection Instruments

Data collection activity represents very important points in any study or research (Bryman, 2012) and because of this, the researcher used a number of data collection instruments for this study. The data collection instruments used for the study were observations, interviews questionnaires and test.

3.5.1 Questionnaires

In all cases the role of the questionnaire is to provide a uniform interview across all subjects. This would ensure that all respondents are asked the questions that are suitable to them and when those questions are asked, they are always asked in the exact same way. It is clear to anyone undertaking data collection through a questionnaire survey that the questionnaire is an important element in its success (Brace, 2018)

Since questionnaires provide a medium of communication between a researcher and the sample unit, two types of questionnaires were prepared and administered to the two types of respondents in the study, which are the tutors and the students. The items in the questionnaire were based on the six constructs of the Delone and McLean's ISS model. These include Information quality, system quality, service quality, intention to use/use, user satisfaction, net benefits and socio-demographic factors like age.

In all, a total of one hundred and sixty (160) questionnaires were designed, printed out and administered to the two categories of respondents. The questionnaire was made up of both open and close ended questions. The open-ended questions offer respondents the opportunity to provide their own answers to certain items as well as elaborating other answers provided while the close ended items provide options for respondents to select from. In order to eliminate any level of ambiguity, key terms were explained to the two categories of respondents.

Time was prearranged for the respondents to submit the completed questionnaires. Students responded to the questionnaires and submitted them before the close of school. Teachers on the other hand had a maximum of three days to submit the completed questionnaires. The study used an eight-section questionnaire to collect the required data. This was done to ensure that all the dimensions of Delone and McLean's

information system success model are covered in the study. Copies of the questionnaires are attached in Appendix of this study.

Table 1: Sections Covered in The Questionnaire

SECTION	DIMENSION/COMPONENT
Section A	Demographic and other information
Section B	System quality
Section C	Information quality
Section D	Service quality
Section E	Intension for use
Section F	User satisfaction
Section G	Use
Section H	Net benefits

3.5.2 Interviews

The research interview is a prominent data-collection strategy in both quantitative and qualitative research. The interviews were planned to boost a conversation (Jones et al as cited in Bryman, 2012). This method was adopted after the observation because direct verbal interaction with the interviewee does not only expose us to the desired responses but also some factors that could only be seen or exhibited.

Amidst this face-to-face verbal interaction, the topic under study was taken into consideration and care was taken not to put the interviewee in a state of contradiction of responses that might result from boredom and fatigue (Brace, 2018).

3.5.3 Observation

Observations are defined as "direct first hand eyewitness accounts of everyday social action answering the classic fieldwork question What's going on here?..." (Schwandt as cited in Leech, Collins, & Onwuegbuzie, 2017). This technique was adopted for this study because of the four major purposes it serves in a study: to increase understanding of the context, to identify implicit and explicit patterns, to have personal experience and knowledge of the participants' behaviors and to be able to increase understanding beyond the participants' selective perceptions (Leech, Collins, & Onwuegbuzie, 2017). Observations were made to find the main driving force behind this routine of students using their teachers' mobile phones to assess information for their assignments. The performance of such students was critically observed in the respective assignments, teachers who assign students to such tasks were also observed with the frequency of such assignments.

3.5.4 Testing

The testing design used for this study is the pre-test and post-test design. This testing design is very effective in measuring the impact training has on a participant (Shivaraju, Manu, Vinaya , & Savkar, 2017) and testing in most researches of diagnostic nature are "likely to entail pre-testing subjects, exposing them to some treatment and post-testing respondents" (Bryman, 2012).

In view of the adopted testing design, the same set of test items was administered to the participants at the pre-testing stage to measure the level of achievement before exposing them to the online learning activity.

3.5.4.1 Pre-Test:

The pre-test was administered to assess students' achievement levels prior to the exposure to the e-learning environment. Twenty (20) multiple choice questions were prepared and administered. In all, one hundred and fifty (150) students responded to these pre-test items which were at a lower level of difficulty.

3.5.4.2 Post-test

Final test: the post-test was administered after exposing the participants to the e-learning environment. The online activity was been ran simultaneously with the traditional face-to-face learning situation in a blended environment. The post-test was administered after the e-learning exposure, the test was made up of twenty test items which was similar to the pre-test that was administered earlier. This was done to measure the level of acquisition of knowledge after the exposure to the e-learning situation. A total of one hundred and fifty (150) students responded to these test items which were at a medium level of difficulty.

Statistical analysis on this pre-test and post-test results then determined whether the exposure to the online learning environment had any impact on academic achievement. For instance, the participants were given access to computers, internet connection, e-books, youtube content and others. This practice enabled the researcher to detect the level of impact the exposure to e-learning had on the performances.

3.6. Research validity and Reliability

In order to present a reliable data, the researcher organised the collected data and documented them. The administered questionnaires were simple and within students' level of comprehension, this was done to ensure that validity is achieved. The same set

of questionnaires were administered twice at two-week interval to ensure that there is consistency in the responses gathered.

3.7. Ethical Issues

Confidentiality: participants of this study were assured of confidentiality of the information provided in the study and it will be used for only the intended purposes explained to them earlier in the study.

Permission: permission was sought from the appropriate authorities of Methodist Girls' High School before the study was conducted.

Anonymity: teachers and students were advised not to provide their names throughout the study in order to remain anonymous.

3.8 Data analysis

Data analysis is a data-reduction activity which is done to reduce the voluminous information gathered by the researcher in order to make a meaning out of it (Bryman, 2012). Bryman reiterates that without categorizing the collected data or putting them into tables, it will be impossible to interpret the collected data.

After the sorting process, all the questionnaires were accepted giving a 100% return rate; a combination of both qualitative and quantitative methods were used in the data analysis with the help of Statistical Package for the Social Sciences (SPSS). The analysis was preceded by coding to assign values to the selectable responses and subsequently, tables and graphs were generated for use in this study.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1. Overview

The aim of this study is to analyze the impact of e-learning on the academic achievement of students using Delone and McLean's information system success model.

This chapter of the study presents the findings, analysis and interpretation of the data gathered at both the pre-test and post-test stages of this study. In this particular section, the data analysis results were presented rationally in tables and graphs. This data was collected from one hundred and fifty (150) main track students of Methodist Girls' High School and ten (10) core subject teachers in the school.

4.2. Demographic Information of Students

This section shows the socio-demographic information of respondents computed in tables and bar graphs. This study deemed it necessary to include this information since factors such as age, gender and students' parental income can influence students' ability to learn with technology. The responses provided by the participants were categorized based on their acquaintances.

Table 2: Students' Age in Years

Age in years	No. of students	Percentage (%)
15 and below	3	2
16-17	135	90
18-20	12	8
Total	**150**	**100**

Source: Field work 2019

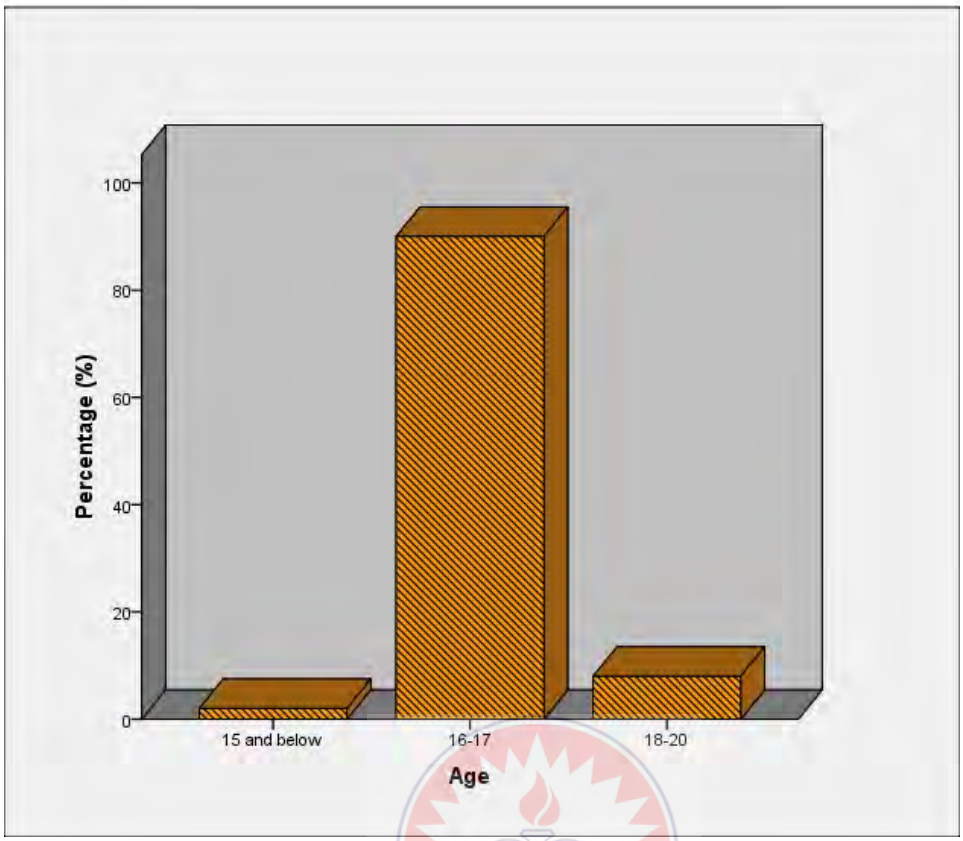

Figure 3: Students' Age

The ages were derived from the responses on the demographic variable question on the administered questionnaire. The data on ages were collected and computed as at August, 2019 prior to the survey closure. The data indicate that only three (3) students representing 2% of the participants are 15 years and below and twelve (12) participants representing 8% of the respondents were between the ages of 18 to 20 years. However, one hundred and thirty-five (135) representing 90% of the participants were between the ages of 16 and 17 years.

This information reveals that the highest concentration of the participants are teenagers who may be anxiously receptive to modern technology and the use of technology.

Table 3: Sampled Views on Availability of Alternate Means of Study Aside Face-To-Face Study Method.

Response	Number of students	Percent (%)
No	141	94
Yes	9	6
Total	**150**	**100**

Source: Field work 2019

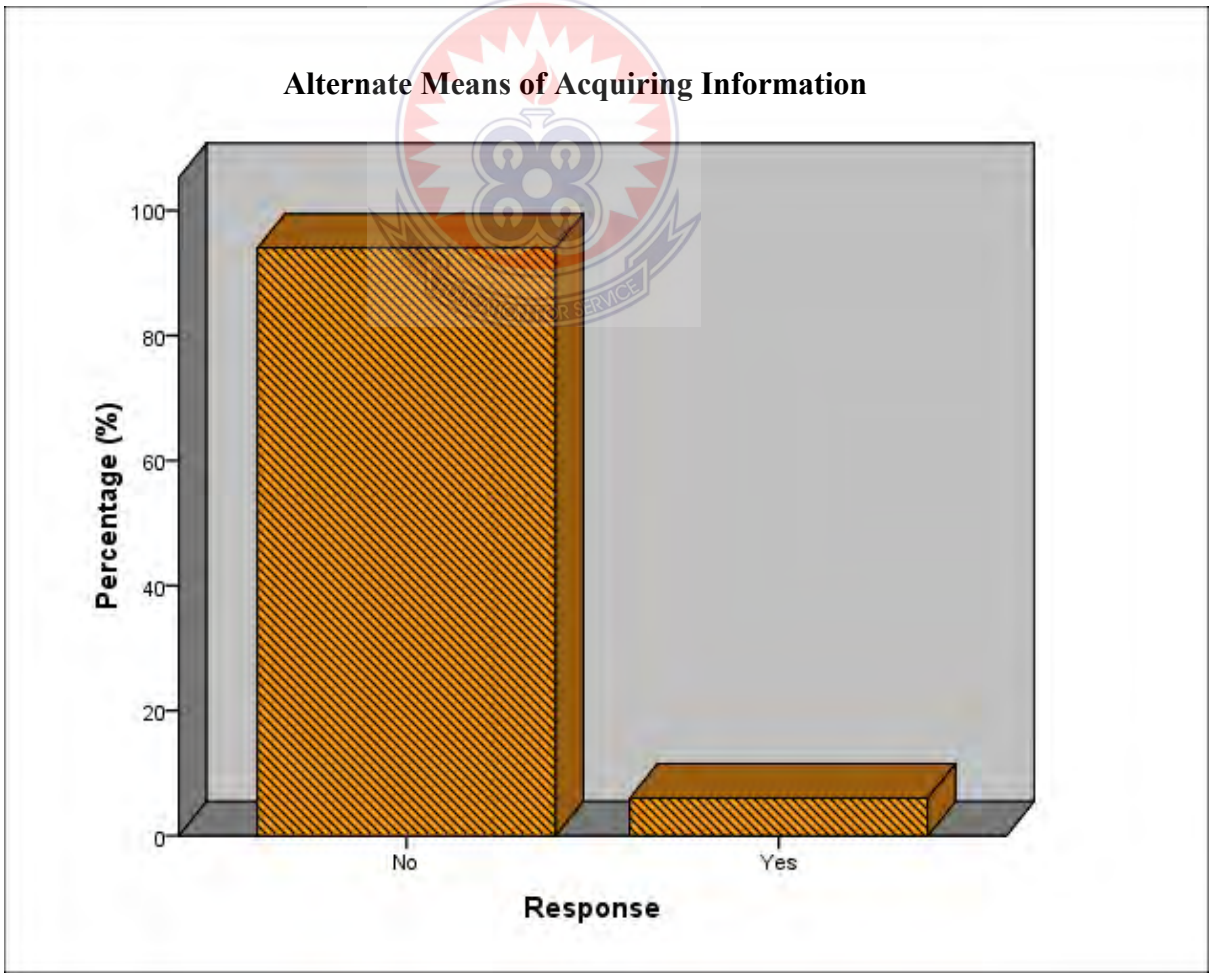

Figure 4: Students' Response on Whether They Have Additional Method of Learning Besides the Traditional Face-To-Face Method of Teaching and Learning.

Figure 4 shows that one hundred and forty-one (141) participants representing 94% do not have any alternative form of acquiring new knowledge besides the face-to-face method of teaching and learning. Nine (9) of the participants representing 6% also indicated that they do have an alternate way of learning, these students admitted under anonymity that they have personal smartphones for learning purposes though the use of such devices in schools are prohibited. The results above clearly show that few 'courageous students' decided to break the existing rules and regulations regarding mobile phone usage just to explore other learning modes that the field of technology has to offer.

Table 4: Students' Response on Whether They Are Satisfied with The Face-To-Face Mode of Study

Response	Number of Students	Percentage(%)
No	111	74
Yes	39	26
Total	**150**	**100**

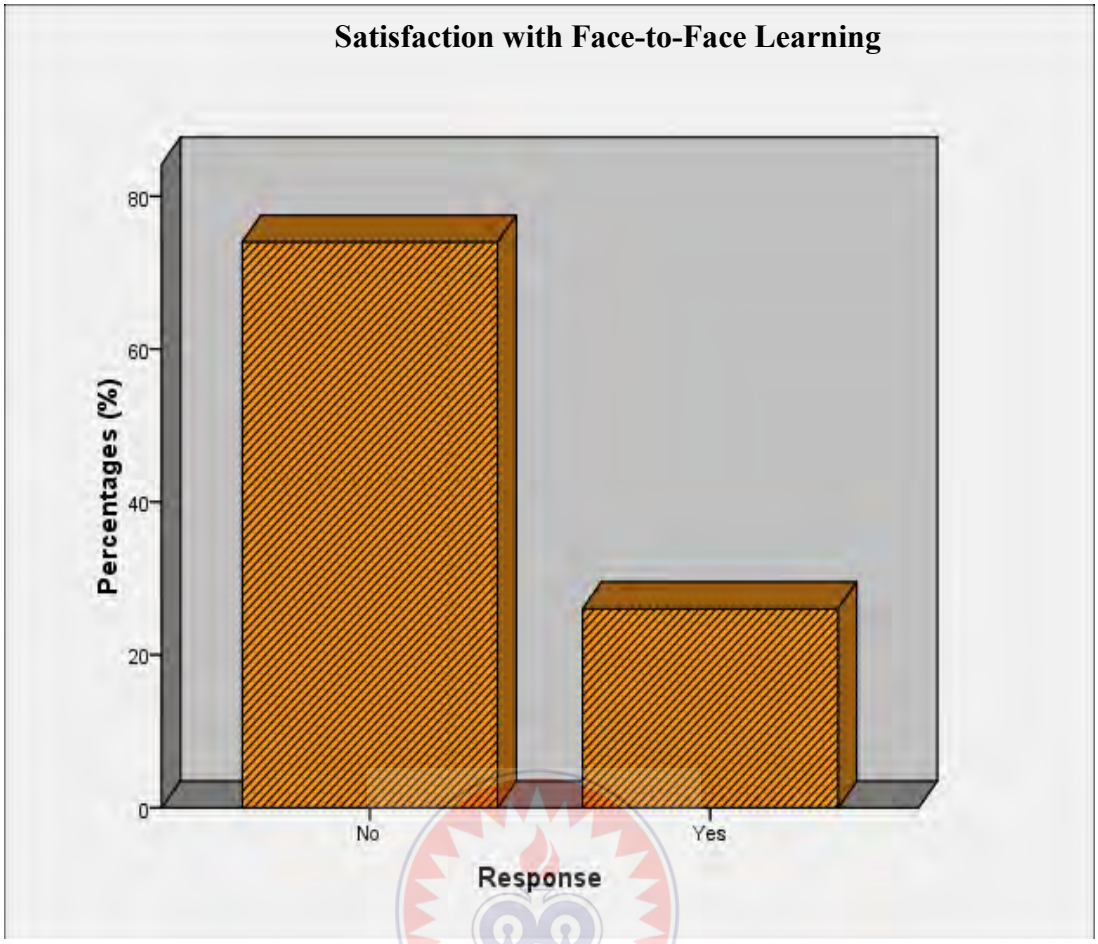

Figure 5: Students' Response on Whether They Are Satisfied with The Face-To-Face Mode of Study

Figure 5 shows that 111 respondents representing 74% of the responses indicated that they are not satisfied with the face-to-face mode of learning currently being used in the school. However, the remaining 39 respondents representing 26% said they are satisfied with the face-to-face mode of acquiring new knowledge.

The data show that most of the respondents are willing to explore other learning avenues that may be available to them which in this case is about the possibility of being exposed to additional way of learning using modern technology.

Table 5: Synthesis of Responses to The Construct of System Quality

Response	Service Availability		Service Dependability		Service Response Time		Service Usability	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Strongly Disagree	6	4	72	48	57	38	9	6
Moderately Disagree	21	14	21	14	21	14	6	4
Neutral	18	12	45	30	30	20	48	32
Moderately Agree	93	62	9	6	36	24	69	46
Strongly Agree	12	8	3	2	6	4	18	12
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

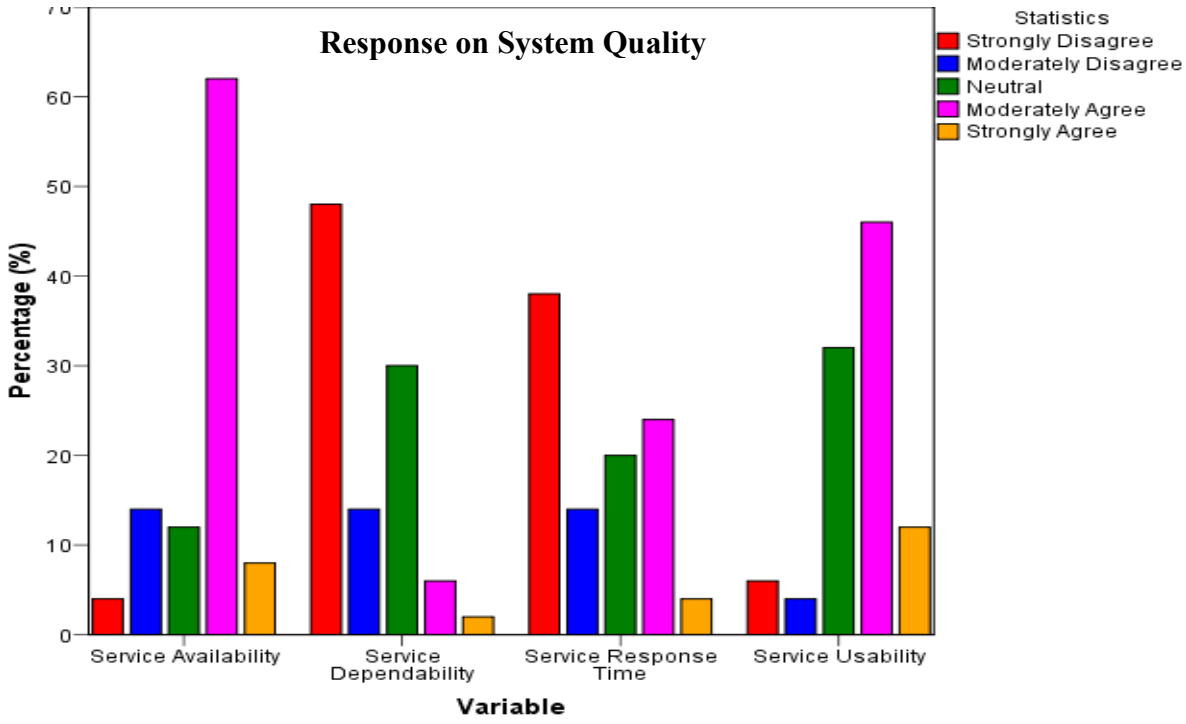

Figure 6: Students' Response on The System Quality Construct of The Delone and Mclean Information System Success Model.

Responses on system quality construct of the Delone and McLean information system success model was assigned to a nominal scale from *1=strongly disagree, 2=moderately disagree, 3= neutral, 4= moderately agree and 5=Strongly agree*. The responses revealed that ninety-three (93) participants representing 62% moderately agreed that the service was available most of the time and twelve (12) representing 8% of the respondents strongly agreed to this statement. Greater part of the responses range between strongly disagree and neutral with 72 (Seventy-two) respondents representing 48% and forty-five(45) representing 30% respectively, an indication that most participants found the service to be undependable while others have not yet decided on the level of dependability. Responses on service response time yielded the following, fifty-seven (57) participants representing 38% strongly disagreed and twenty-one (21) representing 14% moderately disagreed that the service had a good response time while 20% have not yet decided. In the researcher's opinion, slow internet speed coupled with network traffic might have accounted for the low agreeing levels. Responses on service usability also revealed that 69 respondents representing 46% moderately agreed that the all the services they interacted with were usable and eighteen (18) representing 12% of the participants strongly agreed to this statement. However, forty-eight (48) representing 32% of the participants recorded that they have not yet decided on service usability level. this signifies that though the service was available and usable, most participants found it unreliable partly due to response time issues.

Table 6: Synthesis of Responses to The Construct of Information Quality

Response	Information Accuracy		Comprehension of Information		Information Relevance		Info Security	
	N	%	N	%	N	%	N	%
Strongly Disagree	27	18	93	62	6	4	3	2
Moderately Disagree	6	4	15	10	15	10	9	6
Neutral	96	64	27	18	57	38	96	64
Moderately Agree	21	14	6	4	45	30	6	4
Strongly Agree	0	0	9	6	27	18	36	24
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

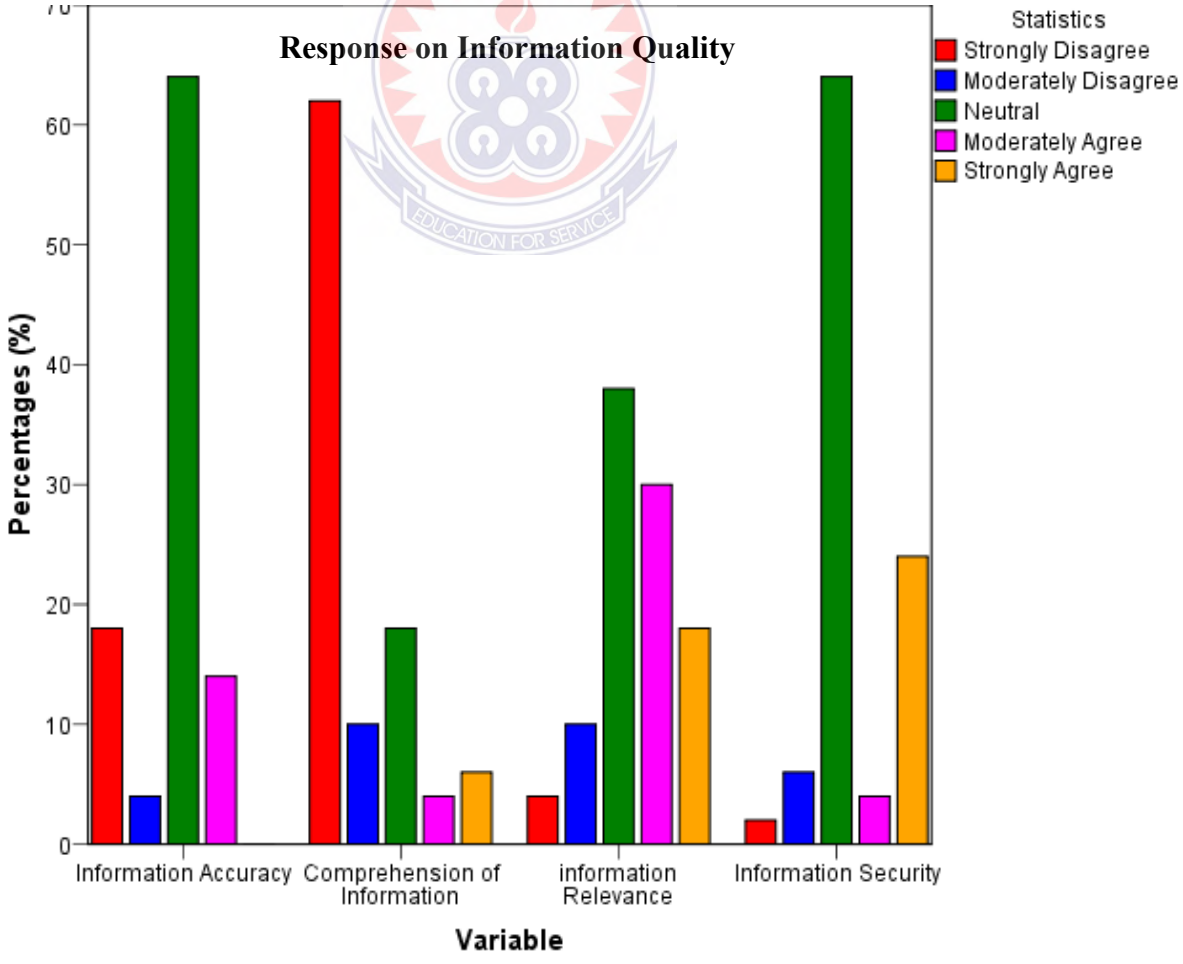

Figure 7: Synthesis of Responses to The Construct of Information Quality

The quality of the output from the information system cannot be overemphasized since the information quality influences user's satisfaction with the system and consequently the net benefits derived from the system. The figure 7 and table 6 above clearly show that ninety-six (96) representing 64% of the participants are not sure whether the information they obtain from the online systems are accurate or secured because they do not have what it takes to verify the authenticity of such information. Again, ninety-three (93) representing 62% of the participants strongly disagree that they understood most of the content from online learning systems whereas fifteen (15) representing 10% of the respondents moderately disagreed to this item making the disagreeing levels a dominant response. This is an indication that majority of the participants see the information as being beyond their level of comprehension due to complex terminologies that might require further explanation. However, ratings on the relevance of the information to participants' subject area spans from neutral, moderately agree to strongly agree with 57 respondents representing 38%, 45 respondents representing 30% and twenty-seven (27) respondents representing 18% respectively. This signifies that inasmuch as 38% of the respondents have not yet decided on the relevance of the obtained information to their subject area, greater percentage of the remaining respondents agreed at various levels that the information obtained from the system are relevant to their subject area.

Table 7: Students' Response to The Construct of Service Quality

Response	E-Learning Dependability		Availability for Use		Service Feedback		System Level of Sophistication	
	N	%	N	%	N	%	N	%
Strongly Disagree	18	12	51	34	9	6	30	20
Moderately Disagree	21	14	57	38	27	18	51	34
Neutral	54	36	33	22	36	24	69	46
Moderately Agree	36	24	3	2	60	40	0	0
Strongly Agree	21	14	6	4	18	12	0	0
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

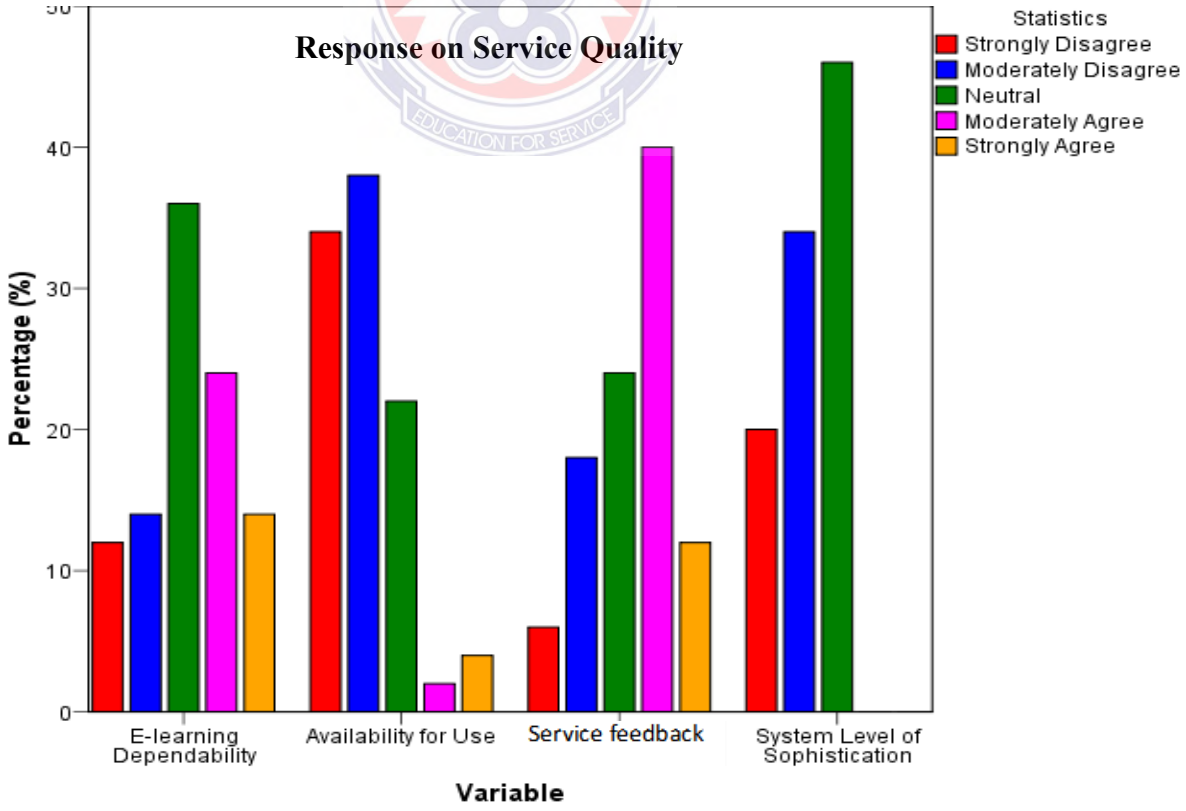

Figure 8: Students' Response to The Construct of Service Quality

Figure 8 and table 7 represent participants' response on the quality of the service or the support they receive from the system. In the opinion of the researcher, the service quality influences the students' satisfaction which tends to attract students to use the online services. The responses however showed that fifty-four (54) of the participants representing 36% said they are not sure if the service is dependable whereas twenty-one (21) respondents representing 14% each moderately agreed or strongly agreed that the e-learning service is dependable. Again, eighteen(18) respondents representing 12% and thirty-six (36) representing 24% of the respondents strongly disagreed and moderately agreed respectively that the service provided by the e-learning environment is dependable. This is an indication that individual's measure of dependability of the service is closely tied to the opinion they build around its usage.

The findings also presented participants view on whether the system was available for use, 57 respondents representing 38% moderately disagree that there was uninterruptible internet access while fifty-one (51) representing 34% of the respondents strongly disagree in this variable. In the opinion of the researcher, this is partly due to the spontaneous data bundle unavailability to ensure service continuity at all time.

Eighteen (18) respondents representing 12% and sixty (60) respondents representing 40% of the respondents moderately agree and strongly agree respectively that they had varying degrees of feedback from the systems they interacted with whereas thirty-six(36) respondents representing 24% responded neutral to this statement. Interestingly, participants were asked whether the learning services required installation of any sophisticated client-side application and none of the participants representing 0% agreed at any level while the greater concentration of the response's spans from neutral, moderately disagree and strongly disagree with sixty-nine(69) respondents representing

46%, fifty-one (51) respondents representing 34% and thirty(30) respondents representing 20% respectively. The 46% neutral rate clearly indicate that nearly half of the participants are only interested in using service without checking the requirements of any of the systems they interacted with.

Table 8: Students' Response to The Construct of Intention to Use

Response	E-Learning Recommendation		Blending E-Learning		E-Learning Implementation		E-Learning Use at Home	
	N	%	N	%	N	%	N	%
Strongly Disagree	24	16	0	0	3	2	0	0
Moderately Disagree	9	6	3	2	6	4	18	12
Neutral	9	6	9	6	27	18	63	42
Moderately Agree	21	14	45	30	24	16	27	18
Strongly Agree	87	58	93	62	90	60	42	28
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

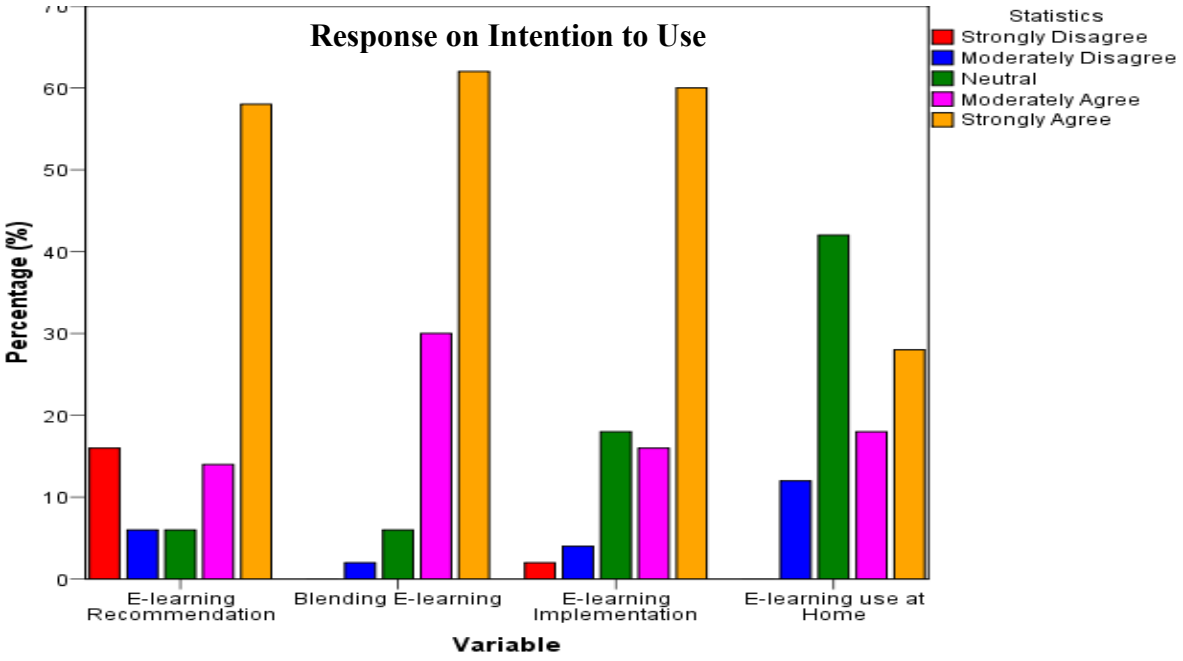

Figure 9: The Construct of Intention to Use E-Learning

Figure 9 and table 8 show participants' responses on the *intention to use* variable. Eighty-seven (87) of the respondents representing 58% strongly agreed that they are eager to recommend the e-learning services to their classmates while twenty-one (21) representing 14% of the respondents moderately agree to this item. This data shows that most of the students are excited about using technology to learn and are eager to encourage their peers to do likewise. An overwhelming 62% that is ninety-three(93) of the respondents strongly agreed that they have the intention to blend the e-learning with their traditional face-to-face mode and forty-five(45) respondents representing 30% moderately agree to that statement. This is a prove that students see the e-learning environment as a complement to their traditional face-to-face learning mode hence the desire to blend the two learning environments. According to sixty-three of the respondents representing 42%, they are not sure if they are going to use the e-learning service during vacation breaks while another eighteen (18) representing 12% of the respondents moderately disagree that they are going to use the online activity off

campus. Considering students' eagerness to blend learning and to recommend e-learning, it is clear that there may be factors in the house that are likely to discourage students from using the e-learning activities in the house. These factors may include availability of computer in the house among other reasons which were not covered in this research.

Higher percentage of the respondents have various level of agreement that government ought to implement the e-learning services in all Ghanaian Senior High schools, these are represented by ninety(90) respondents representing 60%, twenty-four(24) respondents representing 16% and three (3) respondent representing 2% who strongly agree, moderately agree and strongly disagree respectively to the e-learning implementation.

Table 9: The Construct of User Satisfaction

Response	**Satisfaction with Service**		**Simplified Studies**		**Satisfied with Feedback**		**Satisfied with Support**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Strongly disagree	3	2	18	12	45	30	6	4
Moderately disagree	6	4	9	6	30	20	0	0
Neutral	21	14	12	8	30	20	18	12
Moderately agree	69	46	57	38	18	12	33	22
Strongly agree	51	34	54	36	27	18	93	62
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

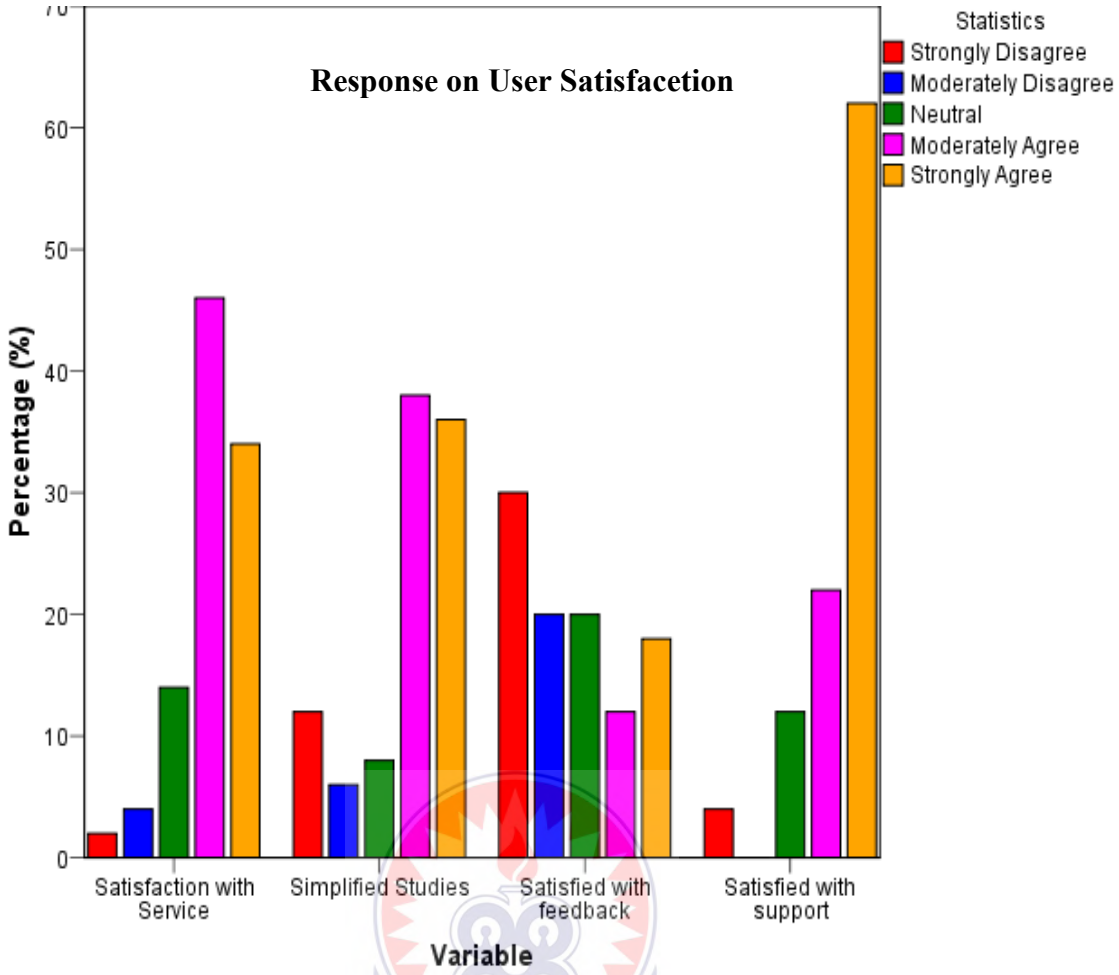

Figure 10: The Construct of User Satisfaction

The study sought to establish students' level of satisfaction with the e-learning environment and the following results were obtained and presented in table 9 and figure 10, sixty-nine(69) respondents representing 46% of the respondents shared the view that they were moderately satisfied with the learning environment whereas fifty-one(51) respondents representing 34% strongly agreed to being satisfied with the online learning environment. These results highlight the fact that students had the opportunity to choose their own learning service providers and as a result, the level of user satisfaction were examined on the basis of case-by-case. Fifty-four (54) participants representing 36% strongly agreed that the e-learning environment has simplified their study situation while fifty-seven (57) respondents representing 38% of the respondents

agreed strongly that their study environment has been simplified. This shows that majority of the participants had varying degree of satisfaction with the online learning environment because they had the chance to supplement what they learn in the classroom and as a result, their study activities were simplified based on their entry level. Participants were asked to provide response on their satisfaction with the feedback provided by the online learning service providers and forty-five(45) respondents representing 30% of the respondents strongly disagreed in this variable while thirty(30) representing 20% of the participants each moderately disagreed or decided to stay neutral. However, an overwhelming 62% of the respondents strongly agreed that they had support from their teachers and that influenced their level of satisfaction while thirty-three (33) representing 22% of the participants moderately agreed in this variable.

The finding reveals that most of the students agreed that they had a support while using the e-learning service, it is therefore not surprising that fifty-seven (57) representing 38% and 54 representing 36% of the respondents moderately agreed and strongly disagreed respectively that the e-learning usage has simplified their studies. This shows that majority of students would be satisfied with the online learning environment if they are able to get support from a teacher whenever the need arises.

Table 10. The Construct of Use

Frequency of use	Daily use		Weekly use	
	N	(%)	N	(%)
1-2 Times	150	100	21	14
3-4 Times	0	0	54	36
5-6 Times	0	0	75	50
7-8 Times	0	0	0	0
9-10 Times	0	0	0	0
Total	**150**	**100**	**150**	**100**

Source: Field work 2019

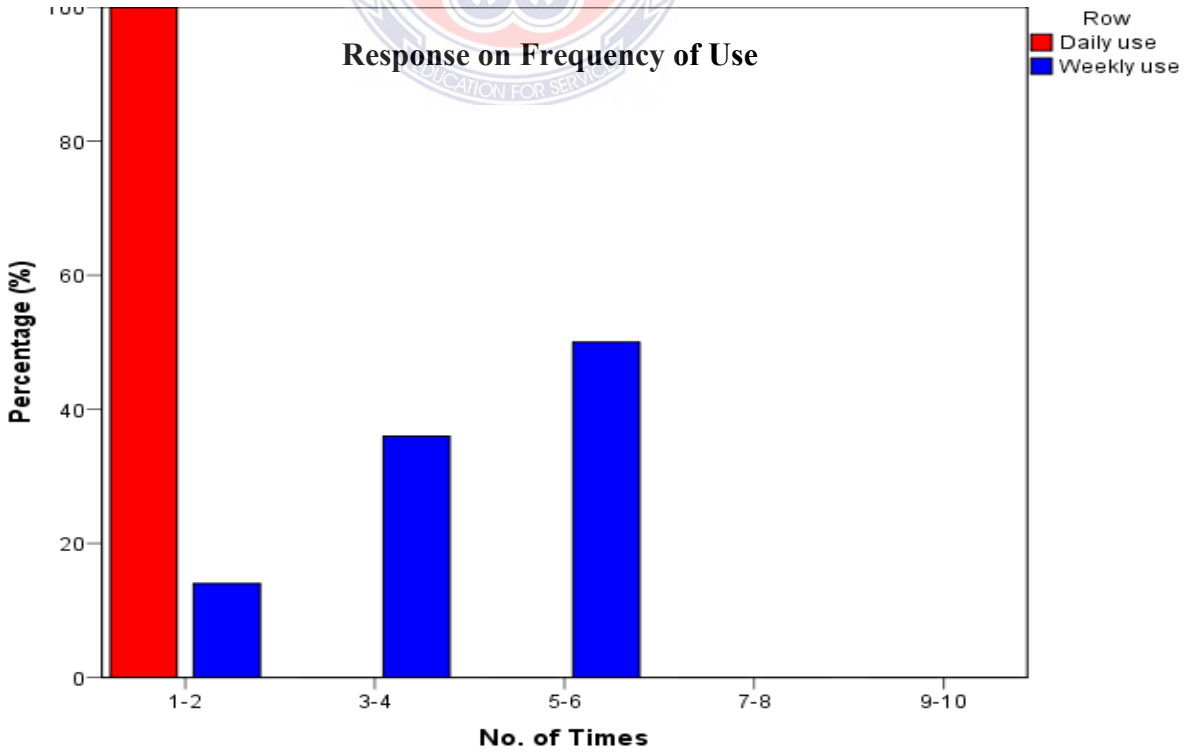

Figure 11: The Construct of Use

Figure 11 shows participants' response on the statement of frequency of use of the e-learning environment on daily and weekly basis. The responses were represented on a scale ranging from *1=1-2, 2= 3-4, 3= 5-6, 4= 7-8 and 5= 9-10.* All 150 participants representing 100% are within the 1-2 group which means that all the students used the e-learning service 1 to 2 times daily. This also reflects the fact that students only had the chance to use the services during break time or after closing.

According to 50% of the respondents, they only use the e-learning services 5-6 times in a week while 36% of the respondents reported that they used the online activity 3-4 times in a week. However, 14% of the participants recorded low usage of 1-2 times weekly. The number of hours of use was greatly influenced by curricular, co-curricular and extra-curricular activities since e-learning is not yet part of the regular school timetable.

Table 11. The Construct of Net Benefit

	System Benefit		**Control Over Learning**		**Info Literacy**		**Problem-Solving Skills**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Strongly disagree	0	0	9	6	27	18	0	0
Moderately disagree	0	0	24	16	36	24	18	12
Neutral	6	4	30	20	42	28	18	12
Moderately agree	69	46	60	40	30	20	66	44
Strongly agree	75	50	27	18	15	10	48	32
Total	**150**	**100**	**150**	**100**	**150**	**100**	**150**	**100**

Source: Field work 2019

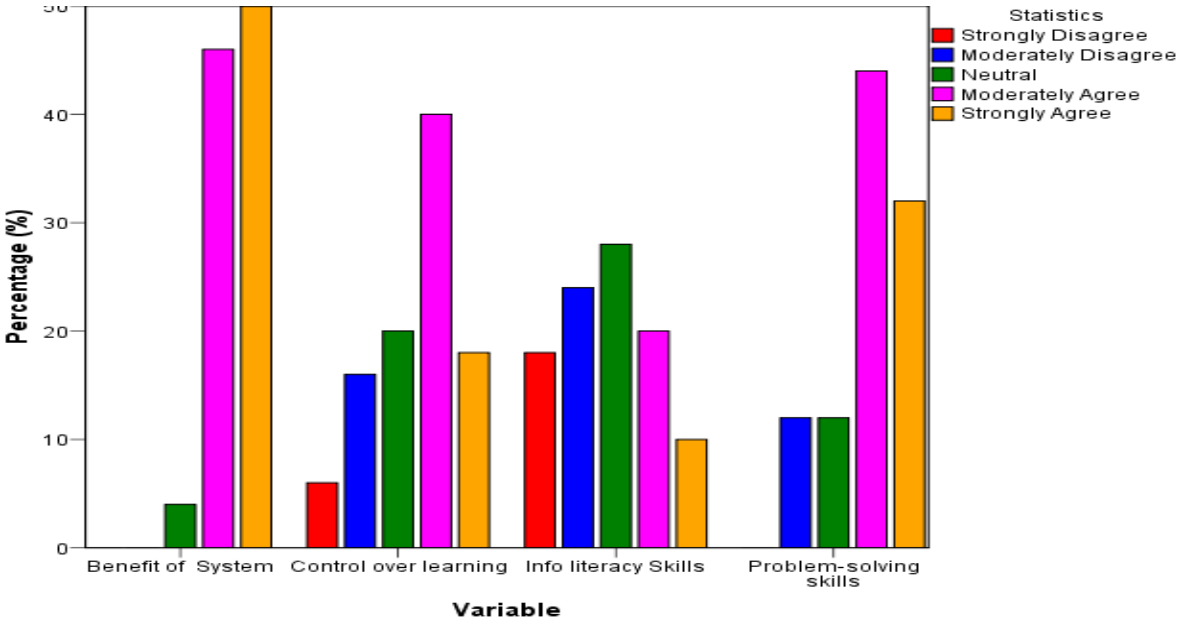

Figure 12 The Construct of Net benefit

The figure 12 above shows participant's response on the net benefit construct of Delone and McLean's information system success model. Students were asked whether there is a real benefit in using the online learning system, Seventy-five(75) of the participants representing 50% strongly agreed to this statement while sixty-nine(69) of the respondents representing 46% said that they moderately agree to the statement. In the opinion of the researcher, almost all the participant had a varying degree of agreement to the benefits of the online learning environment. According to twenty-seven (27) representing 18% of the participants, they strongly agree that e-learning situation helps them to control their learning environment whereas sixty (60) of the respondents representing 40% moderately agreed to this statement and thirty(30) participants representing 20% decided to remain neutral. This results clearly shows that greater percentage of the respondents agreed at various levels that they are able to learn at their own pace or control what they learn.

Students were asked about their ability to locate accurate information for their studies, fifteen (15) representing 10% and thirty (30) representing 20% of the respondents strongly agreed and moderately agreed respectively that they are more knowledgeable on how to select the right type of information for their academic work. This suggests that though students are exposed to a large volume of information, majority of them are less knowledgeable on how to locate the right type of information for academic work. Response to students' acquisition of problem-solving skills yielded the following results; highest concentration of responses range between strongly agree and moderately agree with 48 (32%) and 66 (44%) of the respondents respectively. This is an indication that students have acquired a new skill in the online environment.

Table 12. Pre-Test And Post-Test Results

	N	Mean	Std. Deviation
Pre-test	150	18.27	1.242
Post-test	150	17.88	.759
Valid N (listwise)	150		

Source: Field work 2019

The table 12 above shows students pre-test and post-test results at the testing stage. The calculated mean from the pre-test shows an average score of 18.27 with a standard deviation of 1.242. Students' scores in the post-test reflects a mean score of 17.88 with a standard deviation of 0.759 . This is a clear indication that the average score is higher at the pre-test stage though the scores are widely spread apart from the mean whereas

the average score at the post-test stage is comparatively lower but the scores are closer to the mean.

Table 13: Descriptive Analysis of The Constructs from Students' Responses

Construct	Mean	Item
Information quality	2.87	**Q1**. The overall information I get from the various learning services are complete and accurate. Q2. The overall information I get from the learning services is easy to understand. Q3. The information I get from the online service is relevant to my studies in the various subjects. Q4. The information from the online learning services are secured.
Service quality	2.88	Q1. The online learning services are dependable. Q2. There is uninterruptible internet access to ensure that the services are available for use. Q3. The support staff of the selected learning services give me feedback whenever it is required. Q4. The service requires installation of sophisticated client-side apps.
System quality	2.70	Q1. The online learning services is available

		most of the time Q2. Overall the online learning service is reliable with minimal downtime. Q3. The response time of the online learning services is very good. Q4. The online services are easy to use
Intention for use	4.09	Q1. I am eager to recommend e-learning services to other students Q2. I intend to blend the e-learning with face-to-face mode in subsequent semesters. Q3. Government ought to implement e-learning services in Senior High schools in Ghana. Q4. I intend to use the e-learning services more during vacation breaks.
User satisfaction	3.73	Q1. Am satisfied with the online learning services. Q2. Online learning services have simplified my studies environment. Q3. I am satisfied with the feedback or the responses I get from the system. Q4. I am satisfied with the support provided by the teacher while using the service.
Use	1.48	Q1. I use the online services this number of times ***in a day***

		Q2. I use the services this number of times ***in a week*** Q3. How many hours do you spend on the online services in a day?
Net benefit	3.68	Q1. There is real benefit for using the online learning systems Q2. The e-learning situation has enabled me to control my learning activities easily Q3. I am more knowledgeable about how to locate additional information for my studies. Q4. I have acquired problem solving skills from the internet

The table 13 above shows the measurement values of the various constructs of the Delone and McLean ISS model in a computed mean. The table presents a clear indication that on the average, students had a very high intention to use the e-learning service and this was computed at a mean of 4.09 however the actual usage recorded a low mean of 1.48. This means that although students were excited about using the online environment, the level of usage was low and this could be partly due to inadequate time available to students and other factors not covered in this study.

4.2: Socio Demographic Information of teachers

This section highlights a socio-demographic factor like the age of the teachers involved in the study and these are presented in tables. The study deemed it necessary to solicit

for this information since it was a potential indicator of the factors that may influence the way teachers in different age group view the use of technology in teaching.

Table 14: Distribution by Age

Age (Years)	Frequency	Percentage (%)
25 and Below	0	0
26-30	4	40
31-35	4	40
36-40	2	20
41-45	0	0
50 and above	0	0
Total	**10**	**100**

Source: Field work 2019

The table 14 above shows the ages of the teachers who participated in the study. The ages of the respondents range between 26 and 40 years and these are professionals who either use or teach technology on daily basis. These respondents are subject matter experts in the fields of technology or Information and Communication Technology, Mathematics, English, Integrated Science, Physical Education and Social Studies and as a result, there is a positive expectation they can effectively guide students on the use technology in learning.

Table 15. Teachers' Response on Using E-Learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	100.0	100.0	100.0

Source: Field work 2019

The table 15 above shows participants' response on offering students the opportunity to have an alternate means of studying. All the ten (10) respondents representing 100% agreed that they give online assignments or projects to students, a prove that teachers are aware of the benefits of e-learning or blended learning environment to students.

Table 16: Teachers' Response on Their Level of Satisfaction with Face-To-Face Mode Only

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	2	20	20	20
	Yes	8	80	80	100
	Total	**10**	**100**	**100**	

Source: Field work 2019

The table 16 above shows teachers' response on whether they are satisfied with using the current face-to-face teaching mode to promote teaching and learning. eight of the respondents (80%) said they are satisfied with the current face-to-face teaching mode while two respondents representing 20% registered dissatisfaction with the teaching method. This signifies that most of the respondents are only interested in using the

traditional face-to-face method to complete the syllabus without necessarily giving the students the opportunity to exchange and discover knowledge for themselves.

Table 17: Teachers' Response on Quality of The Service

Response	**The online learning services is available most of the time**		**Overall the online learning service is reliable with minimal downtime.**		**The response time of the online learning services is very good**		**The online services are easy to use)**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Strongly disagree	0	0	0	0	0	0	0	0
Moderately disagree	60	6	30	3	30	3	20	2
Neutral	10	1	0	0	10	1	10	1
Moderately agree	30	3	60	6	60	6	30	3
Strongly agree	0	0	10	1	0	0	40	4
Total	**100**	**10**	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

Teachers' response on the service quality variable yielded the following results; six (6) respondents representing 60% moderately disagreed that the e-learning service was available most of the time while three (3) respondent representing 30% moderately agreed to that statement and one(1) representing 10% decided to stay neutral. The results in table 17 reflects the fact that teachers were given limited internet access due to the fact that they may have other uses for the internet which may outside the domain of this research and this may be coupled with high cost of internet data access hence the high disagreement levels. Again, a total of 70% of the respondents strongly agree or moderately agree that the e-learning services is reliable and has a good response time. In the researcher's opinion, some of the teachers switch to their individual internet

services whenever the main internet services for the study is not available and this partly accounts for these results. Seven (7) of the respondents representing 70% moderately agree or strongly agree that the various online learning systems are easy to use whereas two respondents representing 20% also moderately disagree while one (1) of the respondents decided to stay neutral.

The findings reveal that most of the respondents agree at various levels that the service is easy to use which may not come as a surprise since 80% of the respondents are youth between the ages of 26 and 35 who use technology almost on daily basis.

Table 18: Teachers' Response on the Quality of Information

Response	The overall information I get from the various learning services are complete and accurate.		The overall information students get from the learning services is within their level		The information students get from the online service is relevant to my subject and topics		The information from the online learning services are secured	
	%	N	%	N	%	N	%	N
Strongly disagree	0	0	0	0	0	0	0	0
Moderately disagree	20	2	30	3	0	0	20	2
Neutral	10	1	40	4	20	2	60	6
Moderately agree	30	3	20	2	40	4	20	2
Strongly agree	40	4	10	1	40	4	0	0
Total	**100**	**10**	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

Table 18 highlights teachers' response on the *information quality* construct of the Delone and McLean ISS model. A total of 70% of the respondents reported that they moderately agreed or strongly agree that the information they get from the learning services is complete and accurate while one (1) respondent representing 10% stayed neutral in his response, an indication that most teachers are aware that the information from the systems has a certain level of accuracy and completeness and 20% moderately disagree to this statement. Questions on students' level and the level of information they are exposed to in the online environment highlight the following results, 30% of the respondents moderately disagree, a total of 30% agree at varying levels that the information is within the level of students. In the view of the researcher, a 40% neutral response indicate that most of the teachers are not sure if the information from the online sources is within the levels of their students.

Again, 80% of the respondents reported that the information obtained from the e-learning environment covers most of the topics in the curriculum while 20% of the respondents are not sure of the relevance of the contents to their subject areas. This is an indication that some subject areas may be more represented in the e-learning environment than others.

The level of security of the information produced by the system is a very important part of a system since a useful information can be altered to cause 'harm' to its users. In view of this, 20% of the respondents moderately agreed and moderately disagreed that the information from the e-learning systems is secured. However, 60% of the respondents have not yet decided on the security level of the kind of information students are exposed to. This means that though most of the respondents (70%) agreed

that the information derived from the e-learning are accurate and complete, information may be deemed useful only when it is seen and approved by these teachers as a useful piece of information.

Table 19: Teachers' Response on Quality of the Service

Response	The online learning services are dependable		There is uninterruptible internet access to ensure that the services are available for use		The support staff of the selected learning services give me feedback whenever it is required		The service requires installation of sophisticated client-side apps	
	%	N	%	N	%	N	%	N
Strongly disagree	0	0	10	1	30	3	50	5
Moderately disagree	20	2	50	5	30	3	20	2
Neutral	20	2	20	2	10	1	30	3
Moderately agree	50	5	20	2	10	1	0	0
Strongly agree	10	1	0	0	20	2	0	0
Total	**100**	**10**	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

The table 19 above presents the construct of system quality which reflects the quality of the system teachers and students interact with. A total of six respondents representing 60% moderately and strongly agreed that the systems they interacted with are dependable, 20% each moderately disagreed or decided to stay neutral. In spite of the higher neutral response in information security in table 18, most of the respondents still hold the view that the system is dependable.

Again, a total of 60% of the respondents strongly disagree and moderately disagree that there was uninterruptible internet supply to ensure the service continuity. Two(2) participants representing 20% moderately agree to this statement while another 20% have not yet decided. In the researcher's view, the high disagree levels may be partly due to the fact that the school has not subscribed to any unlimited internet service hence the need to halt the service to recharge internet bundle whenever it becomes necessary.

A total of 60% of the respondents strongly disagree or moderately disagree that the creators or managers of the e-learning contents do not give the necessary feedback whenever it is required. Another 30% of the respondents strongly agree or moderately agree that the feedback they get from the various managers or content creators are adequate. Teachers want a detailed explanation on why certain answers to questions are correct or wrong but on the contrary, most of these providers only highlight the correct answers at the end of an online tests.

Responses on whether the online services require installation of sophisticated client-side apps yielded this response, an overwhelming 70% moderately disagree or strongly disagree to this statement. This signifies that the systems do not require any skilled personnel to use them.

Table 20: Teachers' Response on their Intention to Use E-learning

Response	I am eager to recommend e-learning services to my students and other teachers		I intend to blend the e-learning with face-to-face mode in subsequent semesters		Government ought to implement e-learning services in Senior High schools in Ghana		I intend to use the e-learning services more to reach students during vacation breaks	
	%	N	%	N	%	N	%	N
Strongly disagree	0	0	0	0	0	0	0	0
Moderately disagree	10	1	10	1	0	0	0	0
Neutral	10	1	30	3	20	2	40	4
Moderately agree	60	6	60	6	10	1	50	5
Strongly agree	20	2	0	0	70	7	10	1
Total	**100**	**10**	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

The table 20 above shows the response gathered from the statement "I am eager to recommend e-learning services to my students and other teachers", a total of eight respondents representing 80% moderately agree and strongly agree that they will recommend the e-learning to others while 10% moderately disagree to this statement. This suggests that though the e-learning approach has its own challenges, teachers see it as a useful tool in our educational setting hence the eagerness to recommend to others.

Also, 6 respondents representing 60% moderately agree that they intend to blend the e-learning with the face-to-face mode of lesson delivery whereas 10% moderately disagree and 30% of the respondents chose to stay neutral. This indicates that although most of the participants intend to use the services, others have their own doubts about the possibilities of blending the two methods.

Again, a total of 80% of the participants strongly agree and moderately agree that government ought to implement this learning mode in senior high schools across Ghana whiles 20% stayed neutral in their response. This depicts that teacher expect the government to do more to ensure that the e-learning environment is replicated in all senior high schools.

Lastly, a total of 60% of the participants moderately agree and strongly agree that they intend to reach their students with the e-learning activities during vacation breaks and 40% stayed neutral. An indication that though most teachers intend to use the service during vacations, others are unsure about the requirements that need to be met to ensure that a smooth activity is achieved.

Table 21: Teachers' Response on their Level of Satisfaction with E-learning

Response	Am satisfied with the online learning services		Online learning services have simplified my teaching and learning environment		I am satisfied with the feedback or the responses I get from the system		I am satisfied with the support provided by the online team responsible while using their service	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Strongly disagree	0	0	10	1	0	0	30	3
Moderately disagree	0	0	0	0	0	0	50	5
Neutral	10	1	20	2	10	1	20	2
Moderately agree	50	5	50	5	40	4	0	0
Strongly agree	40	4	20	2	50	5	0	0
Total	**100**	**10**	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

Table 21 above depicts the responses obtained from the construct of *user satisfaction*. A close gaze at the table reveals that a total of 90% moderately agree and strongly agree that they are satisfied with the e-learning services. Again, 70% moderately agree and strongly agree that the online learning services have simplified their teaching and learning environment while 10% strongly disagree to that statement. According to a total of 9 respondents representing 90%, they moderately agree or strongly agree that they are satisfied with the feedback they get from the systems. A contrasting response also reveals that a total of 80% of the respondents strongly disagree and moderately

disagree that they are satisfied with the support provided by the respective online teams or service providers while using the service. This implies that though most of the respondents are satisfied with the online services, the system's response and how e-learning simplifies teaching and learning environment, they do not get the needed support or additional support from the providers or the content creators.

Table 22: Teachers' Response on The Use Construct of Delone and Mclean's ISS Model

Statement	Usage	Frequency	Percentage%
I assign students to online task this number of times in a semester	1-2	8	80
	3-4	2	20
	5-6	0	0
	7-8	0	0
	9-10	0	0
	None	0	0
How many hours do you engage students in each instance?	1-2	10	100
	3-4	0	0
	5-6	0	0

Source: Field work 2019

Table 22 presents responses to a statement on the frequency of use of the e-learning service and this was represented on a scale ranging from *0= none,1 = 1-2, 2 = 3-4, 3 = 5-6, 4 = 7-8, 5 = 9-10.*

The statements highlighting the *use* construct of Delone and McLean ISS model were presented to the respondents to describe their level of usage of the systems. Eight (8) of the respondents representing 80% admitted that they usually assign one (1) to two (2) online-related tasks to students in a semester and these tasks usually lasts for one to two hours whereas 20% of the respondents give three (3) to four (4) tasks to students which also lasts for the same duration. This means that all the teachers use the e-learning

services at varying degree of frequency and this may be affected by factors such as curricular, co-curricular and extra-curricular activities.

Table 23: Teachers' Response on The Net Benefits Of E-Learning to Their Teaching

Response	There is real benefit for using the online learning systems		The e-learning situation has made my job easier.		I have seen tremendous improvement in students' academic performance.	
	%	N	%	N	%	N
Strongly disagree	0	0	0	0	0	0
Moderately disagree	0	0	10	1	0	0
Neutral	20	2	10	1	60	6
Moderately agree	60	6	50	5	30	3
Strongly agree	20	2	30	3	10	1
Total	**100**	**10**	**100**	**10**	**100**	**10**

Source: Field work 2019

The table 23 shows participants' response on the overall benefits of the e-learning situation to teachers. Two (2) respondents representing 20% remained neutral in their responses while a total of 80% moderately agreed and strongly agreed that there is a real benefit for using the online learning systems. Again, a total of 80% moderately agree and strongly agree that the e-learning situation has made their jobs easier whereas 10% each were neutral in their responses or moderately disagree. The level of benefit e-learning has on students' academic performance also yielded the following results; a

total of 40% are of the moderately agree and strongly agree that they have seen tremendous improvement in students' academic performance while 60% stayed neutral in their response. From the outcome of the findings, teachers somewhat agree that e-learning is beneficial to the students and teachers and makes their job (teaching) easier. However, higher neutral response shows that it is either most teachers have not taken their time to analyse the impact it is likely to have on the academic performance of the students or they have not seen any remarkable improvement in the students' performance.

Table 24: Descriptive Analysis of The Constructs from Teachers' Responses

Construct	Mean	Item
Information quality	3.55	**Q1**. The overall information I get from the various learning services are complete and accurate.
		Q2. The overall information students get from the learning services is within their level.
		Q3. The information students get from the online service is relevant to my subject and topics.
		Q4. The information from the online learning services are secured.
Service quality	2.60	Q1. The online learning services are dependable.

		Q2. There is uninterruptible internet access to ensure that the services are available for use.
		Q3. The support staff of the selected learning services give me feedback whenever it is required.
		Q4. The service requires installation of sophisticated client-side apps.
System quality	3.33	Q1. The online learning services is available most of the time
		Q2. Overall, the online learning service is reliable with minimal downtime.
		Q3. The response time of the online learning services is very good.
		Q4. The online services are easy to use
Intention for use	3.90	Q1. I am eager to recommend e-learning services to my students and other teachers.
		Q2. I intend to blend the e-learning with face-to-face mode in subsequent semesters.
		Q3. Government ought to implement e-learning services in Senior High schools in Ghana.
		Q4. I intend to use the e-learning services more to reach students during vacation breaks.

User satisfaction	3.58	Q1. Am satisfied with the online learning services. Q2. Online learning services have simplified my teaching and learning environment. Q3. I am satisfied with the feedback or the responses I get from the system. Q4. I am satisfied with the support provided by the online team responsible while using their service.
Use	1.10	Q1. I assign students to online task this number of times ***in a semester*** Q2. How many hours do you engage students in each instance?
Net benefit	3.83	Q1. There is real benefit for using the online learning systems Q2. The e-learning situation has made my job easier. Q3. I have seen tremendous improvement in students' academic performance.

Table 24 presents the Means for the various constructs of the Delone and McLean's ISS model from teachers' point of view. The findings record low levels of the overall quality of the service and the level of usage with mean of 2.60 and 1.10 respectively whereas intention for use and user satisfaction recorded mean scores of 3.9 and 3.83 respectively. This is a clear indication that irrespective of the level of quality of the

service, teachers are satisfied with the use of the e-learning environment and have the intention to use e-learning facilities to enhance their future lessons.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Overview

The aim of this study is to analyse the impact of e-learning on the academic achievement of students using Delone and McLean's information system success model.

. This chapter summarizes the entire research process. A brief summary of the whole study is given. It also highlights the summary of the key findings of this study, conclusions of the study, recommendations and suggestions for future studies.

5.2. Summary of Findings

All the students used in this study were females (150) mostly between the ages of 16 and 17 years, an indication that this study was carried out in a gender-biased environment.

The study sought to assess the impact of e-learning on the academic performance of students of Methodist Girls' Senior High School in the Akuapem-North Municipality of the Eastern Region. The findings revealed that 94% of the participants did not have any other means to acquiring new knowledge apart from the conventional face-to-face mode and 74% were not satisfied with this face-to-face study mode in the above-mentioned school.

More precisely, the research exposed students to various e-learning systems and materials to ascertain its impact on students' performance.

The outcome of the study reviewed under the Delone and Mclean's Information system success model are summarized as follows:

5.3. Conclusion

This study sought to assess the impact of electronic learning on students' academic performance. The DeLone and McLean's ISS model was adopted to measure the success of the e-learning environment under study.

The influence of this e-learning system on students' academic performance was systematically tested by means of the six constructs which are; intension to use/use, user satisfaction, system quality, information quality, service quality and net benefit. The results show that e-learning environment is very helpful or beneficial to both students and teachers if they have the intention to use the system. However, some levels of enhancement are expected in the quality of service and system as well as the its usage as highlighted by the constructs below.

5.3.1 Information quality

The information quality construct had an overall mean score of 2.8. An indication that participants were not quite sure about the quality of the information they receive from the various systems as 64% of the respondents decided to stay neutral in response to both accuracy of the information they receive from the system and the security of such information. According to 62% of the respondents, they find it difficult to comprehend the information from the e-learning systems however a total of 70% of the teachers think the information available to the students are complete and accurate and relevant to their subject area topics though they are not sure if the information is secured, information quality response had a mean score of 3.55.

5.3.2 Service Quality

The service quality construct was calculated at a mean of 2.88. The underlying factor for the this score is largely due to the fact that students have not been exposed to all the features of the various system in order to equip them adequately to use the systems, this

factor consequently led to the low rating in this construct as 46% of the participants were not sure whether the system has a sophisticated interface.

Teachers' response on this construct was calculated at a mean of 2.60 which was partly due to the fact that the online service was not always available and they do not get support from the service providers or the content creators when the need arises.

5.3.3 Service Quality and Intention to Use/Use

The researcher sought to establish the influence the quality of the e-learning service has on students' intention to use this online environment. The results revealed that most of the participants (62%) moderately agree that the service is available anytime they show up to use the e-learning service and the service was rated usable whereas the question about whether one can depend on the service still remains. The service quality received a calculated mean of 3.7 while the 'intention to use construct received an overwhelming mean score of 4.09, a clear indication that students are eager to use the e-learning service in spite of the fact that they cannot fully depend on the services provided by the e-learning systems.

The *use* construct which is viewed as the most appropriate and regularly assessed construct in evaluating the success of information system was calculated at mean score of 1.48. This is an indication that the online systems had low benefaction to the participants as all the students used the system between one to six times weekly while 92 percent of them used the system between one and two hours daily. This was largely due to the fact that e-learning is not part of the school timetable and therefore the construct of *use* was greatly influenced by curricular, co-curricular and extra-curricular activities of the school. Low rating of the *use* affect the importance of incorporating e-learning in the conventional study mode in our schools. This may imply that students do

not attach any level of importance to the e-learning activities. However, a contradicting result reveal that the *intention to use* construct was rated at a mean score of 4.09, an indication that students have the intention to use the e-learning environment though other school activities limit the amount of time they spend in using the e-learning services. The teachers' response to these constructs also validates this finding with mean scores of 2.60 and 3.90 for Service quality and intention to use.

5.3.4 User Satisfaction and System quality

From the 2.73 mean score, a conclusion can be drawn that the respondents are somehow not happy with the level of quality of the online learning systems and its related content though the systems were reported to be usable. The contents were drawn from electronic books, youtube videos, DVDs and other educational websites which in the view of the researcher are media which are not new to the participants. This means that if these systems are readily available and user-friendly, users would be satisfied with the overall performance of these systems. Teachers on the other hand, rated the user satisfaction at a mean score of 3.58 which proves that the teachers are somewhat satisfied with the system because they have more knowledge in the use of these e-learning systems and how to make the best out of them.

5.3.5 Estimated Net Benefit of the E-Learning Systems

The assessment of the *net benefit* construct is perceived to be the most outstanding one since all the other constructs point to the benefits users are likely to derive from the system and this was calculated at a mean score of 3.68, an indication that amidst the usage and satisfaction levels, students still derived an appreciable number of benefits from the e-learning environment. The results obtained highlights the fact that there is significant connection between system quality, service quality, information quality, user

satisfaction, intention to use/use and net benefit of an electronic learning environment. This finding reflects the idea that students appreciate the net benefits of an e-learning system due to their intention to use the system. However, this should encourage the other constructs that were ranked low in this study especially the use of the system, the results obtained from the teachers' response also confirms this finding.

5.4. Recommendations

This study recommends the following based on the findings and what was learned.

- Students and teachers have the intention to use the e-learning facility therefore schools must make sure that students are directed to the right information and if possible, a part of the school curriculum must be dedicated to the eLearning environment and workshops organized for teachers who may be handicapped in this area.
- All stakeholders such as parents, teachers and the government must get actively involved in approving the right e-learning contents and systems for use as well as designing and implementation of those that reflect our unique educational needs as a country.
- An ideal e-learning setup must be decentralized so that its administration and maintenance are regulated by the very people who use the system who are in this case the teachers of the various subjects.

REFERENCES

(2016, August 11). Retrieved 11 17, 2018, from Ghanaweb: http://ghanaweb.com

(2017, 7 13). Retrieved 9 19, 2018, from Ghanaweb: http://ghanaweb.com

(2018, 6 26). Retrieved 9 19, 2018, from Modern ghana: http://modernghana.com/news

Acton, T., Halonen, R., Conboy, K., & Golden, W. (2009). DeLone & McLean success model as a descriptive tool in evaluating the use of a virtual learning environment. 10-16. Retrieved August 24, 2019, from https://aran.library.nuigalway.ie/xmlui/bitstream/handle/10379/222/OLKC2009_4DRaijaHalonen.pdf?seq..

Adams, D., Sumintono, B., Mohamed, A., & Noor, N. S. (2018). E-Learning Readiness among Students of Diverse Backgrounds in a Leading Malaysian Higher Education Institution. *Malaysian Journal of Learning and Instruction, 15*(2), 233-244. Retrieved May 15, 2019, from https://files.eric.ed.gov/fulltext/EJ1201661.pdf

Al Gamdi, A. M., & Samarji, A. (2016, January). Perceived Barriers towards e-Learning by Faculty Members at a Recently Established University in Saudi Arabia. *International Journal of Information and Education Technology, 6*(1), 23-27. doi:10.7763/IJIET.2016.V6.652

Aldowah, H., Ghazal, S., & Muniandy, B. (2015). Issues and Challenges of using E-Learning in a Yemeni Public University. *Indian Journal of Science and Technology, 8*(32), 1-8. doi:10.17485/ijst/2015/v8i32/92160

Alzahrani, I. A., Mahmud, I., Ramayah, T., Alfarraj, O., & Alalwan, N. (2019). Modelling digital library success using the DeLone and McLean information system success model. *Journal of Librarianship and Information Science, 51*(2), 291-306. Retrieved August 24, 2019, from https://www.researchgate.net/profile/Imran_Mahmud2/publication/319247083_Modelling_digital_library_success_using_the_DeLone_and_McLean_information_system_success_model/links/59dca4500f7e9b1460038407/Modelling-digital-library-success-using-the-DeLone-and-M

Bada, O. S., & Olusegun, S. (2015). Constructivism Learning Theory: A Paradigm for Teaching and Learning. *IOSR Journal of Research & Method in Education (IOSR-JRME), 5*(6), 66-70. Retrieved April 19, 2019, from http://www.academia.edu/download/54094559/Constructivism.pdf

Baturay, H. M., Gökçearslan, Ş., & Ke, F. (2017). The relationship among pre-service teachers computer competence, attitude towards computer-assisted education, and intention of technology acceptance. *International Journal of Technology Enhanced Learning, 9*, 1-13. doi:10.1504/IJTEL.2017.10003119

Bell, B. S., & Federman, J. E. (2013). Retrieved 9 29, 2018, from http://scholar.google.com

Bener, A. (2016, March). Prevalence and Determinants of Common Fears in Children and their Socio-demographic Characteristics. *European Psychiatry, 33*, 1-3. doi:10.1016/j.eurpsy.2016.01.180

Boelens, R., Van Laer, S., De Wever, B., & Elen, J. (2015). Blended learning in adult education: towards a definition of blended learning. *Adult Learners Online!*

Blended and Online Learning, 1. Retrieved August 26, 2019, from https://biblio.ugent.be/publication/6905076/file/6905079

Brace, I. (2018). *Questionnaire design: How to plan, structure and write survey material for effective market research.* London: Kogan Page Publishers.

Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. *Internet and higher Education, 33*, 24-32. doi:https://doi.org/10.1016/j.iheduc.2017.01.004

Brown, H. D. (2007). *Principles of language teaching and learning* (5th ed.). New York, U.S.A.: Longman.

Bryman, A. (2012). *Social Research* (5 ed.). (5, Ed.) New York, United States: Oxford University Press Inc.

Burns, A., & Richards, J. C. (2009). *Second Language Teacher Education.* Cambridge, England: Cambridge University Press.

Camilleri, M. A., & Camilleri, A. C. (2017). Digital Learning Resources and Ubiquitous Technologies in Education. *Technology, Knowledge and Learning, 22*(1), 20-22. doi:10.1007/s10758-016-9287-7

Castillo-Merino, D., & Serradell-López, E. (2014). An analysis of the determinants of students' performance in e-learning. *Computers in Human Behavior, 30*, 476–484. doi:10.1016/j.chb.2013.06.020

Cela , K. L., Miguel, Á. S., & Sánchez, S. (2015). Educ Psychology Rev. *27*, p. 220.

Chen , W. S., & Yao , A. Y. (2016). An Empirical Evaluation of Critical Factors Influencing Learner Satisfaction in Blended Learning: A Pilot Study. *Universal Journal of Educational Research, 4*(7), 1667-1671.

Chen, S. W., & Yao, T. A. (2015). An empirical evaluation of critical factors influencing learner satisfaction in blended learning: A pilot study. *Universal Journal of Educational Research , 4*, 1667-1671. Retrieved August 25, 2019, from https://files.eric.ed.gov/fulltext/EJ1106235.pdf

Chinyamurindi, W., & Shava, H. (2015). An investigation into e-learning acceptance and gender amongst final year students. *South African Journal of Information Management, 17*(1), 1-9. doi:10.4102/sajim.v17i1.635

Clark, K. R. (2018). Learning Theories: Behaviorism. *Radiol Technol, 90*(2), 172-175. Retrieved April 18, 2019, from https://www.ncbi.nlm.nih.gov/pubmed/30420574

Concannon, F., Flynn, A., & Campbel, M. (2005). What campus-based students think about the quality and benefits of e-learning. *British Journal of Educational Technology, 36*(3), 501-512.

Coopasami, M., Pete, M., & Knight, S. (2017). e-Learning readiness amongst nursing students at the Durban University of Technology. *Health SA Gesondheid, 22*, 300-306. doi:10.4102/hsag.v22i0.1059

Curriculum Research and Development Division. (2010). *Teaching Syllabus for Information and Communication Technology(Core).* CRDD.

DeLone, W. H., & Ephraim, M. R. (2016). Information Systems Success Measurement. (D. R. Alan , Ed.) *Foundations and Trends in Information Systems, 2*(1), 6. doi: http://dx.doi.org/10.1561/2900000005

Deschacht, N., & Goeman, K. (2015). The effect of blended learning on course persistence and performance of adult learners: a difference-in-differences analysis. *Computers & Education, 87*, 83-89. Retrieved from https://www.sciencedirect.com/science/article/pii/S0360131515000986

Driscoll, P. M. (2005). *Psychology of Learning for Instruction.* London: Pearson.

Dunn, L. (2002, 6 27). Retrieved 9 22, 2018, from http://www.brookes.ac.uk/services/ocsd/2_learntch/theories.html

Edumadze, J. E., Ogoe, J. I., Essilfie, G., Edumadze, G. E., Osei-Gyasi, A. A., & Graham, R. E. (2017). E-learning at the university of cape coast, ghana-are our distance education students technologically ready? *The Online Journal of Distance Education and e-Learning, 5*(1), 7-9. Retrieved April 21, 2019, from www.tojdel.net

Etikan, I., Alkassim, R., & Abubakar, S. (2016). Comparision of snowball sampling and sequential sampling technique. *Biometrics & Biostatistics International Journal, 3*(1), 1-2. Retrieved June 3, 2019, from http://www.academia.edu/download/42569290/BBIJ-03-00055.pdf

Fisher, T. (2011). Quine's behaviorism and linguistic meaning: Why Quine's Behaviorism is not Illicit. *Philosophical Quarterly of Israel, 39*(1), 51-59.

Fleming, J., Becker, K., & Newton, C. (2017). Factors for successful e-learning: does age matter? *Education+ Training 59, 59*(1), 76-89. doi: https://doi.org/10.1108/ET-07-2015-0057

George , V. (2016). *Emergence and Innovation in Digital Learning : Foundations and Applications.* (G. Valestsianos, Ed.) Edmonton, Canada: Athabasca University Press.

Goldie, J. G. (2016). Connectivism: A Knowledge Learning Theory for the Digital Age? *Medical Teacher, 38*(10), 1064-1069. doi:10.3109/0142159X.2016.1173661

Gros , B., & García-Peñalvo, F. J. (2016). *Future trends in the design strategies and technological affordances of e-learning.* Retrieved 9 28, 2018, from http://scholar.google.com

Holsapple, W. C., & Lee-Post, A. (2006, 1). Decision Science and Information Systems Area, School of Management. *Decision Sciences Journal of Innovative Education, 4*(1), 147-156. doi:10.1111/j.1540-4609.2006.00102.x

Howatt, R. A. (2000). *A History of English Language Teaching* (3 ed.). Oxford, United Kingdom: Oxford University Press.

Huptych, M., Martin, H., Zdenek, Z., & Jakub, K. (2018). Investigating Influence of Demographic Factors on Study Recommenders. *Artificial Intelligence in Education, 10948*, 150-154. doi:10.1007/978-3-319-93846-227

Imenda, S. N. (2018). On the Unity of Behaviourism, Cognitivism and Constructivism in Teaching and Learning. *Int J Edu Sci, 20*(1-3), 86-94. doi:10.1080/09751122.2017.1334399

Information system success model. (n.d.). Retrieved August 29, 2019, from Wikipedia: https://en.wikipedia.org/wiki/Information_systems_success_model

Jeong, H. Y., & Hong, B. H. (2013). A practical use of learning system using user preference in ubiquitous computing environment. *Multimedia Tools and Application*, 64,491. doi:https://doi.org/10.1007/s11042-012-

Jiang, Q. C. (2014). Internet addiction among young people in China Internet connectedness, online gaming, and academic performance decrement. *Internet Research, 23*, 6-10. doi:10.1108/IntR-01-2013-0004

Juvova, A., Chudy, S., Neumeister, P., Plischke, J., & Kvintova, J. (2015). Reflection of Constructivist Theories in Current Educational Practice. *Universal Journal of Educational Research*, 345-349. doi:10.13189/ujer.2015.030506

Kassab, S. E., Al-Shafei, A. I., Salem, A. H., & Otoom, S. (2015). Relationships Between the Quality of Blended Learning Experience, Self-Regulated Learning, and Academic Achievement of Medical Students: a Path Analysis. (A. A. Majumder , Ed.) *Advances in Medical Education and Practice, 6*, 27-34. doi: https://doi.org/10.2147/AMEP.S75830

Kayri, M., & Ceyhan, G. (2016). Investigating the Effect of Certain Socio-demographic Factors on University Students' Level of Reflective Thinking by Using Regression Tree. *Anthropologist, 24*(3), 694-701 . Retrieved May 15, 2019, from http://krepublishers.com/02-Journals/T-Anth/Anth-24-0-000-16-Web/Anth-24-3-000-16-Abst-PDF/T-ANTH-24-3-694-16-1612-Kayri-M/T-ANTH-24-3-694-16-1612-Kayri-M-Tx[2].pdf

Kee, C. L., & Samsudin, Z. (2014). Mobile devices: Toys or learning tools for the 21st century. *The Turkish Online Journal of Educational Technology, 13*(3). Retrieved April 19, 2019, from https://www.researchgate.net/profile/Qiaolei_Jiang/publication/236274121_Internet_addiction_among_young_people_in_China_Internet_connectedness_online_gaming_and_academic_performance_decrement/links/57bff67e08aed246b0f7deda.pdf

Kirk, R. E. (1995). *Experimental Design: Procedures forthe Behavioral Sciences* (3 ed.). Pacific Grove, CA:.

Kratochvil, J. (2014). Efficiency of e-learning in an information literacy course for medical students at the Masaryk University. *The electronic library, 32*(3), 322-340. Retrieved April 5, 2019, from https://core.ac.uk/download/pdf/83518934.pdf

Kristanto, A. (2017). The Development of Instructional Materials E-Learning Based On Blended Learning. *International Education Studies, 10*, 10-17. doi:doi.org/10.5539/ies.v10n7p10

Kweon, B.-S., Ellis, C. D., Lee, J., & Jacobs, K. (2017). The link between school environments and student academic performance. *Urban Forestry & Urban Greening, 23*, 35–43. Retrieved April 25, 2019, from https://www.researchgate.net/publication/313316009

Kweon, B.-S., Ellis, C. D., Lee, J., & Jacobs, K. (2017). The link between school environments and student academic performance. *Urban Forestry & Urban Greening, 23*, 35-43. doi:10.1016/j.ufug.2017.02.002

Lau, Y. C., & Shaikh, M. J. (2012). The impacts of personal qualities on online learning readiness at Curtin Sarawak Malaysia (CSM). *Educational Research and Reviews, 7*(20), 430-444.

Lawless, S., O'Donnell, E., Sharp, M., & Wade , V. (2015). A Review of Personalised E-Learning: Towards Supporting Learner Diversity. *International Journal of Distance Education Technologies*, 22.

Leech, N. L., Collins, K. M., & Onwuegbuzie, A. J. (2017). Collecting Qualitative Data to Enhance Social Network Analysis and Data Mining. *Encyclopedia of Social Network Analysis and Mining*, 1-11. Retrieved July 19, 2019, from https://link.springer.com/content/pdf/10.1007/978-1-4614-7163-9_395-1.pdf

Malina, M., Nørreklit, H. S., & Selto, F. H. (2010, 10 27). *Lessons Learned: Advantages and Disadvantages of Mixed Method Research.* Retrieved 9 28, 2018, from Google scholar: http://google.scholar.com

Manwaring, K. C., Larsen, R., Graham, C. R., Henrie, C. R., & Halverson, L. R. (2017). Investigating student engagement in blended learning settings using experience sampling and structural equation modeling. *The Internet and Higher Education, 35*, 21-33. doi:10.1016/j.iheduc.2017.06.002

Marilynne, C., Stephen, K., & Mari, P. (2017). e-Learning readiness amongst nursing students at the Durban University of Technology. *Health SA Gesondheid, 22*, 300-306. doi:10.4102/hsag.v22i0.1059

Mason, R., & Rennie, F. (2008). *E-Learning and Social Networking Handbook:Resources for Higher Education.* 270 Madison Ave, New York, NY 10016: Routledge.

Mitchell, R., & Myles, F. (1998). *Second Language Learning Theories.* London: Arnold.

Morgan, D. L. (2007, 1). *Journal of Mixed Methods Research.* Retrieved 9 27, 2018, from http://jmmr.sagepub.com

Mothibi, G. (2015). A Meta-Analysis of the Relationship between E-Learning and Students' Academic Achievement in Higher Education. *Journal of Education and Practice, 6*(9), 6-9. Retrieved from https://eric.ed.gov/?id=EJ1082408

Naresh, B., Reddy, S. B., & Pricilda, U. (2016). A study on the relationship between demographic factor and e-learning readiness among students in higher education. *Sona Global Management Review, 10*(4), 1-11.

Oliver, K. M. (2000). Methods for developing constructivist learning on the web. *Educational Technology, 40*(6), 5-18. Retrieved April 20, 2019, from https://www.jstor.org/stable/44428633

Pandit, K. R. (2015). Pedagogy and Teaching Tools for Integration of New Knowledge. *Blended Learning*.

Pena, N., & Curado, C. (2017). Uncovering the pathways to e-learning success: A qualitative approach. *Online Journal of Applied Knowledge Management, 5*(1), 47. Retrieved April 19, 2019, from https://www.researchgate.net/publication/318055132

Pourfarhad, M., Davoudi, M., Zareian, G., & Amirian, S. M. (2018). Translation Strategies Used in Behaviourist, Cognitive, and Constructivist Approaches to Translation Instruction. *International Journal of Instruction, 11*(4), 139-158.

Retrieved February 15, 2019, from https://files.eric.ed.gov/fulltext/EJ1191703.pdf

Pritchard, A. (2009). *ways of learning: Learning Theories and Learning Styles in the Classroom* (2nd ed.). New York, USA: Routledge.

Rammutloa, M. W. (2017). Application of the Delone and McLean's model to assess the effectiveness of an intranet in an open distance learning library. 1,77-81. Retrieved August 24, 2019, from https://scholar.sun.ac.za/bitstream/handle/10019.1/100919/rammutloa_application_2017.pdf?sequence=1&isAllowed=y

Rashid, T., & Asghar, M. H. (2016). Technology Use, Self-Directed Learning, Student Engagement and Academic Performance: Examining the Interrelations. *Computers in Human Behavior, 63*, 604-612. Retrieved March 2, 2019, from http://elib.vums.ac.ir/bitstream/Hannan/21829/1/2016%20MT%20Volume%2038%20Issue%2010%20October%20%2819%29.pdf

Rasouli, A., Rahbania, Z., & Attaran, M. (2016). Students' Readiness for E-Learning Application in Higher Education. *Malaysian Online Journal of Educational Technology, 4*(3), 51-64. Retrieved May 14, 2019, from https://files.eric.ed.gov/fulltext/EJ1106478.pdf

Rogaten, J., Rienties, B., & Whitelock, D. (2017). Assessing Learning Gains. 117-132. doi:10.1007/978-3-319-57744-9_11

Sabri, A. (2014). Applying DeLone and McLean IS success model on sociotechno Knowledge Management System. *IJCSI International Journal of Computer Science, 11*(6), 160-165. Retrieved August 24, 2019, from

https://pdfs.semanticscholar.org/c0cb/bdb6c6e8f5d25e05e79ef76b607cbd3a19ea.pdf

Sangrà, A., Vlachopoulos, D., & Cabrera, N. (2012). Building an inclusive definition of e-learning: An approach to the conceptual framework. *International Review of Research in Open and Distance Learning, 13*(2), 145-159.

Sarfo, F. K. (2007). *Educational technology; instructional technology.* Kumasi: Ospra Publishing Company Limited.

Scott, C. L. (2015). THE FUTURES of LEARNING 3: What kind of pedagogies for the 21st century? *UNESCO Education Research and Foresight*(15).

Shand, K., Glasset-Farrelly, S., & Costa, V. (2016). Principles of course redesign: A model for blended learning. *Proceedings of Society for Information Technology & Teacher Education International Conference*, 378-389.

Sharma, G. (2017). Pros and cons of different sampling techniques. *International Journal of Applied Research, 3*(7), 749-752. Retrieved June 12, 2019, from http://www.allresearchjournal.com/archives/2017/vol3issue7/PartK/3-7-69-542.pdf

Shin, W. S., & Kang, M. (2015). The Use of a Mobile Learning Management System at an Online University and Its Effect on Learning Satisfaction and Achievement. *International Review of Research in Open and Distance Learning, 16*(3), 110-130 . doi:0.19173/irrodl.v16i3.1984

Shivaraju, T. P., Manu, G., Vinaya , M., & Savkar, K. M. (2017). Evaluating the effectiveness of pre-and post-test model of learning in a medical school. *National Journal of Physiology, Pharmacy and Pharmacology, 9*(7), 947-948.

Retrieved July 19, 2019, from https://www.ejmanager.com/mnstemps/28/28-1492680142.pdf?t=1502535181

Sidney, P. F. (2015). Evaluating a Behaviorist and Constructivist and Constructivist Theory for 21st Century Learners. *Georgia Educational Research Association Conference*, 4,7-13.

Siemens, G. (2004). Connectivism: A Learning Theory for the Digital Age. *International Journal of Instructional Technology and Distance Learning*.

Sink, D. L. (2014). Design Models and Learning Theories for Adults. *American Society for Training & Development (ASTD)*, 188-196. Retrieved from https://dsink.com/downloads/10SinkASTDhandbook.pdf

Spanjers, A. I., Könings, D. K., Leppink, J., Verstegen, D. M., de Jong, N., Czabanowska, K., & Van Merrienboer, J. J. (2015). The promised land of blended learning: Quizzes as a moderator. *Educational Research Review, 15*, 59-74. Retrieved August 26, 2019, from https://daneshyari.com/article/preview/357727.pdf

Stegers-Jager, K. M., Steyerberg, E. W., Cohen-Schotanus, J., & Themmen, A. P. (2015). Ethnic disparities in undergraduate pre-clinical and clinical performance. *Medical education, 49*, 124-133. doi:10.1111/medu.12536

Stegers-Jager, K. M., Steyerberg, E. W., Lucieer, S. M., & Themmen, A. (2015). Ethnic and social disparities in performance on medical school selection criteria. *Medical Education, 49*(1), 124–133. doi:10.1111/medu.12536

Waits, T., & Lewis, L. (2003). Distance education at degree-granting postsecondary.

Wong, L. (2012). Student attitudes towards e-Learning: The first-year accounting experience. *Issues in Informing Science and Information Technology, 9*, 195-200. Retrieved May 23, 2019, from https://pdfs.semanticscholar.org/d084/719f8221c6470ee14e7d18b5d9a16cdad511.pdf

Yakubu, N. M., & Dasuki, S. I. (2018). Assessing eLearning systems success in Nigeria: An application of the DeLone and McLean information systems success model. *Journal of Information Technology Education: Research,, 17*, 182-202. doi:https://doi.org/10.28945/4077

Yeboah, P., Dadzie, P. S., & Owusu-Ansah, C. M. (2017, 5). Information access and evaluation skills of secondary school students in Ghana. *Library Philosophy and Practice, 1552*.

Youssef, A. B., Dahman, M., & Omrani, N. (2015). Information technologies,students'e-skills and diversity of learning process. *Education and Information Technologies*, 1-13. doi: 10.1007/s10639-013-9272-x

Yu, P., & Qian, S. (2018). Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care. *PLoS ONE, 13*(1), 5-16. doi:9. https://doi.org/10.1371/journal.

Yu, T., & Jo, I.-H. (2014). Educational Technology Approach toward Learning Analytics: Relationship between Student Online Behavior and Learning Performance in Higher Education. *Proceedings of the Fourth International Conference on Learning Analytics And Knowledge*, 269-270. doi:10.1145/2567574.2567594

Zabadi, A. M., & Al-Alawi, A. H. (2016). University Students' Attitudes towards E-Learning: University of Business & Technology (UBT)-Saudi Arabia-Jeddah. *International Journal of Business and Management, 11*(6), 287. doi:10.5539/ijbm.v11n6p286

Zacharis, Z. N. (2015). A multivariate approach to predicting student outcomes in web-enabled blended learning courses. *The Internet and Higher Education, 27*, 44-53. Retrieved August 25, 2019, from https://daneshyari.com/article/preview/357727.pdf

Zhang, D., Zhao, L. J., Lina, Z., & Nunamaker, J. F. (2004, 5). Can E-learning replace classroom learning? *47*.

APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION

QUESTIONNAIRE FOR STUDENTS

The purpose of this questionnaire is to find out whether e-learning has any impact on your academic achievement as a student.

Kindly provide answers to the questions below. Your confidentiality and anonymity is assured.

Please tick appropriate boxes or write short sentences where necessary

A.

1.What is your age?

14 and below [ ]

15-17 [ ]

18-20 [ ]

2.Aside the face-to-face mode of study, did you have any alternate means of study?

YES [ ]

NO [ ]

If YES, specify…….

3.Are you satisfied with the overall, activities involved in your mode of study mentioned in item 2 above?

B. System quality	Strongly agree	Moderately agree	Neutral	Moderately disagree	Strongly disagree
The online learning services is available most of the time					
Overall the online learning service is reliable with minimal downtime.					
The response time of the online learning services is very good.					
The online services are easy to use					

C. information quality	Strongly agree	Moderately agree	Neutral	Moderately disagree	Strongly disagree
The overall information I get from the various learning services are complete and accurate.					

The overall information I get from the learning services is easy to understand.					
The information I get from the online service is relevant to my studies in the various subjects.					
The information from the online learning services are secured.					

D. service quality	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
The online learning services are dependable.					
There is uninterruptible internet access to ensure that the services are available for use.					
The support staff of the selected learning services give me feedback whenever it is required.					

The service requires installation of sophisticated client-side apps.					

E. Intentions for use	**Strongly agree**	**Agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
I am eager to recommend e-learning services to other students					
I intend to blend the e-learning with face-to-face mode in subsequent semesters.					
Government ought to implement e-learning services in Senior High schools in Ghana.					
I intend to use the e-learning services more during vacation breaks.					

F. User satisfaction	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**

Am satisfied with the online learning services.					
Online learning services have simplified my studies environment.					
I am satisfied with the feedback or the responses I get from the system.					
I am satisfied with the support provided by the teacher while using the service.					

G. Actual use	**1-2 Times**	**3-4 Times**	**5-6 Times**	**7-8 Times**	**9-10 Times**
I use the online services this number of times ***in a day***					
I use the services this number of times ***in a week***					
How many hours do you spend on the online services in a day? 1-2 hours [ ] 3-4 hours [ ] 5-6 hours [ ]					

H. Net benefits	Strongly agree	Moderately agree	Neutral	Moderately disagree	Strongly disagree
There is real benefit for using the online learning systems					
The e-learning situation has enabled me to control my learning activities easily					
I am more knowledgeable about how to locate additional information for my studies.					
I have acquired problem solving skills from the internet					

APPENDIX B

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION

QUESTIONNAIRE FOR TEACHERS

The purpose of this questionnaire is to find out whether e-learning has any impact on students' academic achievement. This will also enlighten the researcher on your views as far as e-learning integration into education is concerned.

Kindly provide answers to the questions below. Your confidentiality and anonymity is assured.

Please tick appropriate boxes or write short sentences where necessary.

Section A

1.What is your age?

25 and below [ ]

26-30 [ ]

31-35 [ ]

36-40 [ ]

41-45 [ ]

50 nd above [ ]

2.Aside the face-to-face mode of teaching and learning, do you give students any alternate means of study?

YES [ ]

NO [ ]

If YES, specify…….

3 Are you satisfied with the overall, activities involved in your teaching and learning mode mentioned in item 2 above?

YES [ ]

NO [ ]

A. System quality	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
The online learning services is available most of the time					
Overall the online learning service is reliable with minimal downtime.					
The response time of the online learning services is very good.					
The online services are easy to use					

B. information quality	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
The overall information I get from the various learning services are complete and accurate.					
The overall information students get from the learning services is within their level.					
The information students get from the online service is relevant to my subject and topics.					
The information from the online learning services are secured.					

C. service quality	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
The online learning services are dependable.					

There is uninterruptible internet access to ensure that the services are available for use.					
The support staff of the selected learning services give me feedback whenever it is required.					
The service requires installation of sophisticated client-side apps.					

D. Intentions for Use	**Strongly agree**	**Agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
I am eager to recommend e-learning services to my students and other teachers.					
I intend to blend the e-learning with face-to-face mode in subsequent semesters.					
Government ought to implement e-learning services in Senior High schools in					

Ghana.					
I intend to use the e-learning services more to reach students during vacation breaks.					

E. User satisfaction	**Strongly agree**	**Moderately agree**	**Neutral**	**Moderately disagree**	**Strongly disagree**
Am satisfied with the online learning services.					
Online learning services have simplified my teaching and learning environment.					
I am satisfied with the feedback or the responses I get from the system.					
I am satisfied with the support provided by the online team responsible while using their service.					

F. Actual use	1-2 Times	3-4 Times	5-6 Times	7-8 Times	9-10 Times
I assign students to online task this number of times ***in a semester***					

If response falls within 1-2 and 9-10 then answer question G2

How many hours do you engage students in each instance?

1-2 hours [ ]

3-4 hours [ ]

5-6 hours [ ]

G. Net benefits	Strongly agree	Moderately agree	Neutral	Moderately disagree	Strongly disagree
There is real benefit for using the online learning systems					
The e-learning situation has made my job easier.					
I have seen tremendous improvement in students' academic performance.					

APPENDIX C

UNIVERSITY OF EDUCATION, WINNEBA
DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION

PRE-TEST

The purpose of this test is to find out whether e-learning has any impact on students' academic achievement. This will also enlighten the researcher on your performance as far as e-learning integration into education is concerned.

1. **ICT stands for :**

   A. Inter connected Terminals

   B. Intera Common Terminology

   C. International Communication Technology

   D. Information and Communication Technology

2. **Which of the following is the appropriate definition of Information Technology?**

   A. Information Technology refers to the use of hardware and software for processing information

   B. Information Technology refers to the use of hardware and software for distribution of useful information

   C. Information Technology refers to the use of principles of Physical sciences and

Social sciences for processing of information of many kinds.

D. Information Technology refers to the use of hardware and software for storage, retrieval, processing and distributing information of many kinds.

3. Which of the following is not the characteristic of a computer?

A. computer cannot think at its own
B. computer is an electrical machine
C. computer processes information error free
D. computer can hold data for any length of time

4. Which of the following is the appropriate definition of a computer?

A. Computer is a machine that can process information.
B. Computer is an electronic device that can store, retrieve and quickly process only quantitative data.
C. Computer is a machine that can store, retrieve and process quickly and accurately only qualitative information.
D. Computer is an electronic device that can store, retrieve and process both qualitative and quantitative data quickly and accurately.

5. Which part of the Central Processing Unit (CPU) performs calculation and makes decisions:

A. Alternate Local Unit
B. American Logic Unit
C. Alternating Logic Unit
D. Arithematic Logic Unit

6. www represents:

A. word wide web B. world wide web
C. weird wide web D.who what and where

7. CD ROM stands for:

A. Compact Disk Read Only Memory
B. Compact Disk Read Over Memory
C. Computer Disk Read Only Memory
D. Computer Disk Read Over Memory

8. The 'brain' of a computer which keeps peripherals under its control is called:

A. Central Power Unit
B. Common Power Unit
C. Central Processing Unit
D. Common Processing Unit

9. Data can be saved on backing storage medium known as :

A. Compact Disk Rewritable
B. Computer Disk Rewritable
C. Compact Disk Recordable
D. Computer Data Rewritable

10. RAM means:

A. Rigid Access Memory
B. Rapid Access Memory
C. Random Access Memory
D. Revolving Access Memory

11. bit stands for

A. binary tree
B. binary digit
C. bivariate theory
D. binary information term

12. Which one of the following is an example of Operating System?

A. Microsoft Word B. Microsoft Excel
C. Microsoft Access D. Microsoft Windows

13. ALU stands for

A. Alternate Local Unit
B. American Logic Unit
C. Arithmetic Logic Unit
D. Alternating Logic Unit

14. Which of the following is not an output device?

A. Printer B. Monitor
C. Speaker D.Keyboard

15. Which of the following enables us to send the same letter to different persons in MS Word?

A. Mail join B. Mail copy
C. Mail insert D. Mail merge

16. Which is the largest unit of storage among the following?

A. Gigabyte B. Kilobyte
C. Megabyte D. Terabyte

17. WYSIWYG - describes the display of a document on screen as it will actually print:

A. What you see is what you get
B. What you save is what you get
C. What you state is what you get
D. What you suggest is what you get

18. Which of the following statements is correct?

A. Virus is a part of software
B. Virus is an operating system
C. Internet does not allow the virus to spread
D. Virus improves the speed of processing information through computer

19. Which of the following statements is NOT correct?

A. Computer is capable of processing only digital signal
B. Appropriate software is required for processing the data
C. Computer is capable of processing digital as well as analog signals
D. Computer is capable of analyzing both quantitative and qualitative data

20. Which of the following describes the categorization of computers by type?

A. Super, mainframe, and micro computers.
B. General and special purpose computers.
C. Digital, analogue and hybrid computers
D. Wearable computers and servers

APPENDIX D

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY EDUCATION

POST-TEST

The purpose of this test is to find out whether e-learning has any impact on students' academic achievement. This will also enlighten the researcher on your performance as far as e-learning integration into education is concerned.

1. **Which of the following is correct statement?**

   A. A set of instructions is called a programme
   B. Computers can be used for diagnosing the difficulty of a student in learning a subject
   C. Psychological testing can be done with the help of computer provided software is available
   D. All of the above

2. **Use of an ordinary telephone as an Internet applicance is called:**

   A. voice net B. voice line
   C. voice portal D. voice telephone

3. **LAN stands for:**

   A. Live Area Network B. Local And National
   C. Local Area Network D. Large Area Network

4. **Which of the following statement is correct?**

   A. Modem is a software
   B. Modem is the operating system
   C. Modem helps in stabilizing the voltage
   D. Modem converts the analog signal into digital signal and vice-versa

5. **Which of the following is the appropriate format of URL of e-mail?**

   A. www.mail.com B. www_mail.com
   C. www@mail.com D. WWW@mail.com

6. **Which of the following is not a Computer language?**

   A. UNIX B. COBOL
   C. PASCAL D. FORTRAN

7. **An E-mail address is composed of:**

   A. one-part B. two parts

C. three parts D. four parts

8. HTML is basically used to design:

A. Web-site B. Graphics
C. Web-page D. Tables and Frames

9. What do you need to put your web pages on the www?

A. a web server
B. a web browser
C. a connection to internet
D. all of the above

10. Computers on an internet are identified by

A. IP address B. street address
C. e-mail address D. none of the above

11. DNS in internet technology stands for

A. Domain Name System
B. Dynamic Name System
C. Distributed Name System
D. None of these

12. HTML stands for

A. Hyper Text Managing Links
B. Hyper Text Markup Language
C. Hyper Text Manipulating Links
D. Hyper Text Manipulation Language

13. Which of the following operating system is used on mobile phones?

A. Android B. Windows XP
C. Windows Vista D. All of the above

14. Internet explorer is a type of

A. Browser B. Compiler
C. IP address D. Operating System

15. A Personal Computer uses a number of chips mounted on a circuit board called

A. Mother Board B. System Board
C. Daughter Board D. Microprocessor

16. The acronym FTP stands for

A. File Transfer Protocol
B. File Tracking Protocol
C. Fast Transfer Protocol
D. File Transfer Procedure

17. Which one of the following is not a search engine?

A. Bing B. Yahoo
C. Google D. Chrome

18. Which of the following is not an input device?

A. Monitor B. Joystick
C. Keyboard D. Microphone

19. An unsolicited e-mail message sent to many recipients at once is a

A. Virus B. Worm
C. Spam D. Threat

20. The software used to navigate through the web is known as

A. Website B. Internet
C. Web Browser D. World Wide Web