EFFECTS OF GAMIFICATION AND ILIAS ONLINE LEARNING PLATFORMS ON LEARNING OUTCOMES IN EDUCATIONAL TECHNOLOGY AMONG UNIVERSITY STUDENTS IN NIGERIA

BY

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ABSTRACT

This study investigated the effects of gamification and ILIAS online learning platforms on learning outcomes in educational technology among university students in Nigeria. The study examined the impact of achievement, retention and motivation of students taught using gamification, ILIAS and conventional lecture method. A Quasi-Experimental Pre-test, Post-test, Non-equivalent Control Group Design was adopted for the study. The sample for the study consisted of second year educational technology university students drawn from three Universities from three geo-political zones in Nigeria. A random sampling technique was adopted to select three universities offering educational technology. They were purposively assigned for the study as experimental group I, experimental group II and control group respectively. Ten research questions were raised and six hypothesis were formulated and tested at 0.05 level of significance. Three research instruments (Test instrument, treatment instruments and motivation inventory questionnaire) were developed, duly validated and reliability was established (0.93, 0.90 and 0.91 respectively) before using the instruments for data collection. Data collected were analysed using decision mean and standard deviation while Analysis of variance (ANOVA) was used to test the hypotheses. The results indicated that students exposed to gamification and ILIAS learning platforms performed better than those students in the control group and also there was significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform. HO_1: (F = 460.109, P-value = .000) HO_2: (358.160, .000) HO_3: (4.551, 0.035) HO_4: (0.428, 0.514) HO_5: (4.913, 0.028) HO_6: (.188, .665). The result also showed that majority of the students indicated high level of motivation towards the use of gamification and ILIAS learning platforms. Based on the findings of the study, it was recommended that Universities and other tertiary institutions should implement the use of gamification and ILIAS learning platforms in teaching and learning process for the purpose of enhancing learning outcome.

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GLOSSARY

ACRONYM	MEANING
DE	Distance Education
ETAT	Educational Technology Achievement Test
GLP	Gamification Learning Platform
ILIAS	Intergrated Learning, Information and work Cooperation System
ILP	ILIAS Learning Platform
LMS	Learning Management System
MOOC	Massive Online Open Courses
OSS	Open Source Software

<div align="center">**CHAPTER ONE**</div>

1.0 <div align="center">**INTRODUCTION**</div>

1.1   Background to the Study

Educational Technology has become an important part of modern education as it creates opportunities for learners to develop their cognitive, critical thinking, information reasoning and communication skills. It has played a vital role in the education system and have promoted the introduction of online learning platforms. Learning through the use of online learning platforms is a trending practice in the education world and educational technology tools form the vehicle through which these platforms are being integrated into the classroom.   Educational technology can be seen as a process of solving educational problems and concerns, which might include motivation, discipline, drop-out rate, school violence, basic skills, and a whole lot of educational concerns (Osakwe, 2012).

Educational technology is a field of study that investigates the process of analysing, designing, developing, implementing, and evaluating the instructional environment and learning materials in order to improve teaching and learning (Delhin, 2012). It caters for individual's academic needs and abilities through the use of modern instructional technology such as the internet, Learning Management System (LMS), online learning and where mobile technologies are used. It has the potential to enhance teaching and learning activities and create an ideal learning environment. Hence, it becomes an integral part of both the teaching and learning process (Salleh & Iahad, 2011).

Educational technology at higher institutions of learning, especially in the universities and colleges of education is valued and its application requires knowledge from several areas such as pedagogy, psychology, didactics, computer sciences and informatics.

Because of these different areas, educational technology is still not being applied adequately (Onasanya *et al.,* 2012). In spite of the prevalent use of a variety of efficient online learning platforms which are learner-centred and focus on delivery of great learning experiences at different periods to improve classroom teaching in Nigeria, the use of conventional teacher-centred method continued (Olutola & Olatoye, 2017). Ukpong (2012) stated that this conventional method of teaching are not logically sequenced to fit the ability of the learners, as teachers could not provide teacher-led practice to engage in reciprocal teaching such as online learning.

Online learning, briefly written as e-learning is an inclusive term that describes the use of modern technologies for teaching and learning such as computers, digital technology, networked digital devices, associated software and course ware. Hedge and Hayward (2004) defined it as an innovative approach for delivering electronically mediated, well-designed, learner-centred and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in connection with instructional design principles. Online learning is becoming the conservative approach of teaching students in universities worldwide, changing the education systems which are now focusing on learning through new technological methods such as Integriertes Lern-, Informations- und Arbeitskooperations System (ILIAS) LMS, Moodle, mobile learning, flipped learning, massive online open courses (MOOC), gamification and so on. Access to instruction through online learning is flexible, ensures broad viability and availability of educational content. It is a cost-effective system of instruction and learning materials can be accessed irrespective of time and space (Ahmed, 2012).

The use of online learning is not a new phenomenon in promoting education in some parts of the world. Presently, some institutions in Nigeria are using it to promote distance education (DE) and lifelong learning (Eke, 2011). However, the teaching

model in Nigerian universities is inconsistent with the use of online technologies such as Integriertes Lern-, Informations- und Arbeitskooperations System (ILIAS) and gamification learning platforms, which can be used to enhance teaching and learning.

ILIAS is a German word for "Integrated Learning, Information and Work Cooperation System". It is an open source web-based learning management system (LMS). It supports learning content management and tools for collaboration, communication, evaluation and assessment. It was originally developed in 1998 at the University of Cologne, Germany and it is now being used by many large corporations, organizations and universities (ILIAS, 2015). ILIAS main objective is to provide a flexible environment for online learning. The integrated tools give opportunities that go far beyond the idea that education only consists of creation and completing of a particular course. It could easily be seen as a library, which houses various learning materials. They, in turn, can be made available for non-registered users, making the platform a free knowledge repository.

ILIAS goes far beyond the idea of learning being confined to courses online alone. It offers the possibility for teachers to teach course content as well as plugged in virtual classrooms and assess students' performance while students who missed a lecture are able to catch up using the recorded sessions. Also, when students live far apart or the number of students is low, an online lecture is a good alternative for the regular lecture. Students on the other hand will be able to learn course content at any available location, check their assessment scores, create and design learning materials (Hanson & Asante, 2014). Equally, the use of game elements in online learning may probably promote a successful learning process.

Gamification of learning is an educational approach that involves selecting elements of games and using them to create a game-like environment in a non-game context. It also involves utilizing a challenge or game to teach or support classroom concepts. These game elements include items such as points, leader boards, and badges. However, game elements also can include avatars, three-dimensional environments, feedback, ranks, levels, competition, communication systems, and time pressures (Hanus & Fox, 2015). A game offers students instant feedback, gives students who might otherwise have sat quietly in the background a chance to participate, and can place an emphasis on practice and mastering the information. One of the major benefit of gamification in the classroom is its versatility. Teachers can choose whether to make an individualistic game out of learning for the whole class to play at once, or a game played in small groups to encourage teamwork (Goehle, 2013). This change in direction may benefits students who are not motivated to engage with concepts through reading a textbook or memorizing course materials.

Gamification online learning platform is a technology-supported game that is intended to result in a desirable change in the player's knowledge while gamification serve the primary purpose of being a game, and a secondary goal of teaching something (Goehle, 2013). Gamification learning platform helps to establish flow by taking student's out of their normal routine and presenting them with a series of tasks that are engaging enough to prevent students' minds from wandering. However, currently, there has not been much research to explore the influence of gamification in Nigerian universities. Given that it is still an emerging technology.

Gamification and ILIAS are both online learning platforms that are becoming the conventional approach of teaching students in universities, which provides greater variation in the learning experience and can supply greater adaptability to the learners

needs (Weimer, 2013). They consist of tools for learning, authoring, information access and cooperative work, thus presenting an integrated environment for learning and teaching on the internet. Students can create groups to work through learning materials and communicate with each other. These platforms are available for all registered users, and the learner can repeat each lesson as many times as he or she wants. Mole (2011) added that online-learning platforms have a capacity to address the scarcity of teaching and research materials in the libraries of institutions of higher learning. It would allow students, lecturers and researchers to share their own research outputs with the global community and improve the provision of current e-books, e-journals and other library resources.

University is the highest level of education where the high level manpower, intellectual and future leaders are developed. It is a place where students come together to pursue knowledge and it promotes the development of intellectual capacities of individuals to understand and appreciate their environments (Ahmed, 2012). Universities therefore educate future leaders and develop the high-level technical capacities that underpin economic growth and development. University education is regarded as an instrument of social, political and economic development. The products of university education in any nation will determine the development of such nation. Therefore, university education contributes to national development through high level relevant manpower training in order to acquire both physical and intellectual skills which enable individual to be self-reliant and useful members of the society (Federal Republic of Nigeria, 2004).

However, research has shown that presently, Nigerian Universities are still lacking behind in the use of online learning platforms such as gamification and ILIAS learning platforms as an educational technology tool (Baba, 2014). While there is a great deal of knowledge and information about how online platforms are being used in developed

countries, there is not much information on how it is being used in Nigerian universities. According to Usman (2016), for Nigeria Government to be proud of quality educational development especially at the university level, it should be able to provide a viable, excellent and functional online learning driven education in order to improve learning outcomes among students.

Learning outcomes describe the knowledge or skills students should acquire by the end of a particular assignment, class, course or program and help students understand why that knowledge and those skills will be useful to them (Hubball & Burt, 2007). Learning outcomes are the minimum performances that must be achieved to successfully complete a course or programme. In this study, learning outcomes comprise academic achievement, retention and motivation which are part of the variables under study. Academic achievement according to Fakorede (2010) refers to knowledge and skills attained by a student in school subjects, designated by a score obtained in an achievement test. Accordingly, an achievement test is an instrument administered to an individual to elicit certain desires and expected responses, as demanded in the instrument, performance on which the individual is assigned a score representing his/her achievement. Fakorede (2010) also noted that academic achievement is always denoted by a score, which represents the amount of learning acquired, knowledge gained or skills and competencies developed in the school subject.

Academic achievement, according to Anyagh and Okwu (2010) is hinged on several factors such as: teaching method, intelligence, background, organization, opportunity, motivation, instructional procedures, teaching aids, interest of the learner and other environmental variable. So, in societies like Nigeria where standardized test of different kinds exist, the academic achievement of students is represented by the individual's response to standardized achievement test, and the level of response given to such tests

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can help in determing success. For a student to achieve well in an examination, the ability to recall what was learnt is a necessary condition. Furthermore, one can only recall what is retained and retention which is the ability to remember things learned by individuals at later time is necessary for better achievement.

Retention takes place when learning is coded into memory, and appropriate coding of incoming information provides the index that may be consulted hence enabling retention to take place without an elaborate search in the memory lane (Russell & Lehman, 2008). McGee (2013) stated that anything that aids learning improves retention while things that lead to confusion or interference among learned materials decrease the speed of and efficiency of learning and accelerate forgetting. It can be asserted therefore that the poor or low achievement in educational technology by university students is due to poor retention ability (Fareo, 2012). Therefore, Using gamification and ILIAS learning platform to teach may help in solving learning problems in educational technology encountered by university students and increasing their achievement, retention and motivation level.

Motivation is all those inner striving conditions described as wishes, desires, and urges to stimulate the interest of a person in an activity. Can (2014) opined that motivation is a state of empowerment having physiological, cognitive and affective dimensions of individuals energized for a certain goal. It is also the willingness to perform an action, increasing eagerness to work, directing efforts and directly affecting the performance of workers. It is an inner state that stimulates and triggers behaviour. Two main sources of motivation identified by Gambari *et al.* (2016) are intrinsic and extrinsic motivation. Intrinsic motivation is described as the internal desires and willingness to perform a particular task such as interest, enjoyment and satisfaction while extrinsic motivation refers to external factors which move an individual to carry out activities, such factors

include rewards, coercion, threat of punishment and so on. By applying gamification and ILIAS to the classroom, students may be motivated to learn in new ways or enjoy otherwise tedious tasks. Consequently, the effects of gender on learning, motivation and academic achievement was investigated by probing into learners' engagement and learning in the process of using gamification and ILIAS LMS.

Gender refers to the condition of being male or female. That is a boy or girl, man or woman. Human beings all over the world are generally classified into two biological groups. Gender is one of the factors studied for its influence on learning outcomes. Studies have shown that different genders prefer different achievement goals which affects learning outcomes (Bassi & Camble, 2011; Ikolo & Okiyi, 2012; Kapp, 2012). Recent studies on gender differences in online learning are primarily focused on the comparison of learning methods, empirical studies, blended learning approach and so on. Few studies have analysed motivation, achievements and retention in relation to learning and engagement (Landers & Landers, 2014; Huotari & Hamari, 2016). It is worth noting that gender implications are missing in online learning systems research, including gamification and ILIAS, and remain an area that requires further research. Therefore, this study aimed to determine the effect of gender on motivation, achievements and retention among educational technology university students in Nigeria.

1.2 Statement of the Research Problem

Research evidences have shown that gamification and ILIAS are currently being implemented by schools in the western world and are platforms that help to create more integrated approach for both lecturers and students. (Mese & Dursun, 2019). However, there are few studies conducted on which gamification and ILIAS are used to motivate and engage educational technology students in Nigerian universities, and the

methodology currently employed is considered to be teacher-centred approach, which makes learners passive and the products of schools are rated low in creativity, critical thinking and problem solving, which eventually leads to poor academic performance of students (Fomsi & Ogo-chukwu, 2019).

These poor performances have been attributed to poor teaching strategies and some educational technology concepts are very difficult for teachers to teach as well as for students to learn using the conventional teaching method. Several teaching methods have been used to curb these situations, but there is an urgent need to improve the academic performance of Nigerian university students and also bridge the gap between developed and developing nations. Gamification and ILIAS learning platforms may be considered a necessary tool for this purpose. For this reason, this study will investigate the effects of gamification and ILIAS online learning platforms in educational technology among university students in Nigeria.

1.3   Aim and Objectives of the Study

The aim of this study is to determine the effects of gamification and ILIAS online learning platforms on learning outcomes in educational technology among university students in Nigeria. Specifically, the objectives of the study are to:

1. Determine the effects of Gamification, ILIAS learning platforms and lecture method on   academic achievement of students' in Educational Technology.
2. Determine the effects of Gamification, ILIAS learning platforms and lecture method on retention of students' in Educational Technology.
3. Determine the influence of gender on students' academic achievement in Educational Technology when taught with Gamification learning platform.

4. Determine the influence of gender on students' academic achievement in Educational Technology when taught with ILIAS learning platform.

5. Determine the influence of gender on students' retention in Educational Technology when taught with Gamification learning platform.

6. Determine the influence of gender on students' retention in Educational Technology when taught with ILIAS learning platform.

7. Determine the effect of Gamification learning platform on students' motivation.

8. Determine the effect of ILIAS learning platform on students' motivation

9. Determine the influence of gender on students' motivation in Educational Technology when taught with gamification learning platform.

10. Determine the influence of gender on students' motivation in Educational Technology when taught with ILIAS learning platform.

1.4 Research Questions

1 What are the mean achievement scores of students taught Educational Technology using gamification and ILIAS learning platforms and lecture method?

2. What are the mean retention scores of students taught Educational Technology using gamification and ILIAS learning platforms and lecture method?

3. What is the influence of gender on the mean achievement scores of students taught Educational Technology using gamification learning platform?

4. What is the influence of gender on the mean achievement scores of students taught Educational Technology using ILIAS learning platform?

5. What is the influence of gender on the mean retention scores of students taught Educational Technology using gamification learning platform?

6. What is the influence of gender on the mean retention scores of students taught Educational Technology using ILIAS learning platform?

7. What is the motivation of Educational Technology students after exposure to gamification learning platform?

8. What is the motivation of Educational Technology students after exposure to ILIAS learning platform?

9. What is the influence of gender on students' motivation in Educational Technology after exposure to gamification learning platform?

10. What is the influence of gender on students' motivation in Educational Technology after exposure to ILIAS learning platform?

1.5 Research Hypotheses

HO$_1$: There is no significant difference in the mean achievement scores of students taught Educational Technology using gamification and ILIAS learning platform and lecture method.

HO$_2$: There is no significant difference in the mean retention scores of students taught Educational Technology using gamification and ILIAS learning platform and lecture method.

HO$_3$: There is no significant difference in the mean achievement scores of male and female students taught Educational Technology using gamification learning platform.

HO$_4$: There is no significant difference in the mean achievement scores of male and female students taught Educational Technology using ILIAS learning platform.

HO$_5$: There is no significant difference in the mean retention scores of male and female students taught Educational Technology using gamification learning platform.

HO$_6$: There is no significant difference in the mean retention scores of male and female students taught Educational Technology using ILIAS learning platform.

1.6   Significance of the Study

It is expected that at the completion of this study, the result generated from these study would be significant to students, teachers, educational policy formulators, educational media entrepreneurs, researchers, curriculum planners, Non-Governmental organizations and the nation at large.

Findings from this research are expected to have positive impact on students achievement and retention towards learning of educational technology in the sense that it will enable them have better understanding of some abstract concepts that will significantly improve their academic achievement. Students will also be availed with great opportunities for individualized, team building, student engagement, collaborative and interactive learning. This procedure may reduce the impression caused by abstractness of the content and boredom in the class. It will make learning easier, simpler and more interesting which could result in better mastery of the contents of the course.

It is hoped that the findings from this study will encourage and stimulate educational technology instructor's innovativeness, resourcefulness, and challenge them to use gamification and ILIAS learning platform as a tool for effective teaching and learning. Educational technology teachers could benefit from this study, because it could provide some positive approach to the teaching of large classes and abstract concepts.

Educational policy makers may probably derive immense benefits from the findings of this study, because it will enable them possess the knowledge and disposition to develop instructional strategies that may encourage the development of critical thinking, problem solving and performance skills among students.

The outcome of this study may also help educational media entrepreneurs take better decisions on investing in educational media and also organization of workshops for lecturers to make them more acquainted with online learning platforms. Curriculum planners will be able to introduce into the curricular practical methods of using online learning in the curriculum, this could foster student's readiness, interest and motivate them to utilize gamification and ILIAS in learning.

The findings from this research are expected to serve as a reference point to academics/researchers, by providing useful information upon which future research studies in the area where online learning adoption can be based. It may provide empirical evidence in their quest for further research work on teaching and learning strategies.

Government and non-governmental organizations will be able to provide in-service training for educational technology lecturers through workshops, seminars and conferences where they will be taught how to incorporate online learning strategies in the classroom as a medium of instruction, as this will go a long way in assisting lecturers and government in man-power development.

1.7 Scope of the Study

The study investigated the effects of gamification and ILIAS online learning platforms on learning outcomes in educational technology among university students in Nigeria, which comprises of 36 states and the Federal Capital Territory (FCT). Nigeria has 84 public universities and 7 out of the 84 are offering educational technology (see Appendix A), which is chosen because Educational Technology as a course is studied at degree level in public universities in Nigeria. Educational Technology is considered to be an important discipline in the field of education and the National Policy on Education

made it clear that the contribution of Educational Technology is indispensable and very important (FRN, 2009). Three independent variables (Gamification, ILIAS LMS and lecture method), three dependent variables (Achievement, retention and motivation) and one moderating variable (gender) was investigated in this study. Gamification and ILIAS LMS was selected as two online learning platforms due to its popularity among educators as a tool for creating online learning for their students (Violante & Vezetti, 2017; Downes, 2017; Kpolovie & Lale, 2017). The study was restricted to 200 level Educational Technology students in public universities in Nigeria. This level of students was chosen because the concept of Graphic communication selected as a teaching unit is taught at this level. Graphic communication is selected because of its relevance to the major variables of the study and also it is a course that could be taught via online platforms. Five content units of graphic communication was taught. These units include: Meaning of visual, graphics, design and communication, tools and materials required in graphic studio, Types of graphics, colouring and colouring techniques, Lettering and lettering techniques. The data collection process lasted for twelve (12) weeks.

1.8 Operational Definition of Terms

Achievement: A standard students are expected to meet in order to demonstrate adequate understanding of educational technology concepts tested, denoted by a score.

Educational technology: A process of solving educational problems and concern by creating, using and managing appropriate technological processes such as gamification and ILIAS LMS.

Gamification: act of selecting elements of game and using them to create a game-like environment in educational technology.

ILIAS LMS: A web based LMS which consist of tools for learning, authoring, information access and co-operative work, thus presenting an integrated environment for learning and teaching of educational technology concept on the internet.

Motivation: University students' desire to pursue a goal or perform a task in educational technology using Gamification and ILIAS online learning platforms.

Online learning platforms: an interactive online services that provides teachers and learners with information, tools and resources to support and enhance educational delivery and management.

Retention: ability to recall or recognize educational technology concepts which have been studied through Gamification and ILIAS online learning platforms and conventional lecture method represented by a score.

2.0   **LITERATURE REVIEW**

2.1   Conceptual Framework

Figure 2.1 presents the research conceptual framework using gamification and ILIAS learning platforms to enhance students' learning achievement, retention and motivation with gender as a moderating variable. The conceptual research framework, theoretical framework, literature review and findings that stated that gamification and ILIAS software for learning management system could help teachers or educators to create interaction and collaboration with the course content and can lead to students' learning achievement, learning motivation, collaboration and communication. Therefore, the diagram in Figure 2.1 explained the interaction of the major variables as central to achievement, retention and gender as a moderating variable of the study.
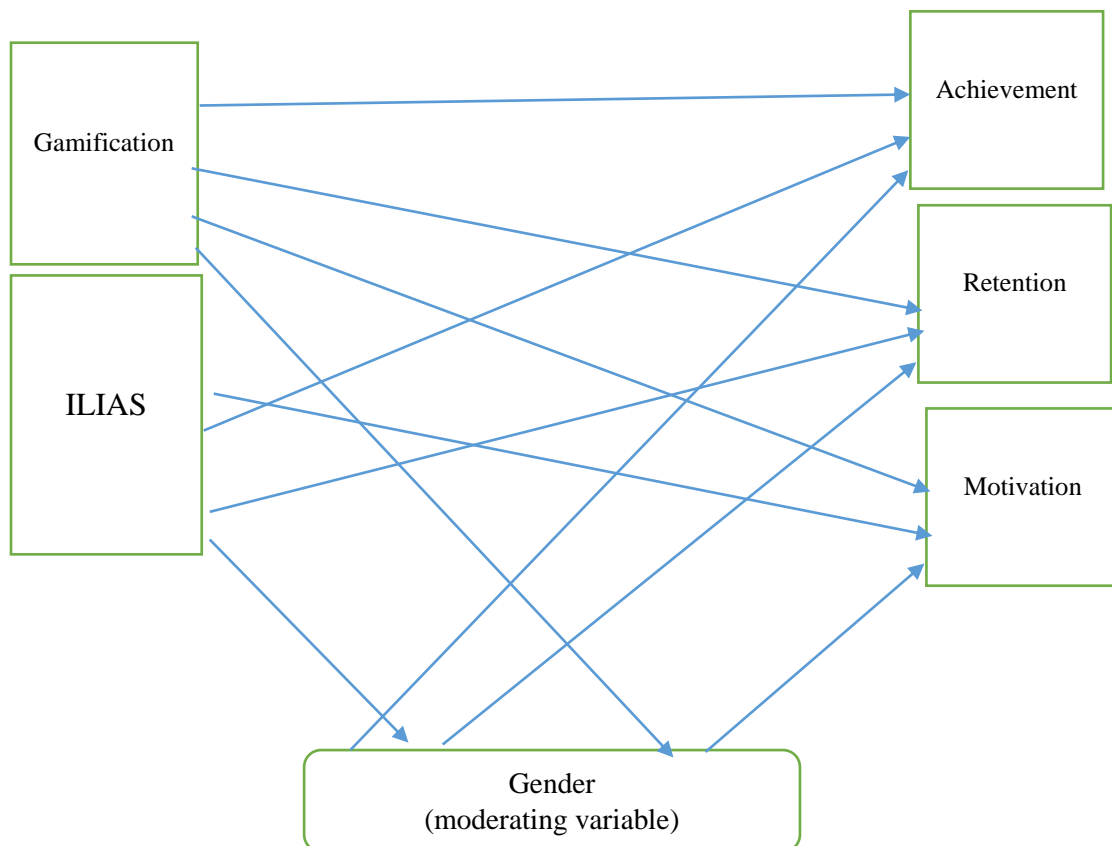
Figure 2.1: Conceptual model of the study (Researcher)

2.1.1   The concept of educational technology

Educational technology is perceived as a vehicle for curriculum enhancement. Studies by Stosic (2015); Laleye, (2017) have indicated that it has the potentials for enhancing student learning and also a way for teachers to deliver content to students within the classroom. Educational technology in this context refers to a systematic way of designing and evaluating the total process of teaching and learning in terms of specific objectives, based on research in human and non-human resources to bring about more effective instruction (Delhin, 2012). It therefore signifies an analytical procedure which is characterized by the identification of an instructional problem, setting of objectives, designing of learning experiences, selection of relevant instructional materials and of course identifying the modern trends in the use of technology in the classroom settings (Walter, 2011).

Educational Technology have been considered as a crucial factor in improving the quality of education and enhancing the level of student's educational learning performance in Nigeria (Sharma, 2008). It creates opportunities for learners to develop their cognitive, critical thinking, information reasoning and communication skills (Chigona & Chigona, 2010). It can also help learners to explore education beyond classrooms by providing access to a wide range of resources and information, promoting scientific inquiry and discovery. The concept of educational technology in Nigeria includes software, hardware, together with online applications, like wikis, blogs, gamification, massive online open courses (MOOC), big data, mobile learning and so on. It is a multifaceted and integrated process involving people, procedure, ideas, devices, and organization, where technology from different fields of science is borrowed as per the need and requirement of education for implementing, evaluating, and

managing solutions to those problems involved in all aspects of human learning (Ajulo, 2010).

Over the years Nigeria has gone through an educational transition in the field of educational technology. This is because of the awareness of the importance of educational technology and its role in the development of the Nigerian Education (Okolo & Bouck, 2010). Educational technology in Nigeria broadly speaking, has passed through stages. The first stage of the Concept of educational technology in Nigeria is coupled with the use of aids like charts, maps, symbols, models, specimens and concrete materials. The second stage is associated with the 'electronic revolution' with the introduction and establishment of sophisticated hardware and software. Use of various audio-visual aids like the projector, magic lanterns, tape-recorder, radio, and television brought a revolutionary change in the educational scenario. The third stage is linked with the development of mass media which in turn led to communication revolution for instructional purposes. The fourth stage is discernible by the individualized process of instruction. A system of self-learning based on self-instructional materials and teaching machines emerged such as computer-based technology including computer hardware, software, CD-ROM, videodisc player and the internet. These forms of technology provide teachers and students with vast quantities of information in an easily accessible, non-sequential format that can be used as teaching tool (Laleye, 2012).

The quest for development now in Nigeria makes it imperative for educators to shift from the existing method of teaching in schools to accommodate use of technologies like online learning platforms. Other African countries like Tanzania, Kenya, Uganda and South Africa seems to have gone ahead of Nigeria in this regard. It is therefore

imperative for educators in Nigerian universities to integrate online teaching and learning platforms in the classroom.

2.1.2 Concept of online learning and its significance in education

Online learning is an inclusive term that describes educational technology that electronically or technologically supports learning and teaching (Nwokike, 2011). Online learning is a learner-controlled, self-paced education environment where the learner has authority over the learning environment; thereby allowing learners to work at their pace and convenience (Eke, 2011). Online learning according to Pollock (2013) is the use of electronic technology to deliver education and training applications, monitor learner's performance and report learner's progress. Hedge and Hayward (2004), defined it as an innovative approach for delivering electronically mediated, well-designed, learner-centred and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in connection with instructional design principles.

In this age, learning with the use of computer is simply online ways of acquiring knowledge through the internet or through the offline – CD-ROM. It may be in form of Audio, Visual, and or Audio/Visual. The applications and process of online learning include computer-based learning, web-based learning, virtual classroom and digital collaboration where contents is delivered via the internet. Its success is mainly based on its benefits and distinctive features, it is easily accessible, cost efficient, gives students the flexibility of learning, it helps provide uniform delivery to all users reducing chances of misinterpretations, as well as promoting team learning and collaboration (Green, 2010).

Online learning has a positive and developmental role in education. It can be used as informative, situating, constructive and communicative tool in the process of education (Waheed & Jam, 2010). It also allows the creation of digital resources like digital libraries where students, teachers and professionals can access research materials and course materials from any place at any time (Bhattacharya & Sharma, 2007). The advantages of online learning stems from the defects in the conventional classroom system. Ajegbelen (2016) noted that the defects in the conventional education system include lack of adequate provision of visual and audio-visual materials, microphones that are in most times epileptic, classrooms that are poorly ventilated and overcrowding of lecture halls. Thus, the advantages of online learning have been articulated (Alu, 2011). It eliminates the barrier of time and place, therefore, has the capacity to reach a global audience whether part time or full time learning can take place, Learners do not need to travel to any location thus saving indirect costs. Online learning links distant learners and experts together to form an on-line collaborative learning community and Learners are bold to ask questions and express their opinion without fear of reprisal from the instruction. There is also learner-learner uninhibited interaction.

Online learning is a technology whose time has come in the contemporary knowledge – driven economy and globalization empowered by ICTs. This is very imperative for higher education because university education plays key role in developing a country like Nigeria to absorb modern technology and to develop the capacity for self-sustainable growth and development. While developed countries have made significant strides toward integrating online learning platforms in higher education, developing ones have not yet effectively adopted such technologies (Ssekakubo *et al*, 2011; Tarus *et al*, 2015). Specifically, there is an obvious delay in online learning adoption within most educational systems in Nigeria (Boulton, 2013). Studies recognize serious

challenges that inhibit the effective integration of online learning in higher education (Al Musawi & Abdelraheem, 2004; Ali & Magalhaes, 2008). As such, while considering the benefits of online learning as a tool to enhance the delivery of education, the adoption of this technology should also be considered in Nigerian universities. In this age and season of globalization which has reduced the wide world to a global village, best practices and global benchmarks in all fields of human endeavour including higher education are accessible on the internet and could be replicated in Nigeria.

2.1.3   Gamification as an educational tool

A game is a rule-based environment that is responsive to the player's actions, offers an appropriate challenge to the player, and keeps a cumulative record of the player's actions (Mayer & Johnson, 2010). While an educational computer game is a technology-supported game that is intended to result in a desirable change in the player's knowledge. Educational games serve the primary purpose of being a game, and a secondary goal of teaching something (Goehle, 2013). Games have clear goals or objectives which are divided into "short-term achievable goals that give a seamless progression to players by providing frequent rewards that act as external motivators" (De-Marcos *et al.*, 2014).

Games have been shown to be effective in promoting learning (Barab *et al.,* 2005; De Freitas, 2006; Ke, 2009; Moreno, 2012; Liu *et al.*, 2014), and are more motivational for students than non-gaming teaching methods. It has been shown to be effective for learning partly because learning takes place within a meaningful context (Eck, 2006), which allows for application and practice. Effective games must be motivating, addictive, and provide encouragement through very short-term goals, so that the player can fail and try again until they succeed (O'Donovan *et al.,* 2013). Muntean (2011)

recommends that technology-supported games be identified and incorporated into the classroom for learning, and one way of incorporating these games into the classroom may be through the use of gamification

Gamification involves selecting elements of games and using these to create a game-like environment in a non-game context (Deterding *et al.,* 2011; Dominguez *et al.,* 2013; de-Marcos *et al.,* 2014; Hanus & Fox, 2015) to increase user experience and engagement. Typically, these game elements include items such as points, leader boards, and badges. However, game elements also can include avatars, three-dimensional environments, feedback, ranks, levels, competition, communication systems, and time pressures (Deterding *et al.,* 2011). Gamification has been used in a variety of settings, including healthcare, business, education, and productivity (Pedreira *et al.,* 2014).

Gamification leverages game design, loyalty program design, and behavioural economics to create the optimal context for behaviour change and successful outcomes. It can also be used for the purpose of improving user engagement and instruction (Kim, 2015). Gamification isn't just about playing games, it's also about making sure the students are motivated to complete the tasks. Students need the feeling of accomplishment and success of striving against a challenge (Villagrasa *et al.,* 2014). To create a gamification system that increases student motivation, it is necessary to focus on fundamental elements that make videogames appealing to their players.

Gamification has been very successful in promoting companies and products and is reaching the domains of marketing, politics, health, fitness and is finding its way into the classroom with the potential of improving learning outcomes for all students. Nah *et al*. (2014) identified the design elements utilized to gamify teaching in the learning context. These design elements were: points, levels or stages, badges, leader boards, prizes and rewards, progress bars, storyline, and feedback. Gamification has been shown

to hold considerable potential in educational settings, as a means to enhance student's motivation and engagement in the learning task as well as enjoyment over them (Hamari *et al.,* 2014).

2.1.4 Educational benefits of gamification

Gamification is becoming more prevalent in education because of its perceived ability to motivate students and thus enhance the learning process. It has recently been used in multiple applications from promoting learning to employee performance, customer engagement, and even crowdsourcing initiatives (Lee & Hammer, 2011). Huang and Soman (2013) asserted that the trend is increasing for two significant reasons: it resonates more directly with todays "digital generation" and in real life, individuals do not feel that they are as good as they are in games. When confronted with obstacles, people may feel depressed, overwhelmed, frustrated or cynical, feelings that are not present in the gaming environment. They also prefer instant gratification to keep themselves engaged and motivated. There are some obvious difference between games and the classroom that makes gamification of course content a logical approach: in games, players work to achieve specific goals and win, in the classroom students' work to achieve specific learning objectives and do well academically. In games players progress from level to level based on performance, in the classroom students must pass prerequisite courses and show some level of understanding before progressing academically (Deterding *et al.,* 2011).

In education, gamification is a way to boost learning through gaming mechanics. It capitalizes on the human desire to meet an objective, achieve a goal, outperform peers,

and "level up" through a series of challenges. In traditional gaming, people play for money, bragging rights, or mere entertainment. Gamification in education adds an e-learning component that allows people to absorb and retain more information. Since it feels like gaming, it feels less like learning, which can make online courses more engaging (Kim, 2015).

Games can instil motivation powered by a sense of achievement. Incorporation of gamification aspects like scores or points in learning invoke in the learner a desire to achieve higher numbers when compared to one's last score or that of the peers. Also, unlocking of new levels in the gamification lark gives the learner the ability to go on playing/learning until all levels get unlocked.

According to Hanus and Fox (2015), the advantages and disadvantages of gamification include: Games enhance the cognitive abilities of a learner, it is the practice that goes into trying to unlock a level or achieve the desired score. It is seen that students who perform poorly in academics are sometimes very acute gamers. Hence, learning via games, that is gamification can be elemental in teaching students who seem to be utter scholastic challenges. Abstract concepts can be put across quite simply besides the vocational skills, students also needs mastery over their behavioural or soft skills. Good communication, team behaviour, interpersonal skills, ability to handle critical situations, control over oneself, one's psyche and personality are some abilities that cannot be taught or be learnt.

However, by the way of gamification, teaching such abstract concepts is also possible. Traditional online learning focuses on course content while gamification adds a narrative to the learning experience. When game elements and its mechanics are applied

to online learning courses, learners are likely to spend more time on learning as the courses are fun and enjoyable. Gamified courses lead to high performance learning and help learners in committing knowledge to long term memory. Knowledge retention takes place when learners process and do something with it. Learners participating in a stimulating activity are likely to remember the information they acquire from it.

The motivation is contained within the game and not to the product which it supposedly supports. Sometimes the method of reaching the highest rank can become trivial as the only important aspect is reaching that superiority. This is a problem of the wrong motivation direction. The learner is targeting their motivation towards being the best and not at seeing what the course has to offer. Another reason is that gamification removes a lot of the essence of a game. It becomes almost a cut and paste methodology and lacks a lot of originality. Games are about discovery and overcoming trials. There's some level of that in gamified sites, but not to the extent of traditional games.

When choosing a game, it is not often clear how the results of the game will tie into the course assessment. While most games have a built-in way to track progress, you will need to find a way to translate the student's game progress into fulfil objectives. It is not always easy to find a good fit between the games on the market and your course materials so this can be a time-consuming process (Kim, 2015).

There are several aspects of video-game design that can be incorporated into the gamified classroom. Here are some according to (Armier *et al.*, 2016)

  i.   Points: In video games, users gain points as they travel through their quests. The more time they invest in the game the more points they earn. They also earn points for completing certain tasks, playing for a certain time, and gathering

certain items. In a gamified classroom, points can take the place of grades. As a student gathers experience and time with a certain concept, they earn points

ii. Badges: Badges are public recognition of achievement, with each one designed with a specific achievement in mind. Other players can see which badges another person has been awarded. In the classroom, badges mark a student's completion of a lesson or mastery of material.

iii. Levels: As a game goes on, players progress through levels that get progressively more difficult. In the classroom, levels could be lessons, or even units of study.

iv. Appointments: Video game players can set up certain times to meet up with their friends, or even strangers, to work together to defeat a villain or clear a level. In the classroom, appointments can be made with the teacher or other students and act as check-ins. Students can receive additional assignments or feedback to help them complete their work during their appointments.

v. Bonuses: Most games have hidden, unexpected rewards. Bonuses help drive player loyalty and keep them playing day in and day out. People get obsessed with earning extra points, finding useful items, or skipping levels. In the classroom, bonuses can also be unexpected rewards. Students can earn bonuses such as a two-day extension on a project.

vi. Infinite play: In many video games, players keep playing until they finish a level. They might lose points, or access to valuable items if they are attacked, but they are still able to keep playing. In classrooms, infinite play is allowing students to keep working on a lesson or skill until they achieve mastery, even if the rest of the class has moved on.

The great thing about gamification is that it appeals to most learning needs and styles. There are visual, auditory, and kinaesthetic components, all of which combine to help people learn more efficiently. Gamification is not only directly associated with knowledge and skills, it affects students' behaviour, commitment and motivation, which can lead to improvement of knowledge and skills (Lowman, 2016).

2.1.5 ILIAS LMS and its significance in education

Learning Management System (LMS) is a general term that describes software designed to manage user learning interventions and provides access to online services for the learning of students, teachers and administrators. This is a software system that enables the development and delivery of training using the Internet as a delivery system. It is a software application for documentation, monitoring administration, reporting, e-learning programs, training programs, classes and events online and in training" (Sulaiman & Ghalib 2007; Moses *et al.*, 2014; Ellis, 2016). The LMS provides a collaborative style of learning among users. The sections, such as chat and forum are those places where users do interact, communicate and share view, feelings with their peers. Students would then be able to develop their knowledge through experiencing rather than depending more on their textbook in class (Moses *et al.*, 2014). LMS has been integrated into online materials that can be accessed by the users at any time any place which is convenient to them. In fact, both smart and weak students alike can have their own pacing in accessing these materials which they feel is more beneficial to them. The later may avoid things that they have mastered and grab the one they are interested in while the former would follow all lessons by their own speed. Students can have practices on drills and exercises which are provided on the LMS. Not only having the materials in conventional way, such online materials can reinforce the students learning abilities and skills at most times. The LMS prepare environment for conducive teaching

and learning processes. It is an avenue for interacting, communicating and sharing ideas with peers. ILIAS is one of the popular learning provider software and portal for education (ILIAS, 2015).

ILIAS (Integriertes Lern-, Informations- und Arbeitskooperations-System) a German word for "Integrated Learning, Information and Work Cooperation System" ILIAS is an open-source learning content management system (LCMS). With ILIAS you can share, administer and organize knowledge and training activities. It supports learning content management and tools for collaboration, communication, evaluation and assessment. The idea behind ILIAS is to offer a flexible environment for learning and working online with integrated tools. It goes far beyond the idea of learning being confined to courses as a lot of other LMS do. ILIAS can rather be seen as a type of library providing learning and working materials and contents at any location of the repository. This offers the possibility to run ILIAS not as a locked warehouse but as an open knowledge platform where content might be made available for non-registered users (ILIAS, 2015).

A general characteristic of ILIAS is the concept of Personal Desktop and Repository. The Personal Desktop is the individual workspace of each learner, author, tutor and administrator. The Personal Desktop contains selected items from the repository as well as certain tools like mail, tagging, a calendar and also e-portfolio and personal blogs. All learning content but also forums or chat rooms, tests and surveys, as well as plugged in virtual classrooms or other external tools are created, offered and administrated in the repository and its categories (Ryan, 2016). In the Repository the learner can create and store all objects and learning resources (categories, courses, groups, training modules, tests, exercises, surveys, polls, forums, chats, news channels and many others). All of them are categorized by type and content. The information can be presented in several different views according to the user's preferences, and the available search

functionality significantly simplifies the process of finding the desired learning material (ILIAS, 2015).

Besides being a learning management system, ILIAS is also a communication platform. The system makes social learning easy to implement. Using forums, chatrooms, wikis, and e-mails, students and teachers can communicate with each other, ask questions, provide (peer) feedback, or point out additional information and so on. It is also possible to use blogs, webinars and wikis to provide additional information regarding the course content. A teacher can use ILIAS to add extra content to his regular classes, like e-learning modules, online assessments, documents, exercises, forums and so on. A teacher can also set up consulting hours and let students sign up for them. This makes personal guidance very accessible (Ssekakubo, 2011).

ILIAS has gained rapid popularity in developed countries. Most educational institutes of Europe or North America have either obtained commercial ILIAS or adapted to any open source (Fatih & Demirkan, 2015). However, these open source tools were not popular in developing countries of Asia and Africa. In Nigeria, institutions of higher education have increasingly invested in course management software to provide a virtual learning environment designed to enhance student learning and to assist in the administration of the course itself, but few employ learning management systems or implement a viable e-learning system such as ILIAS (Attuquayefio & Addo, 2014).

2.1.6   Concept of conventional lecture method of teaching

This is a teacher centered, student peripheral teaching approach in which the teacher delivers a per-planned lesson to the students with or without the use of instructional materials (Nwagbo, 1999). According to Awotua-Efobo (2001), the teacher comes to the class fully armed with a mass of facts, probably gathered from books and would

start to pour out the fact. The teacher presents ideas or concepts, develops and evaluates them and summarizes the main points at the end, while the students listen and take down notes. Usually during the course of lecturing, students' questions are not normally encouraged and in cases where questions arise, they are usually for clarification of important facts.

The lecture method of instruction can be useful in teaching some educational technology topics or in conjunction with other methods. However, some of its disadvantages are identified by Eya and Igbokwe (2000) as follows: It does not develop students' manipulative skills in educational technology, as they are passive listeners. It does not cater for individual differences among the students, with the result that the slow learners and the academically weak students are dragged at the pace they cannot cope with. This may lead to low achievement and loss of motivation.

The method appeals only to the sense of hearing. This makes the method not suitable for teaching educational technology. Alio (2002) stated that a complete learning takes place when the student uses all his senses in the learning process. The major drawback of lecture method is that it is essentially a unidirectional mode of communication. The listening student in most cases has little or no information to influence the nature and rate of flow of information. One way communication offers little in the way of interaction and feedback, which is very essential for learning to occur. When used excessively, the lecture method encourages intellectual passivity, which is the opposite of learning and may not develop in the students' processes of inquiry and problem solving. In other to minimize some of these drawbacks, there may be need for an individualized method of instruction like gamification and ILIAS online learning platforms.

2.1.7 Goals of university education in Nigeria

Education is the process by which every society attempts to preserve, transmit and upgrade the accumulated knowledge, values, attitudes and skills in its cultural heritage in order to foster continually the wellbeing of mankind and society. Thus, education is the pivot of social stability, social change, social progress, national transformation and development, human development, and sustainable development. According to (Fareo, 2012), education is the provision of opportunity for a child to realize his/her potentials, goals and abilities in life. Education includes the acquisition of functional skills, moral identity and attribution to succeed in life and thereby improve the society. The yearnings, needs, aspirations as well as the cultural heritage and environment of any society determine, to a large extent the kind of knowledge and skills to be acquired (Adebosin, 2004). The National Policy of Education (2004) states that education has been adopted as instrument per excellence for effecting national development.

University is the highest level of education where the high level manpower, intellectual and future leaders are developed. It is a place where students come together to pursue knowledge, and it promotes the development of intellectual capacities of individuals to understand and appreciate their environments (Salleh & Iahad, 2011). Universities therefore educate future leaders and develop the high-level technical capacities that underpin economic growth and development (Odekunle, 2001). University education is at the centre of human resource development and advancement. Education in general, and university education in particular, is fundamental to the construction of the knowledge, economy and society in all nations. The goals of university education according to National Policy on Education (FRN, 2004) are stated as follows:

a) To contribute to national development through high-level relevant manpower training.

b) To develop and inculcate proper values for the survival of the individual and society.

c) To develop the intellectual capability of individual to understand and appreciate their local and external environment.

d) To acquire both physical and intellectual skills which will enable individuals to be self-reliant and useful members of the society.

e) To promote and encourage scholarship and community services.

f) To forge and cement national unity; and

g) To promote national and international understanding and interaction.

The function of university education therefore, is to produce high level work force required for rapid socio-economic development of the nation. Students, parents, guardians, individuals, voluntary agencies and Governments have invested and have continued to invest in university education because for society and government, it is a tool for development. National resources committed to education is about 16 percent of annual budget. Private contribution to education is as high as the social contributions. The human resources committed to education in form of teachers and non-teaching individuals in universities are tremendous. Facilities and equipment committed to university education both publicly and privately as well as to formal and non-formal education are countless (Anene *et al*, 2014). According to Nwachukwu and Akinrinmade (2010) university education performs many functions such as:

i.   Politically, university education brings about enlightenment among members in the country. Through political education, national unity can be achieved especially in a plural society like Nigeria.

ii. It confers permanent literacy, numeracy and the ability to communicate effectively. It provides sound citizenship as a basis for effective participation in

and contribution to the life in the society. University education develops in the recipients, the ability to adapt to changing circumstances. It provides tools for further advancement and equips the recipients to live effectively in a modern society of science and technology, while at the same time develops and projects culture, art and languages.

iii.   Economically, the university provide skills and techniques necessary to improve human competencies. The educated man provides the society with human capital as a result of his income which represents not only his earnings, but also his potential for further achievement. It increases stock of knowledge and ensures its diffusion. University education raises recipient's level of productivity, creativity, initiative and innovation. The educated are prime movers of innovation in various areas of economic endeavour.

iv.   Socially, university education play a vital role in group, occupational effectiveness and development of self-confidence. It brings changes in attitude, motivation and incentive which lead to technology changes, invention, innovation and initiation. It instils discipline, hard work and morality.

University education is regarded as an instrument of social, political and economic development. The products of higher education in any nation will determine the development of such nation. Therefore, university education contributes to national development through high level relevant manpower training; in order to acquire both physical and intellectual skills which enable individual to be self-reliant and useful members of the society (FRN, 2004).

2.1.8   Students achievement and retention level in the teaching and learning of

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Academic achievement implies performance in school subject as shown by a score in an achievement test/examination (Mbah, 2002). In teaching and learning, achievement can be achieved by how well students are able to master what they have been taught and these can only be measured by the knowledge and skills that the learners are able to achieve which are shown by scores as a sign (Eppunah, 2000). Achievement is learning outcomes of students which include the knowledge, skills and ideas acquired and retained through what they have learnt within and outside the classroom environment. It is the quality and level of skills that a student is able to acquired and retained. In view of these, Mbah, (2002) asserted that achievement is dependent upon several factors which are instructional techniques, the learning environment, motivation for stimulating student's interest in learning and the learners. When the above mention factors are not utilized properly the objective of teaching and learning will not be actualized. Students' achievement has been the major focus of the educational processes. In view of this therefore, researches have been carried out to identify factors that affect it in an effort to improve it. For example, Ayodele (2009) identified school facilities, teachers' qualification, teachers' experience, and leadership qualities of principals, school size, and school location.

The role of the teacher as an important variable cannot be overemphasized. The teacher is expected in all situations to develop the three learning domains of the learner. These are the cognitive, affective and the psychomotor domains. Because educational technology is one of the courses that is related to everyday life, its learning seems to be unique and challenging. For example, the development of psychomotor skills through practical activities sometimes is hindered by factors such as cultural and superstitious beliefs, emotions to mention but a few (Modritscher, 2006). Some Students for special reasons do not participate in some activities, In this case, more skill and effort of the

teacher is required. This means that the teacher must adopt the teaching strategies that will motivate the learners as well as encourage all of them to achieve irrespective of beliefs and other differences.

Observations have revealed that students are characterized by poor retentive memory, as such that they can hardly remember what they learn. Agbaje and Alake (2014) asserted that retention is the preservative of the mind and that whatever touches the consciousness leaves traces or impressions and is retained in the mind in form of images. Thus, knowledge retention is an essential component of learning. In support of this, Smith (2009) remarked that retention required that knowledge be captured, stored for a specified period of time, and is retrievable. But the question here is that what contribute to students' poor retention? And in what ways can knowledge retention be enhanced? Adesoji and Ibraheem, (2009) are of the view that students understanding and retention of knowledge is dependent on such factors as learners' interest and motivation, the learning environment, the teacher's knowledge levels and instructional strategies.

Retention is facilitated by both the action of the teacher and learner. This is so because the manner of presentation determines to a great extent the quality of consolidation and the subsequent retention (Agboola & Oloyede, 2007). For a student to retain information, the teacher should make use of important strategies and techniques which will encourage the learner to notice important details and when students are encouraged to engage in gamification and ILIAS LMS learning platform they will be able to draw conclusion concerning the meaning and usefulness of the subject matter and this may help them retain what is achieved, through the use of necessary strategies and techniques, recall becomes easier (Noble, 2013). The memory is seen as a phenomenon of persistence while the act of forgetting is a case of not persistence, therefore the

learner recall easily if he is capable of making important and meaningful association between what is to be recalled and the environment setting under which the learning took place or the setting the recalled is to be made. Horton (2006) asserted that retention takes place when learning is coded into the memory and when information are coded correctly the information coming provides the index that may be consulted, thus enabling retention to take place without detailed search in the memory lane.

2.1.9   Students motivation towards learning of Educational Technology

Motivation can be defined as a person's desire to pursue a goal or perform a task. In the educational arena, the goal or task pursued should be student engagement in the learning environment. Motivation is personal and individual to each student, but the teacher/outsider can tap into this latent resource. Keller and Litchfield (2002) emphasize that true motivation takes place at three levels: motivation to learn, motivation to work, and self-motivation. Each level places responsibility on the learner. However, the instructional designer or teacher can work with the environment and to enhance the possibility of self-motivation.

Motivation according to Sanacore (2008) has several effects on students' learning and behaviour. It Directs behaviour toward particular goals. Motivation determines the specific goals toward which people strive. Thus, it affects the choices students make. Motivation also leads to increased effort and energy, it determines whether a student will pursue a task (even a difficult one) with enthusiasm or a lacklustre attitude. It increases the initiation and persistence of activities. Motivation will increase students' time on task and is also an important factor affecting their learning and achievement. Motivation enhances cognitive processing. It actually affects what and how information is processed because motivated students are more likely to pay attention and try to

understand the material instead of simply going through the motions of learning in a superficial manner. Motivation determines what consequences are reinforcing and punishing.

Teachers are always looking to see what motivates their students. Motivation is the key to academic success as well as promoting lifelong learning (Sanacore, 2008). The reluctance to learn must be turned into the want to learn, there are reluctant learners in every classroom. Reluctant learners are the individuals that do not finish their assignments and, sometimes, avoid tasks. Reluctant learners are contented with just getting by. One common thread among reluctant learners is their perception of themselves, known as self-efficacy (Sanacore, 2008). If their self-efficacy is low, then their motivation to perform will be low. When students are constantly berated with negative comments, their self-esteem and self-efficacy become diminished. Student's reluctance to learn is also affected by the assignments teachers create. If an assignment is too easy or too difficult, reluctant learners are unmotivated to succeed. For learning to be successful, there has to be attention and interest. Thus, motivation is a significant aspect (Atkinson, 2000).

Motivation is of particular interest to educational technology because of the crucial role it plays in student learning. Motivation in educational technology can have several effects on how students learn and how they behave towards subject matter. It can direct behaviour toward particular goals, Lead to increased effort and energy, increase initiation and persistence in activities, enhance cognitive processing, determine what consequences are reinforcing, and lead to improved performance.

2.2 Theoretical Framework

2.2.1 Behavioral theory of learning

Behaviorism is primarily concerned with observable and measurable aspects of human behavior. In defining behavior, behaviorist learning theories emphasize changes in behavior that result from stimulus-response associations made by the learner. Behavior is directed by stimuli. An individual selects one response instead of another because of

prior conditioning and psychological drives existing at the moment of the action (Leahey, 2000).

The behaviorist school sees the mind as a "black box," in the sense that a response to a stimulus can be observed quantitatively, totally ignoring the effect of thought processes occurring in the mind. Early computer learning systems were designed based on a behaviorist approach to learning (Overskeid, 2008). Skinner (1974) argued that since it is not possible to prove the inner processes with any available scientific procedures, researchers should concentrate instead on 'cause and- effect relationships' that could be established by observation. Behaviorists claim that it is the observable behavior that indicates whether or not the learner has learned something, and not what is going on in the learner's head (Modritscher, 2006).

According to Rotfeld (2007), the goal from the behaviourist perspective was the development of instruction that would enable the majority of students to achieve levels of performance predetermined by behaviourally defined objectives. Learning that involves recalling facts, defining concepts and explanations, or performing procedures are best explained by behaviourist learning strategies, which focus on attainment of specific goals or outcomes. In behaviourist theory, learners are more passive in the learning process. The learners' role is simply to respond to the learning content and demonstrate a level of performance on specific goals and objectives. Pedagogy based on behaviourism focuses on the ability to modify observable behaviour to acquire knowledge or skills. The operant model of stimulus-response-reinforcement ensures that prescribed learning outcomes are achieved. Anderson (2011) stated that in online learning, the instructor provides learners with information about the appropriateness of the behaviour through frequent feedback. This feedback either reinforces learners' behaviour or determines consequences in the form of corrective actions for the learner

to achieve the desired performance behaviour. This requires continuous monitoring and feedback from the instructor. In an online learning environment, behaviorism involves chunking curriculum into smaller instructional steps. These smaller more manageable steps can then be repeated with ongoing monitoring of student learning.

However, Harasim (2012) suggest implications for online learning with respect to the behaviorist school: Learners should be told the explicit outcomes of the learning so that they can set expectations and can judge for themselves whether or not they have achieved the outcome of the online lesson. Course designers have to define sequences of instructions using conditional or unconditional branching to other instructional units and pre-determining choices within the course. Learners must be tested to determine whether or not they have achieved the learning outcome. The behavioristic approach for learning suggests to demonstrate the required operation, procedure or skill, and to break it down into its parts with appropriate explanation before learners are expected to copy the desired behavior. Learners are supposed to build proficiency from frequent review or revision with check tests at strategic points or repeat practice with feedback.

The relationship of behaviourism to gamification and ILIAS online learning platforms is supported by the interaction of the students and the online environment, applied to educational technology, it implies that the students from whom the learning platform is waiting for response (stimuli) is stimulated by the component systems of the area of information and communication based on the pedagogical and teaching approach used. The reinforcement received by the students' behavior is derived from the online learning environment. In this sense, the students who interact with the learning environment receives stimuli contained in the learning space. Stimuli are represented by all components of the learning platforms such as learning contents, dynamic images, micro worlds are educational stimuli received by the students, on which the students

must answer and for which depending on the response receives a reinforcement (Modritscher, 2006).

Depending on the above analysis, there is a direct relationship between behavioral theory and online learning platforms such as gamification and ILIAS applied to teaching and learning processes. Online learning platforms trains' students to work individually as he/she will demand an active participation in the learning process. Since technology has come to integrate the teaching - learning process. Online learning platforms has emerged as an application of behaviorism (Lawrence, 2005).

2.2.2 Cognitive theory of learning

In the late 1960s and 1970s psychology moved from the study of behavior to the study of the mind, and cognitivism emerged as a new theory of how learning occurs. According to cognitivism, knowledge is still considered to exist outside of the person. However, its focus is on understanding how human memory works to acquire knowledge and promote learning. The theory's foundation is information processes and understanding the memory structure of the mind for knowledge acquisition. In addition, the theory establishes conditions of learning and strategies to incorporate individual differences into the design of instruction, including the use of pretests and more formative assessment strategies (Tennyson & Schott, 1997). However, there is more focus on how learners acquire specific types of strategies for learning, including planning, monitoring, and evaluating, and the influence of prior knowledge, beliefs, attitudes, and values on learning (Tennyson & Schott, 1997). This theory developed a clearer understanding of how information is processed and stored, as well as how prior knowledge is stored in memory structures called schema for retrieval in an appropriate context. According to cognitivism, the transfer of knowledge to new situations is influenced by how information is presented and the relevance of the information.

Gagne (1985) proposed nine events of learning that correspond with specific cognitive processes. Gagne's nine events are a systematic organizational process for learning and include the following: Gaining the learners' attention, Informing them of the learning objectives, Stimulating recall of prior learning, Presenting stimulus in the form of content to be learned, Providing guidance, Eliciting performance through instructional activities, Providing feedback, Assessing performance, Enhancing retention and transfer. Gagne proposed that these nine events provide the conditions of learning and define the intellectual skills to be learned, as well as the sequence of instruction. He believed that lessons should be organized according to these events so learners could associate new knowledge with existing structures. He also thought the nine events could provide the appropriate level of instruction to support learning.

The cognitivism paradigm essentially argues that the "black box" of the mind should be opened and understood. The learner is viewed as an information processor (like a computer). Cognitive psychology claims that learning involves the use of memory, motivation, and thinking, and that reflection plays an important part in learning. They see learning as an internal process and contend that the amount learned depends on the processing capacity of the learner, the amount of effort expended during the learning process, the depth of the processing (Craik & Lockhard, 1972; Craik & Tulving, 1975) and the learner's existing knowledge structure. They also look at learning from an information processing point of view, where the learner uses different types of memory during learning (Modritscher, 2006). The cognitive school recognizes the importance of individual differences, and of including a diversity of learning strategies in online instruction to accommodate those differences.

Online learning platforms are, by nature, learner-centered and can have more active participation by all students in the class than in a conventional classroom. Without the

structure of weekly classes, students are generally expected to take a more active role in their own learning (Kolb & Kolb, 2012). A fundamental difference is that instead of simply showing up to make their presence known, in an online class students must do something, for example submit an assignment, ask a question, participate in a discussion (Fredericksen, 2015). Nania (1999) also defends that online learning platforms emphasizes self-directed learning and according to him the role of the instructor shifts "from sage on the stage to guide on the side". ILIAS and gamification learning platforms are learner centered, a fact that may differentiates them from curriculum-centered and instructor centered forms of learning.

According to Modritscher (2006) learners play a more active role in learning by actively organizing the learning process. The emphasis of cognitivism is on helping learners organize information for successful processing into long-term memory and recall. Cognitive strategies focus on internal learning and thinking processes, including problem solving, organizing information, reducing anxiety, developing self-monitoring skills, and enhancing positive attitudes (Tennyson & Schott, 1997). The instructor continues to determine learning outcomes and direct the learning with the additional application of specific information-processing strategies to assist the learner in acquiring knowledge. To facilitate learning, Kolb and Kolb (2012) postulates that the learning environment should be arranged to maximize learners' ability to retrieve prior knowledge relevant to the learning outcomes and organize the content to maximize information processing. Instructors should provide the appropriate context for learners to draw on prior knowledge and fit new information into existing scheme. For learners with little prior knowledge, instructors need to provide opportunities to create new outline by relating the new information to something that is familiar to them.

Learning outcomes that are focused on higher levels of learning such as online learning are best explained by cognitivism because the focus is on breaking down complex content into component parts and relating the content to be learned with prior knowledge to braid higher levels of understanding. Instructional strategies based on cognitive theory consider the organization of content for learning and focus on information processing, including organization, retrieval, and application (Schunk, 2012). Furthermore, cognitivists have increased our understanding of how humans process and make sense of new information, how we access, interpret, integrate, process, organize and manage knowledge, and have given us a better understanding of the conditions that affect learners' mental states.

2.2.3 Constructivism learning theory

Constructivism learning theory is defined as an active construction of new knowledge based on a learner's prior experience. Constructivism learning theory, which focuses on knowledge construction based on learner's previous experience, is a good fit for online-learning because it ensures learning among learners (Modritscher, 2006). A major emphasis of constructivists is situated learning, which sees learning as contextual. Learning activities that allow learners to contextualize the information that should be used in online learning (Anderson & Elloumi, 2004). In most pedagogies based on constructivism, the teacher's role is not only to observe and assess but to also engage with the students while they are completing activities, wondering aloud and posing questions to the students for promotion of reasoning.

Constructivists see learners as being active rather than passive so he will be the center of the learning, with the instructor playing an advising and facilitating role. That will encourage the learner to arrive at his or her version of the truth, influence by his or her background, culture or embedded worldview (Hung, 2001). Learning should be an

active process by means of keeping learners active doing high-level activities such as asking learners to apply information in practical situations, facilitating personal interpretation of learning content, discussing topics within a group, assessment and so on (kim, 2006). The constructivists viewed learning as a search for meaning. They believed that knowledge is constructed by the learner and that the learner develops her/his own understanding through experience.   A constructivist would be more interested in knowing how the learner is attempting to construct meaning (Bush, 2006).

According to Maxwell (2010) Constructivist theories helped build the foundation for curriculum design. Hypermedia and multimedia are examples of online instructional approaches that are more constructivists in nature and have resulted in an emphasis on online learning for students. This is a primary characteristic of the constructivism theory, and though positive aspects of Behaviorism in learning have emerged, there has been an ongoing shift toward more Constructivist learning situations involving online learning (Wales, 2010). The main argument is that learners actively construct their own knowledge based on their own experiences. This has resulted in an increase in popularity for the constructivist approach when utilizing instructional technologies. The use of gamification and ILIAS learning platform is an example of the constructivist approach (Wales, 2010). Online learning is one method which allows students to apply their knowledge to real world scenarios and applications through the use of gamification and ILIAS learning platforms.

There are two types of constructivism: cognitive constructivism and social constructivism. Cognitive constructivism focuses on the individual characteristics or attributes of the learner and their impact on learning. Social constructivism focuses on how meaning and understanding are created through social interaction. Together, they view knowledge acquisition as a means of interpreting incoming information through an

individual's unique lens, which includes his or her personality, beliefs, culture, and experiences (Maxwell, 2010).

This theory argues that with help from an instructor or peers, learners can understand concepts and ideas that they cannot understand on their own. It supports an instructional technologies such as gamification and ILIAS platforms of providing learners just enough support to help them reach the next level of understanding. This platforms in turn allows learners to work independently until they no longer can learn without support. Instruction again is supported through the instructor or peers, and the learner continues to reach higher levels of understanding through their guidance (Wales, 2010).

According to Brown (2006), a constructivist teacher and a constructivist classroom are distinguished from a conventional teacher and classroom by a number of identifiable qualities: the learners are actively involved, the environment is democratic, the activities are interactive and student centered, and the teacher facilitates a process of learning in which the students are encouraged to be responsible and autonomous. The constructivist classroom is an environment in which student will have enough time to develop mental models of the content, which will assist in moving that knowledge away from primary content area, so that it can be applied elsewhere (Spiro 2006). Kumar (2006) stated that the teacher is seen as a facilitator of learning, where learners are permitted to move around freely, use of time is flexible rather than structured, and evaluation compares learners to themselves rather than to peers, with de-emphasis on formal testing. Teachers need to recognize how learners use their own experiences, prior knowledge and perceptions. The constructivist classroom should be an environment based on inquiry which will lead the learners to deep understanding of the concepts under study. Social interactions and context is necessary for learning to occur. Constructivist classrooms are structured so that learners are immersed in experiences with which they

may engage in interactions, invention and meaning-making inquiry. As a theory of learning, constructivism is relevant in this study as the researcher wished to establish how learners learn using gamification and ILIAS platforms.

2.3   Empirical Studies

2.3.1 Empirical studies on the effects of gamification platform on students' academic achievement and retention.

Rouse (2013) worked on the relationship of educational games to motivation and achievement at University of Southern Mississippi. The purpose of the study was to explore motivation and learning outcomes of a community college microbiology students who participated in educational games. Two research instruments (questionnaire and achievement test) were used to collect data and a sample size of 40 students was used for the experimental group while 22 students make up the control group. A quantitative, quasi-experimental research design was used to address the research questions. Descriptive analysis of the data was conducted to determine the mean and standard deviation, while a multivariate analysis of variance (MANOVA) was used to analyze statistical significance in motivation levels between the control and experimental groups. The results of these findings indicate that students who participated in educational games have statistically higher scores in motivation and achievement than students who do not participate in educational games. The study is related to the present study because both are on gamification and also investigating student's motivation and academic achievement. One of the limitation of the study is the small number of the sample size, the present study will address this limitation by increasing the sample size to for each group. Another area of difference is that while this work focuses on one experimental group the present study will expand the scope by focusing on two experimental groups.

Cheong *et al.* (2014) conducted an investigation on how a gamified learning approach influences science learning, achievement and motivation, through a context-aware mobile learning environment, and explains the effects on motivation and student learning. A series of gamified learning activities, based on MGLS (Mobile Gamification Learning System), was developed and implemented to improve student motivation and to help students engage more actively in their learning activities. The responses to the

questionnaire indicate that students valued the use of gamification activities made possible by the use of a smartphone and its functions. Pre- and post-test results demonstrated that incorporating gamification technologies into a botanical learning process achieved a better learning performance and a higher degree of motivation than either non-gamified mobile learning or conventional instruction method. Furthermore, the result revealed a positive relationship between learning achievement and motivation. The study relates to the present study because both are on gamification learning platform, focusing on achievement and motivation. The difference however lies in the use of gender as a moderating variable by the present study. This limitation would be addressed by exposing the gender group to learning content before determining their motivation towards gamification of learning.

De-Marcos *et al.* (2014) conducted an investigation by comparing Gamification, Social networking and conventional method. The aim of the study was to compare all approaches to determine their effectiveness in terms of achievements of students and levels of participation. The research was conducted by using two instruments, gamification plugin deployed in a Blackboard system and a social networking site. The sample size consist of 371 first-year undergraduate students. 114 students majoring in economics, 184 students majoring in life sciences and 73 students majoring in nursing. Quasi experimental design was employed. Pre-test and post-test data were compared using analysis of variance (ANOVA) tests. Findings of the result indicated that on Comparing both experimental instruments and conventional method in terms of academic achievement for knowledge acquisition, participants in social networking got better results. The study is related to the present study because both measure the academic achievement of undergraduate students using gamification platform. The limitation of the study lies in the methodology. While this study compare two platforms,

the present study will compare two platforms to conventional lecture method. Another area of difference is that the gamification in this study was deployed in a blackboard system while the present study will allow students to learn the course content and answer questions online.

Fotaris *et al.* (2016) conducted a research on the application of gamification techniques to a computer programming Class. The purpose of the study was to evaluate how gamification affected students of a 12-week university course named "Fundamentals of Software Development" (FSD) via the use of "Kahoot!" the study was conducted at the School of Computing and Technology, University of West London. The sample included 106 students. A control class (CC) of Ncon = 54 students (43 males, 11 females) and an experimental class (EC) of Nexp = 52 students (44 males, 8 females). To gather quantitative feedback about the effectiveness of the gamified experience, all EC students (Nexp = 52) completed a 15-question online survey measured on a Likert scale of 1 (Strongly Disagree) to 5 (Strongly Agree) at the end of the semester. According to the Likert scale average, students mostly agreed that the classroom games made learning fun and would like to see them introduced to other modules as well. Students were also generally motivated to attend classes and arrive on time, a finding that was also supported by the administrative data collected at the end of the course. The study is related to this present study because both are on gamification. The limitation of the study lies in the methodology, while descriptive design was adopted by this study using questionnaire for data collection the present study will adopt experimental research design using questionnaire and achievement test as research instrument for data collection. Another limitation of the study is with its scope, only one school was considered. The present study will address this limitation by comparing three schools.

Şahin and Namli (2016) of Çukurova University, Turkey worked on gamification and its effects on students' science lesson achievement. The study aim to reveal students' achievement based on gamification use. To address the research questions, pre-test and post-test was applied. The paired samples t- test was used for determining whether there is a significant difference between pre-test and post-test scores of the control group were applied. As a result of the analysis, it was observed that there is no significant difference between pre-test and post-test scores of the control group. This implied that control groups' scores does not change based on these two tests. In addition, paired samples t-test results was used for the comparison of the pre-test and post-test scores of the experimental group and there is a significant difference between pre-test and post-test scores of the experimental group. It implies that experimental groups' scores change based on these two tests. So, gamification application can change students' academic achievement. The study is related to the present study as both are experimental and adopting a similar method of data analysis. The difference lies with the research methodology, while this study uses one experimental and control group the present study will use two experimental and one control group.

Pechenkina *et al.* (2017) investigated the use of a gamified mobile learning app on students' academic achievement, retention and engagement. Quantitative research design was used for the study a combined sample of 711 students was also used. The app was used to deliver multiple-choice content-based quizzes directly to students' personal mobile devices post-lecture and pre-tutorial. After measuring the relationships between students' app usage and their engagement, retention and academic achievement in the subject. The study revealed that following the app's introduction, student retention rates and academic performance increased, and there was a positive correlation between students' scoring highly on the app and achieving higher academic grades. One

major limitation of the study was that the researcher focused more on engagement and students app usage. The present research is designed to address this limitation by incorporating two learning platforms and students' motivation.

2.3.2   Empirical studies on the effects of ILIAS platform on students' academic achievement and retention.

Al-Ani (2013) attempted to investigate university students' uses of open source learning software (ILIAS) in learning in the way that activated their achievements. This study could have an effect on students' achievement, motivation, collaboration and communication as perceived by students. A sample of 283-students from all colleges at Sultan Qaboos University was randomly selected. A questionnaire of 45 items was developed to collect data, the main instrument of this study was a questionnaire of 45 items developed by generating a list of factors derived from the literature. These factors are learning achievement, learning motivation, and students' collaboration and communication learning skills. Beside these statements, the questionnaire included a list of obstacles (14-items) that face students in using ILIAS in learning. A Likert- scale ranging from 1=very low to 5= very high was used to measure students' responses on the uses of ILIAS in learning. A theoretical mean of 3.00 (mid-point of the scale) was determined as the criterion to judge the means. To determine the reliability of the instrument, a random sample of 30 students was selected and the Cronbach-

Alpha was found to be 0.961 on the total items, 0.912 for learning achievement, 0.902 for learning motivation and 0.903 for students' collaboration and communication. The results reveal that using ILIAS in blended learning has an average level of effectiveness related to students' motivation with a mean of 3.216 and mean of 3.164 for students' achievements, and mean of 3.199 is related to students' collaborations and communication. The results showed that there is no statistical significant difference

among student achievement related to gender. The study is related to the present because both are on ILIAS and used a decision mean of 3.00. The limitation lies on the instrument of for data collection. While this study uses questionnaire as the main instrument for data collection, the present study will address this limitation by adopting a quasi-experimental method of data collection for a better data collection strategy.

Goyel and Tambe (2015) carried out a research on the effectiveness of ILIAS-enabled blended learning in private Indian business school teaching niche programs. The objective of the study was to analyze the effectiveness of ILIAS as an education management tool. The sample size was 89 students'. The instrument used was a 5-point Likert questionnaire. The analysis of the data was done using Frequency distribution and mean. When asked about the effectiveness of different features of ILIAS, 70-80 % of the students reported an improvement in the learning and planning of class activities. 41% of students found that the uploading of syllabus and session plans on ILIAS improved their learning, while 29% found that this improved the planning of class activities. Nearly 11% found improvement in both these activities. 20-33 % students did not use ILIAS for accessing the calendar, for submission of assignments and sharing materials. However, at least 60% reported an improvement in learning and planning of class activities when using ILIAS for sharing of study material, submitting assignments (59%) and using the calendar (64%). The major finding in this study has been that students can adapt themselves quite readily to ILIAS LMS for teaching and learning of course content. The study is related to the present study because both used an open source learning management system platform. However, the methodology of the study is not the same with the present study. One of the limitation of the study was that it was conducted using only one instrument. The present study will tackle this by using three instruments to collect data. The sample size was limited to 89 students, the present study

will address this limitation by increasing the sample size of the students. Another major difference is that while this study only seeks the effectiveness of ILIAS, the present study will compare the academic achievement and motivation level of ILIAS and gamification learning platforms.

Lin *et al.* (2017) of National Kaohsiung University of Applied Sciences, Taiwan investigated the outcomes of the combination of ILIAS learning platform and traditional instruction. The study employed an untreated control group design with pre- and post-tests. A pre-test was conducted before the experimental instruction, followed by a post-test. For the experimental group, ILIAS learning platform was used as the teaching method. The sample of the study consist of 218 students (females, n = 110; males, n = 108). The research instrument for this study includes three achievement tests and the Mathematics motivation Scale. At the end of the experimental instruction, open-ended surveys were administered to all participants in the treatment group to establish if they were motivated by the ILIAS learning approach impacted on their learning. A pilot study was conducted to determine the reliability using Cronbach's Alpha (α= .73 and .87) and analysis had high reliability. This was used to test the internal consistency reliability of the questions on the instruments. Descriptive statistics were used, ANCOVA and MANCOVA were conducted on the scores from the achievement tests and mathematics motivation scale. The results of this study showed that the ILIAS learning platform was more effective than traditional methods in terms of academic achievement. No significant gender difference was found in the post-test results for achievement in mathematics. The result also indicated that male students were more motivated in the ILIAS environment. Areas of similarities include, both studies are on ILIAS, comparison of ILIAS and conventional lecture method, and consideration of achievement and motivation of students. One major area of difference is that while this

study uses an open ended questionnaire the present study will use a close ended questionnaire. Another area of difference is the statistical tool used by this study, which is MANCOVA and ANCOVA. The present study will address this limitation by using a decision mean and ANCOVA for the analysis.

Ezemma *et al.* (2018) worked on effect of ILIAS in learning management systems and face-to-face learning environments on students' gender, interest and achievement in accounting. The purpose of the study was to determine the impact of ILIAS LMS and conventional lecture method on the learning outcome of university students. The study was carried out at University of Nigeria, Nsukka, Enugu State, and Nnamdi Azikiwe University, Awka, Anambra State. The population for the study consists of all the 168 first-year undergraduate students of the Department of Business Education comprising of 76 males and 92 females. The instruments used was an achievement test and a 5-point likert response scale and the reliability of the research instrument was calculated using Kuder-Richardson (K-R 20) test and yielded 0.79. Statistical tools used were descriptive and inferential statistics While ANCOVA was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that ILIAS model on LMS has significant effect on students' academic achievement in Elements of Accounting than the conventional method. The study also revealed that academic achievements of male and female students in the treatment group who were taught using ILIAS model on LMS were higher than their counterparts in the control group. The study is related to the present study because both examine the effect of learning management system platform on students learning outcome. Gender was also one of the moderating variables in both studies. The limitation of the study was that it was conducted using only one learning platforms. The present study will tackle this limitation by using two learning platforms.

The sample size was limited to two public universities in Nigeria, the present study will expand the sample size to three public universities in Nigeria.

2.3.3 Empirical studies on the effects of students' motivation towards the use of gamification and ILIAS learning platforms

Dominguez *et al.* (2013), carried out a work to explore the effects of employing game elements on learning for university undergraduate students. They developed an online learning application using game strategies. A quasi-experimental design was employed to determine if gamification can influence students' motivation, attitude to learning and academic accomplishments. Both qualitative and quantitative data were collected. Pre-test, Post-test, questionnaire, and interviews were collected and analyzed. The outcome of the work unveils that there was a significant difference in the initial knowledge of the learners (using independent 2-sample t-tests). The experimental group scored higher in the initial activity(p=.004) and in practical exercises (spreadsheet=.007) ,software presentation :p=.000,and database :p=.000.On the other hand, the group taught with games got significantly lower scores in the final examination(p=.006), on the scores (p=.090)and the final participation scores(p=.090).In essence, the traditional method (control group) had significantly higher scores in written examination and the participation scores. Thus, in their research, gamification increased motivation and learners involvement but had no impact on the academic performance. The variables explored in the study were motivation, attitude to learning and academic accomplishment. While the work above used both qualitative and quantitative data: achievement test, questionnaire, and interviews, this study would utilize achievement test and questionnaire.

Moses *et al.* (2014) conducted a research on students' learning behavior and motivation on ILIAS learning platform at Language Institute, Bangkok University, Bangkok,

Thailand. The sample of the study consist of 83 students (40 male and 43 female), for investigating students' online behavior, two measurements were used – the number of participations and the number of messages. To examine students' motivation, an opinion questionnaire investigating how the students felt about learning through the LMS was distributed to them. It consisted of ten items. The Likert five-rating scale (1= strongly disagree, 2= disagree, 3 = neither agree nor disagree, 4= agree, and 5 = strongly agree) was used for a post-study survey in the experimental group. In order to test the reliability of the questionnaire, the questionnaire was piloted with 40 undergraduate students and the reliability was calculated using Cronbach's Coefficient Alpha. Internal reliability of the 10 statements was at an acceptable level: the Cronbach Alpha value was 0.86. Correlation coefficients were used to find out the relationship between students' online behavior and their motivation. Independent t-tests were adopted to analyze the differences between male and female students regarding their online behavior and their motivation in learning through the use ILIAS learning platform. The findings revealed that a student's motivation was positively correlated with how much the student participated in the use of ILIAS learning platform. The results also revealed that there was no statistically significant difference in students' motivation between male and female students'. That is, male and female students were not different in their motivation to learn through the use of ILIAS learning platform. So gender was found to have no effect on motivation. The results revealed that there was no statistically significant difference in students' learning behavior in the use of ILIAS. However, the area of the study formed the major limitation to the study. All students used in this work came from the same background, that is language institute, Bangkok University. The present study will address it by expanding the scope of the study by incorporating other universities in the study.

Fazamin *et al.* (2015) conducted a research on the Influence of Gamification on Students' Motivation in using E-Learning Applications. The purpose of the study was to access and examine the influence of gamification on students' motivation in using e-learning applications based on the ARCS+G model. The study design was the true experimental by using Posttest design. Instructional Materials Motivation Survey (IMMS) questionnaire was used to measure students' motivational reactions, this survey uses a Likert- scale with five possible choices: (1) Not true, (2) Slightly true, (3) Moderately true, (4) Mostly true, and (5) Very true. Population of the study was about 25 students of a school and 24 of them were the respondents. The Students were randomly chosen and divided into two groups, the experimental group and the controlled group. The experimental group has 12 students, and the controlled group has 12 students. Reliability estimate for motivational scales was computed using Cronbach's coefficient alpha. The Mann-Whitney U test was used for comparing the mean of two independent groups (control and experimental). The results from this study shows a statistically significant difference reliability estimates between the experimental and controlled groups in terms of the ARCS categories measured at IMMS. The overall reliability estimates value for the experimental group was .078 more than the controlled group. The experimental group has better reliability estimates in each category of the ARCS than the controlled group. Also, the e-learning applications use in this study produce statistically significant differences between the controlled group and the experimental group in terms of students' motivation based on the use of gamification. This study is related to the present study as both tend to work on gamification and motivation, both study also use the same method of data collection. However, a major limitation is in the area of sampling technique and population of the students, while this study uses a random sampling technique and a population of 25 students, this present study will use an intact class.

Papp (2017) conducted a research on the impact of gamification on students' Motivation. The purpose of the research is to identify students' level of motivation on the impact gamification had on their learning in the classes using game elements. The study presented data collected using a survey instrument to report the students' opinions, experiences and outcomes of the gamification process. The survey used a Likert scale with rankings of 1 to 5 with 1 representing Strongly Disagree and 5 representing Strongly Agree. The sample size was 45. The responses to the survey questions regarding students not wanting to miss the class and not wanting to let down their teammates provided a 71.1% and 86.6% response rate respectively in the Strongly Agree and Agree (SA+A) categories. Students SA+A that the class was more engaging than their other classes at a rate of 42.2%. When asked if they spent time outside of the classroom was also deemed to be an activity that represented motivation at a rate of 66.7% that SA+A. Students confirmed that they enjoyed the competition against the other teams at a rate of 66.6% SA+A. the study is related to this present study in that both are on gamification and questionnaires were used to obtain data. One major area of difference is that while this study employs the use of a survey design the present study will employ the use of quasi-experimental design.

Saovapa and Pattanapichet (2017) conducted a study to find out what impact gamification had on students' learning achievement and motivation at Language Institute, Bangkok University. A quasi-experimental study was performed with two groups of students. The experimental group was taught using the digital gamification whereas the control group was taught with the conventional method. Pre-tests, post-tests, and questionnaire on the students' motivation toward gamification in language learning were the instruments used in this study. Then 30 students who were not the participants in this study were assigned for the pilot test. The data were analyzed using

Independent t-tests and One-way Analysis of Covariance. The results revealed statistically significant differences with regard to learning achievement and motivation at 0.05. The experimental group obtained higher scores than the control group, and the motivation of students in the experimental group was much higher than that of the control group. Areas of similarity to the present study is in the use of research design and instruments used in collecting data, while a major limitation lies in the area of statistics used for analysis. While this study employs the use of t-test and ANOVA, the present study will employ the use of mean, standard deviation and ANCOVA to answer the research questions and test the hypotheses.

Mohammed (2018) worked on the effects of gamification on students' academic achievement and motivation at an iraqi university The aim of this study is to analyze the effects of gamification elements such as (points, level-up, badges and leaderboard) in Moodle system on students' achievement and motivation. The experimental research methodology was used. 47 Iraq University students participated and were divided into two different settings. 30 students of the experimental group worked with gamification tools (points, level-up, badges and leaderboard) and 17 students of the control group had access to the same session and activities but without the gamification tools. Data sources included students' grades of pre and post-tests scores and students' survey results of experimental group. The results indicated that students in the experimental group had no statistically significant difference from the control group regarding the student's achievement on pre-test scores, whereas the experimental group students had higher grades than the control group students indicating a statistically significant difference regarding the students' achievement on post-test scores. Furthermore, nearly all students in the experimental group strongly agreed that using the gamification tools (points, level-up, badges and leaderboard) were motivating and beneficial in education.

A major area of limitation is the instrument used in data collection. This study uses students' grade and achievement test scores, while this present study employs the use of achievement, retention scores and questionnaire.

Mese and Dursun (2019) carried out a research on the Effectiveness of gamification elements in blending learning environments at the Faculty of Education, Yozgat Bozok University Yozgat, Turkey. The study was carried out using the convergent parallel mixed design, in which the qualitative and quantitative data were integrated. The study was conducted with 63 participants who were randomly divided into control and experimental groups (30 experimental, 33 control group). The research data were collected via academic achievement test, Instructional Materials Motivation Survey. The reliability coefficient based on the item variance of the test was examined with the method of Kuder-Richardson 20 (KR-20), and the value obtained was .501 for the pretest and .585 for the posttest. In order to determine the participants' levels of motivation, the Instructional Materials Motivation Survey developed by Keller (2010) was used. The Cronbach Alpha internal consistency coefficients of the measurement tool (α) was calculated as .87 for the scale. The quantitative data in the study was analyzed with independent samples t-test, 2 X 2 mixed design ANOVA and Pearson product-moment correlation, while the qualitative data gathered from each data source were analyzed using content (inductive) analysis method. According to the findings of the results, no difference was observed between the groups in terms of academic achievement and motivation. The study is related to the present study because both are on gamification and motivation. The limitation of the study lies in the research design and sampling technique, while this study was on convergent parallel mixed design and random sampling of both experimental and control group. The present study will adopt a quasi- experimental design and an intact class will be used.

2.3.4 Influence of gamification and ILIAS on gender achievement, retention and motivation.

The term gender is socio-cultural and it is built based on the biological expectations of the individual on the basis of being a male or female. Gender has a sound psychological background and is used to refer to specific cultural patterns of behaviour that are attributed to human sexes. Gender, according to Udoh (2011) refers to a set of assumptions about the nature and character of biological differences between males and females, assumptions that manifest in a number of ideas and practices that have a determinant influence on identity, social opportunities and life experiences of human actors. The assumptions tend to define the task and roles of a particular sex, thus enhancing role and behavioural identity for the individual. It could influence what a person is expected to do or not. It also influences the person's belief in respect of being a male or female.

In the educational system, gender is important as it tends to influence the pattern of school enrolment and academic performance of students. This is partly because gender roles affect familiarity with academic content, career aspirations, attitude and motivation toward subjects, teacher expectations and preferred approaches which also affect academic performance (Mahmoud *et al*, 2012).

Elrfani *et al.* (2010) conducted a research on the impact of age, gender, and gamification play performance. The study used 60 students of six-sixteen years old (18 females and 42 males). They were engaged in three video games to determine their influence on their age and gender. The results indicated that males were more motivated to play the game than females. The female learners had a better achievement than the male learners. The study is related to the present study as both examine the effect of gamification and

having gender as a moderating variable. However, the aim of the study might be defeated by wrong use of research instrument. Students achievement would be better achieved through exposure to learning contents through the use of gamification learning platform and not just playing video games and that is what this present study is seeks to address.

In their study, Smith and Stephens (2010) indicated that the mean scores of the conventional class was higher than the mean average of the ILIAS class, and the average performance of female students was significantly better than the average performance of male students. In addition, the researcher indicated there was no association between gender and grades of the student.

Yien *et al.* (2011) carried out a research to ascertain the effects of employing gamification components in a nutrition class. The quasi experimental non-equivalent control group design was employed in a four week learning activity. The study used sixty-six (66) third graders in two classes (33 learners in each class, 18 males and 15 females) in southern Taiwan. The experimental group was taught with gamification while the control group was taught with the traditional teaching method. The outcome revealed that student taught with gamification (experimental group) experienced excellent learning achievements than pupils instructed with the traditional method (control group). The outcome also revealed that learners taught with gamification manifested a higher motivation towards learning than learners taught without gamification. The results also unveiled that there was no significant difference between genders as regards to academic achievements and motivation. The study is related to the present study as both examine the effects of gamification on students' academic achievement. But while this study has a total population of 66 students, the present study will widen the scope for better generalizability of results.

Jamal *et al.* (2015) carried out a research on the effects of age and gender on student achievement in face-to-face and gamification classes. The purpose of the study was to examine the effects of demographic characteristics on student achievement in the 2010-2013 academic years as measured by course grades in face-to-face versus gamification courses at a college in south Texas. This study utilized a quantitative approach, the required sample size was approximately 7,500-9,000 students for an alpha level of .05, a confidence interval of 95%. The researcher obtained archival data regarding students' course grades and students' demographic characteristics of age and gender from the school. One-Way Analysis of Covariance (ANCOVA) was analyzed to measure the main effects between the independent variables such as method of instruction, gamification and face-to-face groups, controlling for the covariate variables such as age and gender. The findings of this study indicated that the achievement score as measured by final grade for face-to-face students was higher than for gamification students and also the average grade of female Students was higher than the average grade of male students. The study is related to the present study as both examine the academic achievement of students in conventional and gamification platforms and having gender as a variable. However, ascertainment of students' performance will be better achieved through exposure to learning contents and not through archival data and that is what the present study seeks to address.

Codish and Ravid (2017) conducted a research on gender moderation in ILIAS at Ben-Gurion University of the Negev, Israel. This study was performed using university undergraduates participating in the courses delivered to students in their third year. Motivation of the students from using the platform was measured using a questionnaire. This questionnaire includes 26 items using a Likert scale of 1 (complete disagreement) to 5 (full agreement). Internal consistency was tested using the Cronbach Alpha and

yielded 0.7. T-tests were performed to examine whether gender differences existed in the motivation towards the use of ILIAS learning platform. The key results from the t-tests are that females were motivated more than male. The study is related to the present study as both studies sampled undergraduate students. But while this study is on survey, the present study will be on quasi- experimental design.

Okeke (2018) carried out a research on the interaction effect of gender and treatment on mean retention score of chemistry students taught using ILIAS. The study sought to specifically study the following objectives; to investigate the difference in mean achievement score of students taught using ILIAS and those taught without it; to ascertain the difference that exists in mean achievement score of male and female students taught using ILIAS and to determine the interaction effect of gender and treatment on mean achievement score of students taught using ILIAS and those taught without it. A quasi experimental, non-equivalent, non-randomized pre-test post-test research design was adopted. The sample was 194 SS2 chemistry students drawn through multistage sampling technique. The instrument Chemistry Achievement Test (CAT) was developed by the researcher. The instrument was pilot tested and the internal consistency of the CAT was obtained using Kuder Richardson formula 20(KR-20) and Cronbach alpha procedure. Reliability coefficients of 0.8359 was obtained for the CAT. Mean and standard deviation scores were used to answer the two research questions while the three null hypotheses were tested at 0.05 level of significance using analysis of covariance (ANCOVA). Results showed that ILIAS was more effective in facilitating students' achievement in chemistry than the control group. Gender was a significant factor on students' academic achievement in chemistry when taught using ILIAS. Furthermore, the results revealed that the influence of gender on mean achievement score was significant. This implies that the female students taught using same ILIAS

obtained higher academic achievement score than the male students taught sing same ILIAS. The results also revealed a significant interaction effect of gender and treatment on achievement. This study also seeks to find out if gender moderating effects exist in a gamified and ILIAS learning environment designed for educational technology undergraduate students.

2.4   Summary of Literature Reviewed

This chapter has addressed the different concepts of the variables used in this work, which include the concept of educational technology, online learning, concept of conventional teaching method, goals of university education, gamification and ILIAS and their significance in education, behavioural theory of learning, cognitive theory of learning, constructivism learning theory and gender in relation to online learning. These variables were operationalized detailing contributions made by different researchers in online learning platforms. These contributions made (Rouse, 2013; Goyel & Tambe, 2015; Sahin & Namli, 2016; Lin *et al.*, 2017; Ezzemma *et al.*, 2018; Mese & Dursun, 2019) revealed that gamification and ILIAS online learning platforms gives lecturers the diversity of their lectures, displaying more information and enhancing students learning. On the other hand encourage learners to seek information, evaluate it, share it collaboratively and, ultimately, transform it into their own knowledge.

Gamification and ILIAS are two online platforms discussed with a mission to serve as a development platforms for present-day society based on knowledge. These platforms could be used to help learners take responsibility of their learning, become autonomous and self-confident. Infact, Gamification is becoming more prevalent in education because of its perceived ability to motivate students and thus enhance the learning process. It capitalizes on the human desire to meet an objective, achieve a goal, outperform peers, and level up through a series of challenges. While ILIAS, a software application for documentation, monitoring administration, reporting, e-learning programs, training programs, classes and events online and in training Students would

use so that they can be able to develop their knowledge through experiencing rather than depending more on their textbooks in class.

Since these study is about behaviourist theory, this theory emphasize changes in behavior that result from stimulus-response associations made by the learner. The goal from the behaviourist perspective was the development of instruction that would enable the majority of students to achieve levels of performance predetermined by behaviourally defined objectives. Cognitive and constructive learning theories were also taken into perspective, because it is found to be appropriate for this study in the sense that it could assist students in directing their own learning and having a high level of motivation to participate in meaningful interactions.

The reviewed literature indicated that most of the researchers (Domínguez, *et al.,* 2013; Papp, 2015; Penchenkina, *et al*., 2017; Mohammed, 2018) focused on the performance, attitude, perception, interest, awareness and academic achievement of gamification and ILIAS online learning platforms without exposing the students to conventional teaching method. Also, most of the studies on the status of gamification and ILIAS online learning platforms in universities were confined to developed countries like the United States of America, Britain and Australia with very few studies in developing countries like Nigeria. Thus, the present study is geared towards filling the gap.

CHAPTER THREE

3.0   RESEARCH METHODOLOGY

3.1   Research Design

The research design used for this study was quasi-experimental design of the pre-test-post-test non-equivalent control group. According to Gall *et al.* (2007), Quasi-experimental research design is considered suitable for any research where the researcher cannot randomly sample the population and assign them to treatment groups without interrupting the academic activities of the institutions being used for the study. Hence, intact classes were used and there was no random assignment of research subjects. The research design layout is shown in Table 3.1

Table 3.1   Research Design Layout

Group Retention	pre-test	Treatment	Post-test
Exp Gp 1 O_3	O_1	X_1	O_2
Exp Gp 2 O_3	O_1	X_2	O_2
Control Gp O_3	O_1	X_O	O_2

Key

Where:

O_1, O_1, O_1 Represents the pre-test scores of experimental and control group

O_2, O_2, O_2 Represents post-test scores of experimental and control group

O_3, O_3, O_3 Represents Retention scores of experimental and control group

X_1 Represents treatment for experimental group 1 (Gamification learning platform)

X_2 Represents treatment for experimental group 2 (ILIAS learning platform)

X_o Represents the control group exposed to lecture method.

3.2   Population of the Study

The population of this study comprised 3,750 educational technology university students in all public universities in Nigeria. There are seven universities offering educational technology in Nigeria. The target population is second year educational technology students in three universities out of the seven universities offering educational technology from 2019/2020 academic session. The choice of this level is based on the fact that they already have the background knowledge in their first year and the concept taught is contained in their syllabus. Table 3.2 and 3.3 show a demographic distribution of universities in Nigeria offering Educational Technology and the population of second year Educational Technology students that form the target population.

Table 3.2: Demographic distribution of Universities in Nigeria offering Educational

Technology.

S/No	Name of Universities		Male	Female
Total				
1	Federal university of Technology, Minna	125	170	295
2	University of Ilorin, Ilorin	240	522	762
3	University of Calabar	280	275	555
4	University of Port-Harcourt	340	455	795
5	University of Uyo	243	260	503
6	Lagos State University	340	345	685
7	Ekiti State University, Ado-Ekiti	130	125	155
	Total		**1698**	**2152**
	3750			

Source: Universities websites and Educational Technology Departments of the respective Universities. 2019/2020.

Table 3.3 Demographic Distribution of Samples for the Study

S/No	Name of Universities	Male	Female	Total
1	University of Port-Harcourt	62	80	142
2	University of Ilorin	80	95	175
3	Lagos state University	78	85	163
	Total	**220**	**260**	**480**

3.3 Sample and Sampling Techniques

The sample for the study consisted of second year Educational Technology students. A random sampling technique was adopted to select three universities offering educational technology from three geo-political zones of Nigeria. Therefore, the three universities were purposively assigned to form the three groups (Experimental group I, Experimental group II and control group). These schools were purposively assigned based on equivalence (facilities and manpower), school type (government institutions), gender composition (mixed schools), ICT facilities and student's exposure to the use of mobile technology. These universities are University of Port-Harcourt, University of Ilorin and Lagos State University. University of port-Harcourt was assigned to Gamification learning platform as experimental group I, University of Ilorin was assigned to ILIAS learning platform as experimental group II while Lagos State university was used as control group. An intact class was used from each of the sampled schools for the study.

3.4 Instruments for Data Collection

Three research instruments were employed by the researcher and used to gather data for the study. They include:

1. Test instrument
   a. Achievement test: Educational Technology Achievement Test (ETAT)
2. Treatment instruments
   a. Gamification Learning Platform (GLP)
   b. ILIAS Learning Platform (ILP)
3. Motivation Inventory Scale Questionnaire (MIQ).

3.4.1 Development of Educational Technology Achievement Test (ETAT)

ETAT was developed by the researcher and consist of two sections (A & B). Section A was designed to obtain the demographic data of the students while section B was designed to obtain information on student's cognitive level based on what they were taught. ETAT is made up of fifty (50) multiple choice objective test drawn from the concept taught (see appendix C). The test is made up of five options with letters A-E with only one correct answer included. The students are expected to circle the correct answer that matches the question. The achievement test contain questions on the concept of visual, graphics, design and communication, tools and materials, types of graphics, colouring and colouring techniques. ETAT was used for pre-test, in order to obtain information on students' entry knowledge before treatment. The same multiple choice questions were reshuffled to give students the impression that the questions are different from the one used for pre-test and used as achievement and retention test. Each of the questions carries two (2) marks which gave a total mark of 100%. ETAT was designed to measure the six levels of cognitive domain of the students. The number of

items measuring each domain level is shown in table 3.4. The necessary procedure for test development, that is, preparation of chart specification, item construction, content validation was followed.

Table 3.4 Specification for Educational Technology Achievement Test (ETAT)s

Cognitive Domain Objectives

Content	Knowledge	Comprehension	Application	Analysis	Synthesis	Creativity	Total
Topic 1	1	2	2	2	2	2	11
Topic 2	1	1	1	1	2	2	8
Topic 3	1	1	2	2	2	2	10
Topic 4	2	1	1	2	2	2	10
Topic 5	1	2	2	2	2	2	11
Total	6	7	8	9	10	10	50

3.4.2   Treatment instruments

Gamification and ILIAS learning platform was used as treatment instruments. These include the methods, procedures and techniques used by the instructor to present to the students the contents and to bring about an outcome. These were developed by the researcher in collaboration with an online course developer. The gamification and ILIAS platforms consisted of five (5) units respectively, each unit comprises of the objectives of the lesson, main content and evaluation questions to enable each student monitor his/her progress in the course of his/her learning. Gamification and ILIAS learning platforms was used by experimental group I and II and exposed to them through a gamification app and ILIAS LMS app.

3.4.3 Development of gamification learning platform

Gamification app is a mobile and desktop application that is compatible with android and apple devices, it was developed using two software: video scribe and adobe flash professional.

Video scribe: The five (5) topics in graphics communication was converted to animated videos to make them more interactive and catchy for the learners. The topics were first converted to audio formats, then the recorded audio was imported into the application to act as voiceover for the video. Each character on the video is represented by a frame in the video scribe application, a time is set for how long it takes to draw a character on the frame. Images used were imported in the application so as not to have just words but also images in the lessons. The frames were later converted into videos (.avi) format

which was in turn converted to another video format (.flv). The reason for this conversion is because adobe flash professional only accepts videos in .flv formats.

Adobe flash professional cs6: Adobe flash professional was used to create the quiz in the gamification. The animated videos created using video scribe was imported and embedded in the gamification, in a way that the learner has to watch the lesson before they can proceed to playing the game. Graphic pieces (pictures and sound) from a reality show who wants to be a millionaire was downloaded from the internet, these images were imported into the flash application to create the interface for the game, text boxes were used to input the questions and options in the game. The options text-boxes were converted to symbols (buttons) to make them clickable by the learners.

The audio files downloaded were imported and embedded in strategic key frames in the game, these sounds include the 'who wants to be a millionaire' theme song and also the clapping effect when the student selects the write answer. The result was converted from .fla to .swf file. This file was then uploaded to the server so learners everywhere can access it on the web http://hellearn.com.ng/gamification.

This application presents students with weekly contents and they had access by

1. Logging on to the site http://hellearn.com.ng/gamification
2. The animated contents is then presented in a form of scribe for the students to read.
3. After each lesson, the students are expected to answer the objective questions culled from the topic treated.
4. If the first question is answered correctly, it automatically unlocks the second question for the student to answer. But if a wrong answer is given, the student will be taken back and read the contents before attempting the question again, if

after the third attempt the student gets it wrong, he/she will be provided with the correct answer by the platform.

5. Members were exposed to this platform for a period of five (5) weeks.

3.4.4 Development of ILIAS learning platform

ILIAS LMS is an open source software (OSS), which means it is free to re-programming and modifying. It is programmed in PHP, support using Mysql and host at server Apache. It can be used under windows or Mac (www.ilias.uni-koeln.de/ios/source-e.html). In relation to this study, ILIAS was adopted and customized and the students had access by:

1. Open the internet browser (e.g. internet explorer, firefox-mozilla, goggle chrome or opera mini).

2. In the address bar, type the web address which is http://hellearn.com.ng/lms.

3. To login, fill in the user name (test) and password (test123) then click button 'login'.

4. After logging in using the provided username and the user's password, ILIAS takes the student to the personal desktop, mail (internal mail system) and repository.

5. The personal desktop is the backbone of the system. Here, hyperlinks with their corresponding icons are displayed to all the important function within the online-learning environment, for example current classes, favourites, help guides, notes and special modules. A calendar with important dates is also availed here, and the students continue with the course where they left off. ILIAS can be navigated through a tab-system, always located at the top of the window.

6. The repositories is where the different courses are listed. Upon clicking on one, such course description is given to student with general information. Then clicking on 'content' displays all the unlocked resources available specifically for that course are displayed. These can be for example learning materials, tests, forums and groups. The next stage is exposure to learning content, the learning content contains five different unit. Each unit was delivered to the students on weekly basis.

7. At the end of every unit comes the evaluation questions. This contains series of questions that access the students understanding of the contents. Students are expected to send their answers to those questions via the private message system of the researcher who in turn gives the student a feedback on their performances.

Students were exposed to this platform for a period of five weeks. After this period, one (1) week was used for assessment and examination. Assessment was done online while examination was done manually, organized in a classroom setting where question papers were shared to the students at a stipulated time and collected once the time elapses.

3.4.5   Development of motivation inventory scale

Development of motivation inventory scale on gamification learning platform:

Questionnaires on Gamification titled 'Questionnaire on University Students' Motivation towards Educational Technology through Gamification Platform' (QUSMETGP) was developed by the researcher. It consist of two sections A and B respectively (See Appendix E). Section A contains information on the demographic data of the respondents while section B contain information on motivation of educational technology students on the use of gamification learning platform. The scale was

developed to elicit information from students regarding their motivation towards the use of gamification learning platform in teaching educational technology concepts. This was administered to the students of experimental group to test their motivation level after been exposed to the learning platform. The motivation scale comprises twenty (20) items, based on a 5-point Likert scale in which strongly agree (SA) was awarded 5 point, Agree (A) awarded 4 point, undecided (UD) awarded 3 point, Disagree (D) awarded 2 point and strongly disagree (SD) awarded 1 point. A decision mean of 3.0 and above was taken as acceptable mean for agreement. The items in the questionnaire were verified by experts on technical accuracy and composition. For the validation of the questionnaire, it was pilot tested on some groups of students who were part of the population but was not part of the sampled school.

Development of motivation inventory scale on ILIAS learning platform:

Questionnaire on ILIAS titled 'Questionnaire on University Students' Motivation towards Educational Technology through ILIAS Platform' (QUSMETIP) was developed by the researcher. It consist of two sections A and B respectively (Appendix F). Section A contains information on the demographic data of the respondents while section B contain information on motivation of educational technology students on the use of ILIAS learning platform. The scale was developed to elicit information from students regarding their motivation towards the use of ILIAS learning platform in teaching educational technology concepts. This was administered to the students of experimental group to test their motivation level after been exposed to the learning platform. The motivation scale comprises of twenty (20) items, based on a 5-point Likert type in which strongly agree (SA) would be awarded 5 point, Agree (A) awarded 4 point, undecided (UD) awarded 3 point, Disagree (D) awarded 2 point and strongly disagree (SD) awarded 1 point. A decision mean of 3.0 and above was taken as

acceptable mean for agreement. The items in the questionnaire were verified by experts on technical accuracy and composition. For the validation of the questionnaire, it was pilot tested on some groups of students who were part of the population but was not part of the sampled school.

3.5   Validation of Research Instruments

The instruments developed for this study were validated by experts in Educational Technology, Psychologist, Research measurement and evaluation. The experts were given the aim and objectives of the study alongside the instruments and were asked to validate the items by making their inputs in form of corrections, and suggestions with regard to structure of items, and objectivity of questions so that the items will be suitable for data collection. Their suggestions, corrections and recommendations were incorporated to produce the final copy of the instruments (see appendix N).

3.5.1   Validity of ETAT

ETAT and lesson note were validated by two experts in educational technology from Federal University of Technology, Minna and Two experts in research measurement and evaluation from FCT College of education, Zuba. The experts validated the content of the test to ensure that it adequately covers the syllabus. Finally, comments, opinions and suggestions of the experts were used to make necessary corrections on the instrument. The validation entails checking both face and content validity. Face validity refers to the extent to which a test appears to measure what it is intended to measure. In content validation, the following areas were considered: the concept of visual, graphics, design and communication, tools and materials, types of graphics, colouring and colouring techniques

The ETAT covered the above topics and was constructed using Test Blueprint/Table of Specification. The importance of Test blueprint in construction of achievement test is to prevent a researcher from developing a test that is biased, and also to build content validity into the test. In constructing the test items, the researchers considered the 6 objectives of cognitive domain. This is in agreement with Nworgu (1992) that content validity can be assured in an achievement test if the objectives of cognitive domain (knowledge, comprehension, application, analysis, synthesis and creativity) were taken into consideration while developing the test items.

3.5.2 Validity of questionnaire on university students' motivation towards educational technology through gamification and ILIAS platforms

The questionnaires on University students' motivation towards educational technology through gamification and ILIAS platforms (QUSMETGIP) were validated by two experts in educational technology from Federal University of Technology, Minna and expert in Psychology from College of Education, Minna. The validation entails checking both face and content validity of the instrument. Content validity was considered important in this study because it helps to determine if the items were true representatives of samples of all the traits measured (Azuka, 2011) and more so, content validity is one of the most important and suitable form of validity in an achievement test (Nworgu, 1992; Okwo, 2017). The face validity involved checking the instrument for clarity, arrangement and logical sequence and relevance to this study

3.5.3   Validity of gamification and ILIAS learning platforms

Gamification and ILIAS learning platforms were validated by two experts in educational technology from Federal University of Technology, Minna. The instrument

was validated based on the audio, graphics, contrast and harmony of the course content. Corrections made were effected.

3.6   Reliability of the Research Instrument

To determine the reliability of the research instrument, a pilot study was carried out in order to determine the problems inherent in the packages before the treatment using 60 Second year Educational Technology students from Federal University of Technology, Minna. Federal University of Technology, Minna was used because it is part of the population but not part of the sample for the study. ETAT was administered to the students using test-retest method. Thirty students were randomly selected by hat and draw method (15 males and 15 females) and used as gamification group where the students were given the website address to learn the course content administered to them. Another thirty were also selected randomly and used as ILIAS group and also learned the course content on platform. Educational Technology Achievement Test (ETAT) consisting of twenty questions was administered to the students after three weeks of treatment and the scripts were marked. The same test was re-administered to the students after one week (test-retest method), and the questionnaire were also administered to students in the gamification and ILIAS groups. While, the motivation scale questionnaire was administered once on the gamification and ILIAS group. Pearson Product Moment Correlation Coefficient was used in calculating ETAT which yielded a reliability of 0.93 while Cronbach Alpha method was used in calculating the reliability of the motivation inventory scale which yielded a co-efficient of 0.90 and 0.91 for gamification and ILIAS questionnaires respectively. The pilot study revealed that both ILIAS and gamification group perform significantly better on the dependent variables (achievement and retention) and also show a high level of motivation. This is considered acceptable according to a thumb rule suggested by Frankel and Wallen

(2000) that the reliability of a test for research purpose should be at least 0.70 and preferably higher (See Appendix M)

3.7 Method of Data Collection

The researcher visited the three sampled schools in the first week of the experiment to seek for permission to use their students as well as some lecturers with a letter of introduction from the Head of Department. The research assistant were trained for a period of one week on the implementation of the instruments under the supervision of the researcher. Specifically, the role of the research assistants was to help guide the students if they had any problem with the usage of ILIAS and gamification learning platforms. To make sure the instructions were strictly adhered to by the students and also assist in the dissemination and collection of scripts. During the third week, pre-test was administered to each of the sampled schools to determine the students' entry knowledge and the comparability of the experimental and control group with respect to their achievement in the pre-test scores. The main instruction commenced in the fourth to eight week in all the sampled schools. Experimental group one was taught using gamification learning platform while the experimental group two was taught using ILIAS learning platform and the control group with conventional lecture method. The experimental groups were subjected to the learning platforms which contained the introduction and the main objectives were clearly spelt out. Each student was required to carry out the activities on his/her own. The students were advised to consult the researcher or research assistant to discuss any difficulties relating to the concept under study.

The conventional lecture method was used in teaching the control group in the sampled school. The lecture note was prepared by the researcher in order to avoid teacher quality variable. In this method, the researcher verbalized the relevant concepts during the

lesson, the students watched and listened attentively, taking down relevant notes (see appendix L). The test items (ETAT) was reshuffled and administered at the end of eight weeks as post-test to all the groups (Experimental group I, Experimental group II and conventional lecture group). Three weeks after the post-test, the items were reshuffled again and retention test was administered to all the groups. The test items were reshuffled so that the items look different from the first one and to create an impression that the pre/post and retention test questions are different from one another. After the administration of the retention test, questionnaires were administered to the experimental group I and II to determine their response on their level of motivation after being exposed to gamification and ILIAS learning platform. The study lasted for twelve (12) weeks. The scores for both the experimental and control group were recorded and subjected to data analysis. The test items in the pre-test, post-test and retention test were marked, scored and recorded.

BREAKDOWN

1st week …………. Permission from the sampled schools

2nd week ………….. Training of research assistants

3rd week …………. Administration of pre-test

4th – 8th week …….. Main teaching/treatment

9th week ……….. Administration of post-test

10th – 11th week ……….. Free time

12th week ……………. Retention test/questionnaire to determine motivation after treatment.

3.8   Method of Data Analysis

The data collected from the administration of research instruments was analysed using descriptive and inferential statistics. Mean and Standard Deviation were used to answer the research questions. Analysis of variance (ANOVA) was used to test the hypothesis

formulated for the study at 0.05 level of significance. ANOVA was used because it exhibits within group variations, particularly to individual differences and also to compare and contrast the means of two or more populations. The pre-test scores were used as covariate to the post-test scores, where significant difference was observed on the effects of the three modes of instructions on achievement and retention, multivariate analysis was conducted (Sidak post hoc). The data was analysed using statistical package for social sciences (SPSS) 23.00 version.

CHAPTER FOUR

4.0 **RESULTS AND DISCUSSION**

This Chapter presents the relevant data for answering the research questions and for testing the hypotheses. The descriptive statistics of mean and standard deviation were used to answer the research questions while the hypotheses were tested using Analysis of variance (ANOVA) statistics. The analysis and results are presented in tables according to the research questions and hypotheses as shown below.

4.1 **Answering Research Questions**

Research Question 1: what are the mean achievement scores of students taught Educational Technology using Gamification, ILIAS learning platforms and Lecture method?

Table 4.1 Shows the result of mean achievement and standard deviation of students' scores in gamification, ILIAS learning platforms and lecture method (LM)

Groups	N	Pre-test		Post-test		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Experimental (Gamification)	142	34.99	5.36	71.20	9.14	36.21
Experimental (ILIAS)	175	34.59	4.18	80.53	4.18	45.94
Control	163	32.75	3.76	60.75	3.76	28.00

The data presented in Table 4.1 shows that the experimental group (Gamification) had a mean score of 34.99 and standard deviation of 5.36 in the Pre-test and a mean score of 71.20 and standard deviation of 9.14 in the Post-test making a Pre-test Post-test difference in the experimental group (Gamification) to be 36.21. The experimental group (ILIAS) had a mean score of 34.59 and standard deviation of 4.18 in the pre-test

and a mean score of 80.53 and standard deviation of 4.18 in the post-test making a pre-test post-test difference in the experimental group (ILIAS) to be 45.94. The control group had a mean score of 32.75 and a standard deviation of 3.76 in the pre-test and a post-test mean of 60.75 and a standard deviation of 3.76 with a pre-test post-test difference of 28.00. With this result, the students in the experimental group (ILIAS) performed better in the achievement test than the students in the experimental group (Gamification) and control group.

 Research Question 2: What are the mean retention scores of students taught Educational Technology using Gamification, ILIAS learning platforms and lecture method?

Table 4.2 Shows the result of mean retention and standard deviation of students' scores in gamification, ILIAS learning platforms and lecture method (LM)

Groups	N	Post-test		Retention		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Experimental (Gamification)	142	71.20	9.14	63.10	8.97	8.10
Experimental (ILIAS)	175	80.53	4.18	71.92	4.05	8.61
Control	163	60.75	3.76	54.09	4.76	6.66

The data presented in Table 4.2 shows that the experimental group (Gamification) had a mean score of 71.20 and standard deviation of 9.14 in the Post-test and a mean score of 63.10 and standard deviation of 8.97 in the Retention making a post-test retention difference in the experimental group (Gamification) to be 8.10. The experimental group (ILIAS) had a mean score of 80.53 and standard deviation of 4.18 in the Post-test and a mean score of 71.92 and standard deviation of 4.05 making a post-test retention

difference in the experimental group (ILIAS) to be 8.61. The control group had a mean score of 60.75 and a standard deviation of 3.76 in the Post-test and a retention mean of 54.09 and a standard deviation of 4.76 with a post-test retention difference of 6.66. With this result, the students in the experimental group (ILIAS) retained better in the test than the students in the experimental group (Gamification) and control group.

Research Question 3: What is the influence of gender on the mean achievement scores of students taught Educational Technology using gamification learning platform?

Table 4.3 Shows the result of mean achievement and standard deviation of male and female students' scores exposed to gamification learning platform

Groups	N	Pre-test		Post-test		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	62	36.10	4.46	73.03	8.39	36.93
Female	80	34.13	5.85	69.77	9.48	35.64

Results in Table 4.3 shows that male group had a mean score of 36.10 and standard deviation of 4.46 in the pre-test and a mean score of 73.03 and standard deviation of 8.39 in the post-test making a pre-test post-test score difference in male group to be 36.93. On the other hand, the female group had a mean score of 34.13 and standard deviation of 5.85 in the pre-test and a mean score of 69.77 and standard deviation of 9.48 in the post-test making a pre-test post-test difference of 35.64 The results show that there is a difference between the mean achievement scores of Male and Female students when exposed to Gamification Learning platform in favour of the Male students.

Research Question 4: What is the influence of gender on the mean achievement scores of students taught Educational Technology using ILIAS learning platforms.

Table 4.4 shows the result of mean achievement and standard deviation of male and female students' scores exposed to ILIAS learning platform

Groups	N	Pre-test		Post-test		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	80	34.30	3.55	80.30	3.55	46.00
Female	95	34.72	4.66	80.72	4.66	46.00

Results in Table 4.4 shows that male group had a mean score of 34.30 and standard deviation of 3.55 in the pre-test and a mean score of 80.30 and standard deviation of 3.55 in the post-test making a pre-test post-test score difference in male group to be 46.00. On the other hand, the female group had a mean score of 34.72 and standard deviation of 4.66 in the pre-test and a mean score of 80.72 and standard deviation of 4.66 in the post-test making a pre-test post-test difference of 46.00 The results showed that there was no difference between the mean achievement scores of Male and Female students when exposed to ILIAS Learning platform.

Research Question 5: What is the influence of gender on the mean retention scores of students taught Educational Technology using gamification learning platform?

Table 4.5 Shows the result of mean retention and standard deviation of male and female students' scores exposed to gamification learning platform

Groups	N	Post-test		Retention		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	62	73.03	8.39	64.97	8.39	8.06
Female	80	69.77	9.48	61.65	9.18	8.12

Results in Table 4.5 shows that male group had a mean score of 73.03 and standard deviation of 8.39 in the post-test and a mean score of 64.97 and standard deviation of 8.39 in the retention making a post-test retention score difference in male group to be 8.06. On the other hand, the female group had a mean score of 69.77 and standard

deviation of 9.48 in the post-test and a mean score of 61.65 and standard deviation of 9.18 in the retention making a post-test retention difference of 8.12 The results show that there is a difference between the retention scores of Male and Female students when exposed to Gamification Learning platform in favour of the Female students.

Research Question 6: What is the influence of gender on the mean retention scores of students taught Educational Technology using ILIAS learning platform?

Table 4.6 shows the result of mean retention and standard deviation of male and female students' scores exposed to ILIAS learning platform

Groups	N	Post-test		Retention		Mean Difference
		$\bar{x}$	SD	$\bar{x}$	SD	
Male	80	80.30	3.55	71.78	3.59	8.52
Female	95	80.72	4.66	72.04	4.41	8.68

Results in Table 4.6 shows that male group had a mean score of 80.30 and standard deviation of 3.55 in the post-test and a mean score of 71.78 and standard deviation of 36.59 in the retention making a post-test retention score difference in male group to be 8.52. On the other hand, the female group had a mean score of 80.72 and standard deviation of 4.66 in the post-test and a mean score of 72.04 and standard deviation of 4.41 in the retention making a post-test retention difference of 8.68 The results show that there is a difference between the retention scores of Male and Female students when exposed to ILIAS learning platform in favour of the Female students.

Research Question 7: What is the motivation of Educational Technology students after teaching them with Gamification learning platform?

Table 4.7: Shows the result of mean and standard deviation of students' response on their motivation after exposure to gamification learning platform

S/N	Items	Mean	SD	Decision
1	Learning educational technology concept using gamification platform make learning more interesting and encouraging to me	3.89	0.84	Agreed
2	The use of gamification platform challenges me to learn new things.	4.03	0.79	Agreed
3	Compared with other students in the class, I am expected to do well in learning educational technology concept using gamification platform	3.87	0.92	Agreed
4	I'm certain I can understand educational technology concept taught on gamification platform	4.04	0.76	Agreed
5	I believe I will be able to use what I learned on gamification platform in other related courses.	3.91	0.87	Agreed
6	I believe I will perform better in educational technology test using gamification platform	3.72	1.13	Agreed
7	The most motivating thing for me in this course is trying to understand the content as thoroughly as possible	4.46	0.50	Agreed
8	I can ask myself questions to make sure I understand the concept being taught on gamification platform.	2.44	1.15	Disagreed
9	The use of gamification platform will help me retrieve from my memory what I have learnt.	3.90	0.80	Agreed
10	The knowledge of gamification boost my understanding of ideas and its application in other field of study.	3.54	0.51	Agreed
11	The knowledge of gamification has boost my recalling memory	3.89	0.80	Agreed
12	Working on practice exercises and answering end of lesson questions becomes easier with the knowledge of gamification platform.	3.92	0.96	Agreed
13	The instant feedback made available through the application of gamification will motivate me to do better in learning educational technology concept.	4.05	0.83	Agreed

14	I believe I will be motivated to participate more often in learning using gamification platform in order to get better grades.	3.99	0.83	Agreed
15	Even when educational technology concept are dull and uninteresting, gamification platform keeps me learning to the end.	4.04	0.82	Agreed
16	When preparing for a test, I can practice important concept over and over again using gamification platform	3.89	0.97	Agreed
17	I believe I can use what I have learned using gamification platform to do my assignment in educational technology and other courses.	3.77	1.03	Agreed
18	I find that I have been reading for lesson, but using gamification platform can help me know what the material is all about.	3.86	0.88	Agreed
19	Using gamification during teaching and learning has made me to be more attentive in the classroom.	3.52	1.07	Agreed
20	When using gamification platform, I can stop once in a while and go over what I have read	4.01	0.84	Agreed
	Grand Mean	**3.89**		Agreed

Decision Mean: 3.00

Table 4.7 shows the Mean and Standard Deviation of students' response on their motivation after teaching them with Gamification learning platforms. The table revealed the computed Mean score of 3.89 with Standard Deviation of 0.84 for item one, Mean score of 4.03 with Standard Deviation of 0.79 for item two, Mean score of 3.87 with Standard Deviation of 0.92 for item three, Mean score of 4.04 with Standard Deviation of 0.76 for item four, Mean score of 3.91 with Standard Deviation of 0.87 for item five, and Mean score of 3.72 with Standard Deviation of 1.13 for item six, and Mean score of 4.46 with Standard Deviation of 0.50 for item seven, and Mean score of 3.44 with Standard Deviation of 1.15 for item eight, and Mean score of 3.90 with Standard

Deviation of 0.80 for item nine, and Mean score of 3.54 with Standard Deviation of 0.51 for item ten, and Mean score of 3.89 with Standard Deviation of 0.80 for item eleven, and Mean score of 3.92 with Standard Deviation of 0.96 for item twelve, and Mean score of 4.05 with Standard Deviation of 0.83 for item thirteen, and Mean score of 3.99 with Standard Deviation of 0.83 for item fourteen, and Mean score of 4.04 with Standard Deviation of 0.82 for item fifteen, and Mean score of 3.89 with Standard Deviation of 0.97 for item sixteen, and Mean score of 3.77 with Standard Deviation of 1.03 for item seventeen, and Mean score of 3.86 with Standard Deviation of 0.88 for item eighteen, and Mean score of 3.52 with Standard Deviation of 1.07 for item nineteen, and Mean score of 4.01 with Standard Deviation of 0.84 for item twenty. The table revealed further that, the grand Mean score of the twenty items was 3.89 which is greater than the decision mean score of 3.00. This implies that majority of the students were motivated by Gamification learning platform.

Research Question 8: What is the motivation of Educational Technology students after teaching them with ILIAS learning platform?

Table 4.8: Shows the result of mean and standard deviation of students' response on motivation after exposure to ILIAS learning platforms

S/N	Items	Mean	SD	Decision
1	Using ILIAS platform increases my motivation to learn educational technology concept.	3.92	0.83	Agreed
2	It is important that I get a good grade in educational technology concept using ILIAS platform.	3.96	0.83	Agreed
3	I'm expected to do very well in learning educational technology concept by using ILIAS platform.	3.89	0.92	Agreed
4	Using ILIAS will enable me learn difficult concept, even if it requires more work.	4.03	0.77	Agreed

5	I will like to do better than other students in educational technology test using ILIAS platform.	3.97	0.80	Agreed
6	My learning skills will improve by using ILIAS platform compared to other learning strategies.	3.75	1.09	Agreed
7	Compared to other students in my class, I think I'll perform better in learning educational technology concept using ILIAS platform.	4.36	0.60	Agreed
8	When reading for a test, I try to put together information from the class and from ILIAS platform.	3.56	1.13	Agreed
9	Using ILIAS platform will help improve my retention ability in learning.	3.87	0.80	Agreed
10	Using ILIAS platform will help me have control over my own learning.	3.63	0.61	Agreed
11	ILIAS platform will motivate me to work hard and get a good grade.	3.89	0.81	Agreed
12	Learning with ILIAS platform will enable me to connect the things I am learning with what I already know.	3.95	0.93	Agreed
13	The most motivating thing for me in learning educational technology concept is trying to understand the content using ILIAS platform.	3.98	0.84	Agreed
14	Using ILIAS platform during teaching and learning has made me to be more attentive.	4.02	0.83	Agreed
15	With ILIAS platform I can stop once in a while and go over what I have learned.	4.10	0.82	Agreed
16	I believe I will be able to use what I learned using ILIAS platform in other related courses	3.91	0.96	Agreed
17	I prefer a learning strategy that motivates me, even if it is difficult to learn.	3.83	0.99	Agreed

18	Using ILIAS platform will help me get support from my peers to complete my learning activities.	3.85	0.85	Agreed
19	The use of ILIAS platform will help me retrieve from my memory what I have learnt.	3.64	1.06	Agreed
20	When using ILIAS platform, I can stop once in a while and go over what I have read.	4.03	0.84	Agreed
	Grand Mean	**3.91**		Agreed

Decision Mean: 3.00

Table 4.8 shows the Mean and Standard Deviation of students' response on their motivation after teaching them with ILIAS learning platforms. The table revealed the computed Mean score of 3.92 with Standard Deviation of 0.83 for item one, Mean score of 3.96 with Standard Deviation of 0.83 for item two, Mean score of 3.89 with Standard Deviation of 0.92 for item three, Mean score of 4.03 with Standard Deviation of 0.77 for item four, Mean score of 3.97 with Standard Deviation of 0.80 for item five, and Mean score of 3.75 with Standard Deviation of 1.09 for item six, and Mean score of 4.36 with Standard Deviation of 0.60 for item seven, and Mean score of 3.56 with Standard Deviation of 1.13 for item eight, and Mean score of 3.87 with Standard Deviation of 0.80 for item nine, and Mean score of 3.63 with Standard Deviation of 0.61 for item ten, and Mean score of 3.89 with Standard Deviation of 0.81 for item eleven, and Mean score of 3.95 with Standard Deviation of 0.93 for item twelve, and Mean score of 3.98 with Standard Deviation of 0.84 for item thirteen, and Mean score of 4.02 with Standard Deviation of 0.83 for item fourteen, and Mean score of 4.10 with Standard Deviation of 0.82 for item fifteen, and Mean score of 3.91 with Standard Deviation of 0.96 for item sixteen, and Mean score of 3.83 with Standard Deviation of 0.99 for item seventeen, and Mean score of 3.85 with Standard Deviation of 0.85 for

item eighteen, and Mean score of 3.64 with Standard Deviation of 1.06 for item nineteen, and Mean score of 4.03 with Standard Deviation of 0.84 for item twenty. The table revealed further that, the grand Mean score of the twenty items was 3.91 which is greater than the decision mean score of 3.00. This implies that majority of the students were motivated by ILIAS learning platform.

Research Question 9: What is the influence of gender on students' motivation in Educational Technology after teaching them with Gamification learning platform?

Table 4.9: Shows the result of mean and standard deviation of male and female response on their motivation after exposure to gamification learning platform

Gender	N	Mean	Std. Dev.	Mean Difference
Male	62	3.87	0.924	
				0.02
Female	80	3.89	0.835	

Decision Mean: 3.00

Table 4.9 shows male and female response on their motivation after teaching them with Gamification learning platform. The table revealed the computed Mean score of 3.87 with Standard Deviation of 0.924 for Male students taught Educational Technology with Gamification learning platforms and Mean score of 3.89 with Standard Deviation of 0.835 for Female students taught Educational Technology with Gamification learning platforms respectively. This gives a Mean difference of 0.02 in favour of Female students. This also implies that the male students were motivated by Gamification learning platforms.

Research Question 10: What is the influence of gender on students' motivation in Educational Technology after teaching them with ILIAS learning platform?

Table 4.10: Shows the result of mean and standard deviation of male and female response on motivation after exposure to ILIAS learning platforms

Gender	N	Mean	Std. Dev.	Mean Difference
Male	62	3.85	0.880	
				0.10
Female	80	3.95	0.802	

Decision Mean: 3.00

Table 4.10 shows male and female response on their motivation after teaching them with ILIAS learning platform. The table revealed the computed Mean score of 3.85 with Standard Deviation of 0.880 for Male students taught Educational Technology with ILIAS learning platform and Mean score of 3.95 with Standard Deviation of 0.802 for Female students taught Educational Technology with ILIAS learning platform respectively. This gives a Mean difference of 0.10 in favour of female students. This implies that the female students were more motivated, but both were motivated by ILIAS learning platform.

4.2 Testing of Null Hypotheses

Table 4.11 Summary of ANOVA result of Mean Achievement pre-test Scores of Experimental and Control Groups (Gamification, ILIAS Learning Platform and Lecture Method)

Source	Sum of Square	Df	Mean Square	F	Sig.
Between Group	592.652	2	296.326		
Within Group	8817.715	477	18.486	2.094	0.150
Total	9410.367	479			

Not Significant at $P < 0.05$

Table 4.11 shows the summary of ANOVA results of mean achievement pre-test scores of experimental and control groups (Gamification, ILIAS learning platform and lecture method). The table revealed that F (2,477) = 296.326, p-value = 0.150 at P < 0.05. On this basis, all groups are at the same significant level of academic achievement before the administration of treatment.

Hypothesis One: There is no significant difference in the mean achievement scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method.

Table 4.12: Summary of ANOVA Result of Mean Achievement Scores of Students Taught Educational Technology Using Gamification, ILIAS Learning Platform and Lecture Method

Group	Sum of Square	df	Mean Square	F	p-value
Between Group	32993.401	2	16496.700		
Within Group	17102.297	477	35.854	460.109	0.000*
Total	50095.698	479			

Significant at 0.05 level

Table 4.12: shows the summary of ANOVA results of mean achievement scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method. The table revealed that F $_{(2,477)}$ = 460.109, p-value = 0.000 at P < 0.05. On this basis, hypothesis one was rejected. Therefore, there was statistical significant difference in the mean achievement scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method. In order to locate where the difference lies as indicated by ANOVA, Sidak post-hoc analysis was carried out to find out where the significant difference occurred.

Table 4.13 Sidak post-hoc analysis of the post-test mean achievement scores of students in GLP, ILP and CLP

Multiple Comparisons

(I) Factor		Mean Difference (I-J)	Std. Error	Sig.
GAMIFICATION	ILIAS	-.540	.501	.629
	CONTROL	2.231*	.509	.000
ILIAS	GAMIFICATION	.540	.501	.629
	CONTROL	2.771*	.483	.000
CONTROL	GAMIFICATION	-2.231*	.509	.000
	ILIAS	-2.771*	.483	.000

The mean difference is significant at 0.05 level.

Table 4.13 indicated that experimental group I compared with experimental group II (.0629) was not significant. This showed that the two modes of instructions have similar effects on achievement of students taught Educational technology. Also, the table showed that experimental group I and experimental group II compared with the control group using CLM showed (.629 and .000) that it was significant. This indicated that using GLP and ILP to teach educational technology had a significant effect on the post-test achievement scores compared to using the CLM.

Hypothesis Two: There is no significant difference in the mean retention scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method.

Table 4.14: Summary of ANOVA Result of Mean Retention Scores of Students taught Educational Technology Using Gamification and ILIAS Learning Platform and Lecture Method.

Group	Sum of Square	df	Mean Square	F	p-value
Between Group	26828.362	2	13414.181		
				358.160	0.000*
Within Group	17865.119	477	37.453		
Total	44693.481	479			

Significant at 0.05 level

Table 4.14 shows the summary of ANOVA results of mean retention scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method. The table revealed that $F_{(2,477)} = 358.160$, p-value = 0.000 at $P < 0.05$. On this basis, hypothesis two was rejected. Therefore, there was statistical significant difference in the mean retention scores of students taught Educational Technology, Gamification and ILIAS learning platform and lecture method. Since it has been established that there was a significant difference in the retention scores of the groups, Sidak post-hoc analysis was used to find out which of the group is responsible.

Table 4.15 Sidak post-hoc analysis of the mean retention scores of students taught educational technology using GLP, ILP and CLM

Multiple Comparisons				
(I) Factor		Mean Difference (I-J)	Std. Error	Sig.
GAMIFICATION	ILIAS	-8.821[*]	.691	0.000
	CONTROL	9.007[*]	.703	0.000
ILIAS	GAMIFICATION	8.821[*]	.691	0.000
	CONTROL	17.828[*]	.666	0.000
CONTROL	GAMIFICATION	-9.007[*]	.703	0.000
	ILIAS	-17.828[*]	.666	0.000

The mean difference is significant at the 0.05 level.

Table 4.15 showed the Sidak post-hoc analysis of the mean retention scores of students in the three groups. The table indicated that there (.000 and .000) was significant difference in the mean retention scores of Experimental group I (GLP), Experimental group II (ILP) and control group. The table showed that the concept learned using GLP, ILP and CLM were all rejected.

Hypothesis Three: There is no significant difference in the mean achievement scores of Male and Female students taught Educational Technology using Gamification learning platform.

Table 4.16: Summary of ANOVA Result of Mean Achievement Scores of Male and Female Students taught Educational Technology Using Gamification Learning Platform

Group	Sum of Square	df	Mean Square	F	p-value

Group	Sum of Square	df	Mean Square	F	p-value
Between Group	370.593	1	370.593		
				4.551	0.035*
Within Group	11397.885	140	81.413		
Total	11768.478	141			

Significant at 0.05 level

Table 4.16 shows the summary of ANOVA results of mean achievement scores of Male and Female students taught Educational Technology using Gamification learning platform. The table revealed that $F_{(1,140)} = 4.551$, p-value = 0.035 at $P < 0.05$. On this basis, hypothesis three was rejected. Therefore, there was statistical significant difference in the mean achievement scores of Male and Female students taught Educational Technology using Gamification learning platform in favour of the male.

Hypothesis Four: There is no significant difference in the mean achievement scores of Male and Female students taught Educational Technology using ILIAS learning platform.

Table 4.17: Summary of ANOVA Result of Mean Achievement Scores of Male and Female Students taught Educational Technology Using ILIAS Learning Platform

Group	Sum of Square	df	Mean Square	F	p-value
Between	7.508	1	7.508	0.428	0.514*

Group					
Within Group	3032.126	173	17.527		
Total	3039.634	174			

Not significant at 0.05 level

Table 4.17 shows the summary of ANOVA results of mean achievement scores of Male and Female students taught Educational Technology using ILIAS learning platform. The table revealed that $F_{(1,173)} = 0.428$, p-value $= 0.428$ at $P < 0.05$. On this basis, hypothesis four was retained. Therefore, there was no statistical significant difference in the mean achievement scores of Male and Female students taught Educational Technology using ILIAS learning platform.

Hypothesis Five: There is no significant difference in the mean retention scores of Male and Female students taught Educational Technology using Gamification learning platform.

Table 4.18: Summary of ANOVA Result of Mean Retention Scores of Male and Female Students taught Educational Technology Using Gamification Learning Platform

Group	Sum of Square	df	Mean Square	F	p-value
Between	384.484	1	384.484	4.913	0.028*

Group				
Within Group	10956.135	140	78.258	
Total	11340.620	141		

 Significant at 0.05 level

Table 4.18 shows the summary of ANOVA results of mean retention scores of Male and Female students taught Educational Technology using Gamification learning platform. The table revealed that $F_{(1,140)} = 4.913$, p-value = 0.028 at $P < 0.05$. On this basis, hypothesis five was rejected. Therefore, there was statistical significant difference in the mean retention scores of Male and Female students taught Educational Technology using Gamification learning platform in favour of the female.

Hypothesis Six: There is no significant difference in the mean retention scores of Male and Female students taught Educational Technology using ILIAS learning platform.

Table 4.19: Summary of ANOVA Result of Mean Retention Scores of Male and Female Students taught Educational Technology Using ILIAS Learning platform

Group	Sum of Square	df	Mean Square	F	p-value
Between	3.098	1	3.098	0.188	0.665*

Group			
Within Group	2847.782	173	16.461
Total	2850.880	174	

Not significant at 0.05 level

Table 4.19 shows the summary of ANOVA results of mean retention scores of Male and Female students taught Educational Technology using ILIAS learning platform. The table revealed that $F_{(1,173)} = 0.188$, p-value = 0.665 at $P < 0.05$. On this basis, hypothesis six was retained. Therefore, there was no statistical significant difference in the mean retention scores of Male and Female students taught Educational Technology using ILIAS learning platform.

4.3: Discussion of Findings

Tables 4.1 to 4.19 showed the descriptive and inferential analyses of the study. The mean achievement and retention scores, motivational level are descriptive or representative scores of the groups while ANOVA provide a premise for making inference on their relevant tested hypotheses.

The results on Tables 4.1 to 4.13 of this study revealed that the achievement level of the students in educational technology was initially lower (pre-test stage), but improved significantly in the control group but more in the experimental groups after the treatment. The ANOVA comparison of the three modes of instruction (GLP, ILP and CLM) has significant effect on students' academic achievement in educational technology concept. To determine which of the groups varied statistically post-hoc (Sidak) analysis was conducted. From the findings, the difference between the achievements of students exposed to GLP, ILP and CLM was obvious and statistically significant. The implication of this finding is that GLP and ILP are more effective than

CLM in improving students' achievement in Educational technology. This could be ascribed to the active involvement and participation of the students in the homework activities and the continuous learning and watching of lecture video clips posted on the LMS platform. This finding is in agreement with the works of Anyagh and Okwu, (2010), Ahmed (2012), Fotaris *et al.* (2016), Goyel and Tambe (2015), Lin *et al.* (2017) who postulated that gamification and ILIAS platforms have a great capacity to promote pedagogical practices within or outside the classroom setting and can optimally improve students' academic achievement.

Table 4.14 shows the ANOVA results of the mean retention scores of students taught Educational Technology using Gamification, ILIAS learning platforms and lecture method. The table revealed that a significant effect exist on students' retention of educational technology concepts. To determine which of the groups varied statistically post-hoc (sidak) analysis was conducted. From the findings, it was revealed that GLP, ILP and CLM were all effective in improving students' retention in Educational technology. This finding affirmed the assertions of Sahin and Namli (2016) who posited that in using LMS platforms, students are given permission to download course materials posted on the LMS platform or e-mailed to them. They also observed that in this way students can undertake multiple activities when they come to class, such as expressing their thoughts, and interacting with others to strengthen their understanding and retention of the content of the downloaded course content. This finding is in agreement with the works of Goyal and Tambe (2015), penchenkina *et al.* (2017) on using online learning platforms that aid retention but do not agree with the findings of Lin *et al.* (2017) who found that the difference in the mean retention test scores was not significant. The fact that gamification, ILIAS and CLM platforms helped students to retain more, may be because it is activity-packed and students were allowed to interact

with the learning materials promoting meaningful learning. When the materials learnt are meaningful, they tend to be stored in the long term memory.

In addition, Table 4.16 revealed that the academic achievements of male and female students who were taught using gamification learning platform was statistically significant. Hence, the null hypothesis stated above was rejected. The finding is in agreement with the findings of Elrfani *et al.* (2010) and Moses *et al.* (2015) who reported that there was significant difference in the achievement of male and female students exposed to gamification learning platform. The findings stated that male students performed better than their female counterparts when exposed to gamification learning platform. The finding of this study is in disparity with the findings of Olutola and Olatoye (2017), who found no significant difference in the mean achievement scores of male and female students. Male superiority can be associated with social attachment that males are more technologically incline than female.

The ANOVA result on Table 4.17 also affirmed that a significance difference does not exists between the achievement scores of male and female students in Educational technology when taught using ILIAS learning platform. The achievement of male and female students may not vary due to variation in the instructional platform, which is activity oriented and the learners are allowed to learn at their own pace, offering the learner the unique opportunity to read, work, accept and internalize the concepts of educational technology at their own pace. The finding of this study is in agreement with Lin *et al.* (2017) who found no interaction effect between male and female students. However, the finding of the study disagrees with Smith and Stephens (2010), Okeke (2018) who reported that the average performance of female students was significantly better than the average performance of male students. It can be summed that ILIAS learning platform enhanced the achievement of both male and female students.

The effect of gamification learning platform on gender retention of students taught educational technology was determined using hypothesis five. The result indicated that a significant difference existed between the male and female students taught using gamification learning platform in favour of the females The findings support the similar works on the use of gamification platform that aid retention done by Mese and Dursun (2019) but do not agree with the findings of Saovapa and Pattanapichet (2018) who found that the difference in the mean post retention test scores was not significant.

The ANOVA comparison of the mean retention scores of male and female students taught using ILIAS learning platform showed that no significant difference exist between male and female students. As both male and female students were given equal opportunities, there is tendency that there will not be any significant differences in their retention. The result is in agreement with the findings of Saovapa (2014), Ezzemma *et al.* (2018) who in their independent studies found that there is no significant difference in the retention of male and female students. But on the contrary, the findings of Codish and Ravid (2017) found a significant difference in the retention of male and female students. With the female students retaining slightly better than their male counterparts in the retention test.

CHAPTER FIVE

5.0   CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

Based on the results of this study, the following conclusions were drawn: the application of gamification and ILIAS learning platforms showed a significant effect on academic achievement for educational technology students, it also shows that male students achieved more than the females. Gamification and ILIAS learning platforms had improved students' retention level in educational technology than the use of conventional lecture method. While the mean retention score of the female students was found to be slightly greater than their male counterpart using GLP, there was no significant difference in the retention score of male and female students exposed to ILIAS learning platform. A statistical difference also exist and in the mean retention scores of male and female students exposed to gamification and ILIAS in favor of the female. Also, gamification and ILIAS learning platforms not only increased students' motivation, but also enhanced their learning outcomes.

Based on the findings of this study it can be concluded that ILIAS and gamification learning platforms are more effective than the conventional lecture method. The researcher inferred that the high mean gains achieved by the experimental groups is as a result of student‑to-student interaction, a flexible environment for online learning, a good alternative for the regular lecture, offers students instant feedback and places an emphasis on practice and mastering the information.

5.2 Recommendations

In line with the findings of the study, the following recommendations were made:

1. Educational technology lecturers should employ the use of gamification and ILIAS learning platforms elements in order to enhance understanding, achievement retention and motivation of learners.

2. The regulatory bodies on education such as National Universities Commission (NUC) and National Commission for Colleges of Education (NCCE) should update their curriculum by implementing gamification and ILIAS learning platforms into the curriculum of educational technology which should be mandatory for lecturers to use in instructional delivery.

3. The Federal and State governments should make adequate provisions for online resources, and internet connections in all the public universities to support the use of gamification and ILIAS learning platforms.

4. Workshops, seminars and conferences should be organized by government and institutional authorities to equip lecturers with the needed ICT skills for online learning.

5. Lecturers teaching educational technology courses should expose the students to gamification and ILIAS learning platforms to promote student-centered instructional approach, students 'autonomy to knowledge acquisition, and student-self-discovery learning.

6. Students should endeavor to explore the opportunities offered by the use of gamification and ILIAS platforms since it could be utilized to complement other methods of teaching and learning as well as for individual learning.

7. Universities and other tertiary institutions should not rely solely on the conventional pattern of lecturing in relation to teaching of educational technology courses. Instead, other methods of teaching such as the use of gamification and ILIAS platforms need to be introduced, where the presence of

an instructor is supported by the use of modern technology, which renders the learning process more flexible in terms of time and place.

8. Owing to the fact that gamification and ILIAS were gender friendly, it should be encouraged in other fields of study.

5.3 Contributions to Knowledge

1. This study have provided an empirical evidence in respect to the efficacy of gamification and ILIAS learning platforms in facilitating students' achievement, retention and motivation among educational technology university students in Nigeria.

2. This study contributes to the existing scholarly literature and provides additional knowledge to adopt an effective instructional methods for teaching and learning that could help students to learn effectively.

3. The study would enable researchers to gain additional knowledge in the field of online learning platforms.

4. The current study provides numerous opportunities for further research.

5. The successful design and development of the packages have added to the pool of research studies.

5.4 Limitations of the Study

This study is limited to the following:

1. The sample used in this study came from second year educational technology students in three different universities from three geopolitical zone in Nigeria (Uniport, Uniilorin and LASU). This may cause our results to be non-generalizable to other universities and institutions, although similar patterns are reported in this study for first year students in different countries.

2. Some of the challenges faced by implementing the gamification and ILIAS system was issues related to funding and smooth running of the systems such as subscription, hosting and upgrading of the system from time to time.

3. The results of this study were limited to second year educational technology students in Nigeria.

4. Although there are many other online learning platforms but only gamification and ILIAS platforms were used in this study.

5.5 Suggestions for Further Research

The following areas of further research are suggested in line with the findings of this study:-

1. The study was carried out with gamification elements such as level, time and activity completion and presenting notifications to participants regarding the activities. Future studies could be conducted with different kind of elements such as progress bar, badge, level, experience point, leaderboard, award and so on.

2. This study should be replicated in determining the effects of gamification and ILIAS platforms on interest, perception and attitude of students in educational technology.

3. Different data collection tools for motivation such as interviews can be used for investigating the effect of gamification and ILIAS platforms.

4. Future study may possible generalize to include more students in colleges and universities.

5. In addition, researchers may also want to involve a variety of learning platforms such as mobile learning, ubiquitous learning, or context-aware learning mode in

studies to examine students' preferences in learning attitude, learning behavior, and self-learning development.

6. Further study is needed to assess whether the increased student motivation suggested by these methods is sustainable and applicable to other courses.

7. The study could be expanded to include private Universities in Nigeria.

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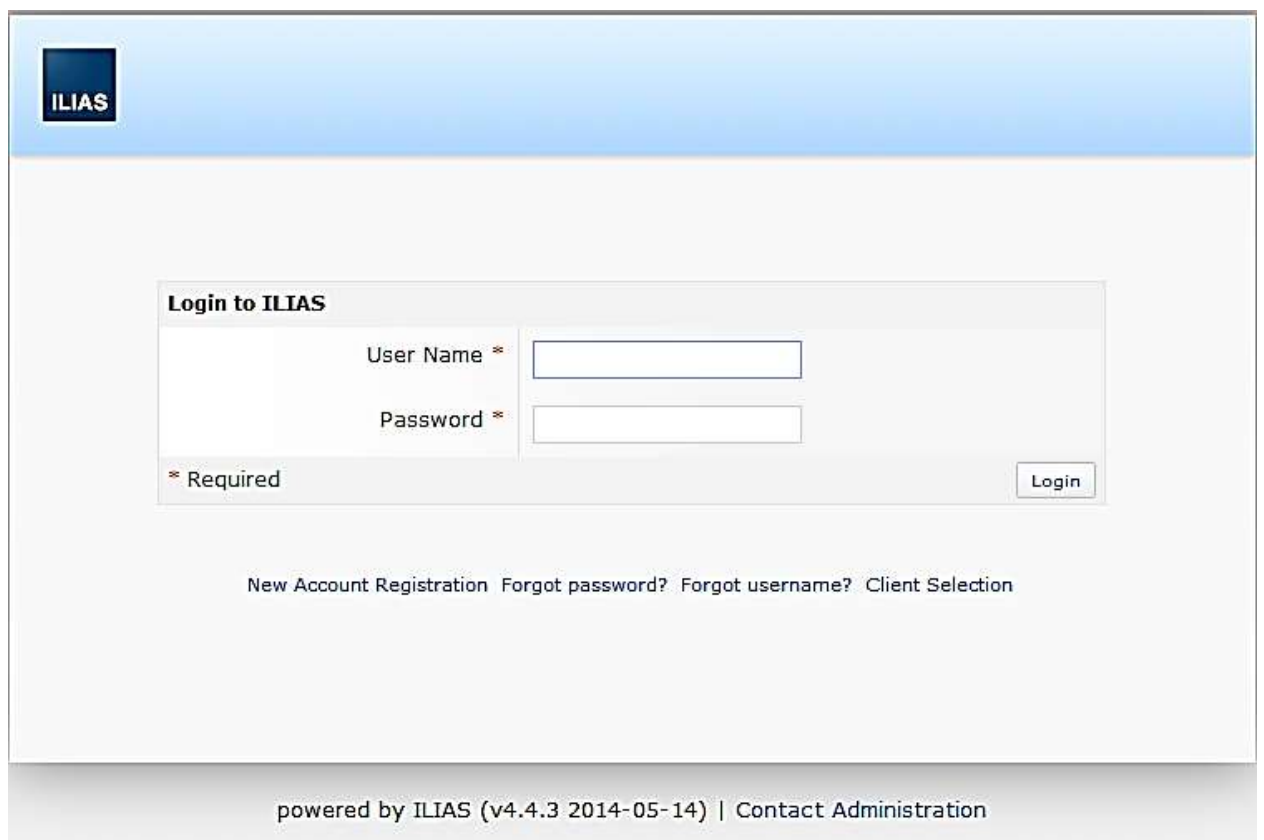
APPENDIX A

LIST OF UNIVERSITIES OFFERING EDUCATIONAL TECHNOLOGY

S/N	Universities	Owner	Location
1	Federal University of Technology, Minna	Federal Government	Niger State
2	University of Ilorin	Federal Government	Kwara State
3	University of Lagos	Federal Government	Lagos State
4	University of port Harcourt	Federal Government	Rivers State
5	University of Uyo	Federal Government	Akwa Ibom State
6	University of Calabar	Federal Government	Cross River State
7	Ekiti State University	State Government	Ekiti State

Source: NUC, 2020: nuc.edu.ng/Nigerian- universities/state-universities

APPENDIX B

SAMPLE OF ILIAS WEB PAGE

SAMPLE OF INSTRUMENTS

EDUCATIONAL TECHNOLOGY ACHIEVEMENT TEST (ETAT)

GENDER:

INSTITUTION:

TIME ALLOWED: 1 hr 30 MINUTES

INSTRUCTIONS

Read the questions carefully and indicate your choice by ticking the appropriate letter (A-E).

Answer all the question

1. ------------ are solids which have capacity and real objects. (a) 3D dimensional (b) 2D dimensional (c) 4D dimensional (d) Visuals (e) Solids

2. One of these is NOT a function of visuals (a) provide ideas in many forms (b) help to explain in a pictorial form (c) enable us communicate ideas which will be difficult (d) helps in retention and remembrance (e) use to decorate the classroom.

3. Graphikos means? (a) representation by means of lines (b) digital technology (c) use of images (d) painting and drawing (e) representation of information.

4. All these are elements of design EXCEPT? (a) line (b) light (c) space (d) value (e) colour.

5. A plan and intended arrangement of all visual elements contained in an art piece is termed? (a) graphic (b) design (c) communication (d) visuals (e) shades

6. ------------ is the transmission of messages, information from the sender to the receiver. (a) etching (b) transmitter (c) communication (d) design (e) visuals

7. One of these is a tool not found in a graphic studio (a) air brushing tools (b) stapling gum (c) templates (d) alignment (e) tee square.

8. Posters, maps, cartoons, comics and diagrams are examples of? (a) graphics (b) elements (c) contours (d) pointillism (e) emphasis

9. A purpose-driven poster must contain two main visual elements which are ------- ------? (a) bold and attractive (b) text and symbolic (c) lettering and pictures (d) typesetting and jigsaw (e) illustrations and clip art.

10. ------------ Posters usually carry some pictorial information which is very colourful and vivid to attract attention. (a) Stop and study (b) pictorial (c) single glance (d) brief caption (e) topic and slogan.

11. Posters which carry more than one picture and many words are called---------? (a) a purpose driven poster (b) communication poster (c) symbolic poster (d) stop and study poster (e) single glance poster.

12. One of these is NOT the use of poster in the classroom (a) for decoration (b) to foster interest in art and literature (c) to create awareness (d) to motivate and capture learners' interest (e) to serve as building blocks.

13. Colour is otherwise known as? (a) reflection (b) pigment (c) sensation (d) rhythm (e) harmony.

14. All of these are colour classifications EXCEPT? (a) primary colour (b) secondary colour (c) tertiary colour (d) polychrome colour (e) complementary colours.

15. Red, yellow and blue are called? (a) primary colours (b) cool colour (c) neutral colour (d) harmonious colour (e) warm colour.

16. The combination of two primary colours in the same proportion is termed? (a) smooth colour (b) harmonious colour (c) secondary colour (d) colour intensity (e) analogous colour.

17. What are the colours called that are made by mixing primary and secondary colours? (a) monochromatic colours (b) complimentary colours (c) tertiary colours (d) intensity colours (e) amber colour

18. Answer the colour equation: Red + Blue= (a) purple (b) green (c) yellow (d) orange (e) black

19. What happens when you shade a colour? (a) It gets lighter (b) it gets darker (c) it gets brighter (d) it gets duller (e) it gets pretty.

20. Colour scheme where colours are next to each other on the colour wheel is termed? (a) Analogous (b) complementary (c) secondary (d) neutrals (e) tertiary.

21. What is the complement of red? (a) purple (b) yellow (c) green (d) orange (e) blue

22. If you add black to a colour, the colour becomes -------- ?(a) lighter (b) darker (c) stays the same (d) its own complement (e) brighter

23. A monochromatic work of art contains the following colours? (a) three colours next to one another on the colour wheel (b) one colour plus tints and shades of

that colour (c) one colour plus one complement (d) all cool colours (e) all bright colours

24. The subtractive primary colours are? (a) red, green, blue (b) cyan, magenta, yellow (c) red, blue, yellow (d) cyan, red, yellow (e) orange, black, yellow.

25. Formation of colour using more than one colour is termed ------------? (a) monochrome (b) polychrome (c) shade (d) tint (e) colour intensity

26. Pen writing is otherwise known as ------------? (a) typeface (b) tint (c) calligraphy (d) shade (e) script

27. The three major types of block lettering are gothic, roman and ---------? (a) cursive (b) serif (c) classic (d) calligraphy (e) decorative

28. -------------- consist of bold, thick and even or uniform letters (a) gothic (b) classic (c) roman (d) script (e) sans serif

29. Thick and thin strokes and serifs at the base and upper part of it is called -----------? (a) label (b) tint (c) classic (d) serif (e) typeface

30. One of these is similar to handwriting? (a) tones (b) monochrome (c) cursive (d) harmonious (e) shades.

31. The diagram below is represent ----------?-

(a) Interactive infographic (b) motion graphic (c) infographic (d) GIFs (e) brainstorm.

32. ----------- is the process that acted as information and it accelerates the learning process. (a) lithographs (b) the efficacy of graphic communication (c) visual aids (d) communicating graphic (e) calligraphy.

33. -----------is the type of lettering below
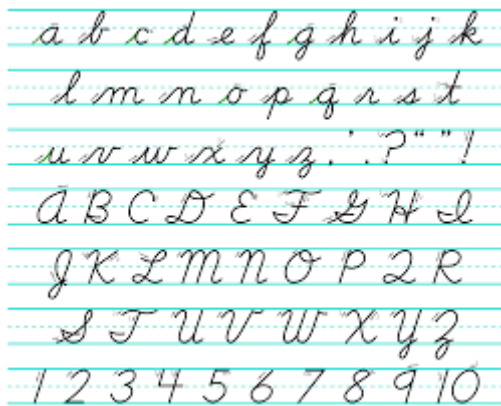
(a) Cursive (b) classic (c) sans serif (d) pen

34. The acronym 'GIF' means? (a) graphic interest formation (b) geometry interactive format (c) graphics interchange format (d) graphikos infographic format (e) graphical interactive format.

35. These are tools found in -------------?

(a) Architectural studio (b) Building studio (c) painting studio (d) graphic studio (e) visual studio.

36. The colour combination below is called?

(a) Colour Wheel (b) complementary colours (c) analogous colours (d) tertiary colours (e) neutral colours.

37. -------------------- is also defined as the application of lines and strokes to a two dimensional surface (a) visual (b) lithographs (c) adaptation (d) graphos (e) stimulation.

38. The following are examples of computer graphics EXCEPT? (a) photographs (b) typography (c) designs (d) maps (e) jigsaw

39. ----------------- represent information or ideas using pictures to make the content easily digestible at first sight (a) GIFs (b) infographics (c) motion (d) web diagrams (e) brainstorms.

40. A digital piece of animation that often incorporates movement and sound is known as? (a) a chart (b) brainstorms (c) web diagrams (d) infographics (e) motion graphics

41. Interactive infographics combine data visualisation, images, language and -------? (a) lines (b) graphs (c) symbols (d) linearity (e) designs.

42. Motion graphics can sometimes be presented as -------------- since they are moving (a) flow charts (b) charts (c) GIFs (d) interactive infographics (e) captions.

43. The systematic way of designing and constructing letters and alphabets without the aid of any lettering instrument is known as? (a) construction (b) lettering (c) supplementary information (d) typefaces (e) label.

44. ------------ is used to create special colour effect by addition of black to another colour (a) tint (b) shade (c) polychrome (d) monochrome (e) tone

45. One of these is characterized by straight lines of uniform letters (a) sans serif (b) cursive (c) pen lettering (d) block lettering (e) classic.

46. The arts or design and science in which ideas are expressed and communicated to learners through the use of gamification and ILIAS is known as? (a) communicating graphics (b) learning process (c) two dimensional (d) visual aid (e) pictorial graphics.

47. One of these is NOT an example of visual images on a surface (a) canvas (b) screen (c) paper (d) stone (e) ceiling

48. Text, illustration and colour are combinations that make up a? (a) slideshow (b) graphic (c) photograph (d) computer graphics (e) chart.

49. To explain a large piece of data, one can use -------? (a) brainstorm (b) motion (c) chart (d) infographics (e) videos.

50. ------------ graphics helps multimedia content creators communicate an idea using a variety of sensory experiences (a) web diagrams (b) captions (c) motion (d) flow chart (e) video.

APPENDIX D

MARKING SCHEME FOR ETAT

1. A
2. E
3. D
4. B
5. B
6. C
7. D
8. A
9. B
10. C
11. D
12. E
13. B
14. D
15. A
16. C
17. C
18. A
19. A
20. A

21. D

22. B

23. B

24. B

25. B

26. C

27. A

28. A

29. C

30. C

31. A

32. B

33. A

34. C

35. D

36. A

37. D

38. E

39. B

40. E

41. D

42. C

43. B

44. B

45. A

46. A

47. E

48. B

49. D

50. C

QUESTIONNAIRE ON UNIVERSITY STUDENTS' MOTIVATION TOWARDS EDUCATIONAL TECHNOLOGY THROUGH GAMIFICATION PLATFORM (QUSMETGP)

Dear Respondent,

I am a postgraduate student of Educational Technology at Federal University of Technology Minna. I am presently carrying out a research title '' **EFFECTS OF GAMIFICATION AND ILIAS ONLINE LEARNING OUTCOMES IN EDUCATIONAL TECHNOLOGY AMONG UNIVERSITY STUDENTS IN NIGERIA''.** This questionnaire therefore is designed to elicit information from you. Your participation will be appreciated.

SECTION A: PERSONAL DATA

Institution: --

Course of study: ---
-

Gender   Male ( )   Female   ( )

Level: --

SECTION B

Instruction

Please complete this questionnaire to the best of your ability by ticking (√) to the answer that meets your response.

Key

Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), Strongly Disagree (SD)

TITLE: Students' Motivation towards the use of Gamification learning platform in the learning of Educational Technology concept

S/N	Items	SA	A	UD	D	SD
1	Learning educational technology concept using gamification platform make learning more interesting and encouraging to me					
2	I will prefer the use of gamification platform for my classwork, it challenges me to learn new things					
3	Compared with other students in the class, I am					

	expected to do well in learning educational technology concept using gamification platform					
4	I'm certain I can understand educational technology concept taught on gamification platform					
5	I will be able to use what I learned on gamification platform in other related courses.					
6	I believe I will perform better in educational technology test using gamification platform					
7	The most motivating thing for me in this course is trying to understand the content as thoroughly as possible					
8	I can ask myself questions to make sure I understand the concept been taught on gamification platform.					
9	The use of gamification platform will help me retrieve from my memory what I have learnt.					
10	The knowledge of gamification boost my understanding of ideas and its application in other field of study.					
11	The knowledge of gamification has boost my recalling memory					

12	Working on practice exercises and answering end of lesson questions becomes easier with the knowledge of gamification platform.					
13	The instant feedback made available through the application of gamification will motivate me to do better in learning educational technology concept.					
14	I think I will be motivated to participate more often in learning using gamification platform in order to get better grades.					
15	Even when educational technology concept are dull and uninteresting, gamification platform keeps me learning to the end.					
16	When preparing for a test, I can practice important concept over and over again using gamification platform					
17	I believe I can use what I have learned using gamification platform to do my assignment in educational technology and other courses.					
18	I find that I have been reading for lesson but using gamification platform can help me know what the material is all about.					
19	Using gamification during teaching and learning has made me to be more attentive in the					

	classroom.					
20	When using gamification platform, I can stop once in a while and go over what I have read					

Thank you

Hellen Thaddeus

APPENDIX F

QUESTIONNAIRE ON UNIVERSITY STUDENTS' MOTIVATION TOWARDS EDUCATIONAL TECHNOLOGY THROUGH ILIAS LEARNING PLATFORM (QUSMETIP)

Dear Respondent,

I am a postgraduate student of Educational Technology at Federal University of Technology Minna. I am presently carrying out a research title '' **EFFECTS OF GAMIFICATION AND ILIAS ONLINE LEARNING OUTCOMES IN EDUCATIONAL TECHNOLOGY AMONG UNIVERSITY STUDENTS IN NIGERIA''.** This questionnaire therefore is designed to elicit information from you. Your participation will be appreciated.

SECTION A: PERSONAL DATA

Institution: --

Course of study: --
-

Gender   Male (   )   Female   (   )

Level: ---

SECTION B

Instruction

Please complete this questionnaire to the best of your ability by ticking (√) to the answer that meets your response.

Key

Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), Strongly Disagree (SD)

TITLE: Students' Motivation towards Educational Technology using ILIAS platform

S/N	Items	SA	A	UD	D	SD
1	Using ILIAS platform will increases my motivation to learn educational technology concept.					
2	It is important that I get a good grade in educational technology concept using ILIAS platform.					
3	I'm expected to do very well in learning educational technology concept by using ILIAS platform.					
4	Using ILIAS will enable me learn difficult concept, even if it requires more work.					
5	I will like to do better than other students in educational technology test using ILIAS					

	platform.					
6	My learning skills will improve by using ILIAS platform compared to other learning strategies.					
7	Compared to other students in my class, I think I'll perform better in learning educational technology concept using ILIAS platform.					
8	When reading for a test, I try to put together information from the class and from ILIAS platform.					
9	Using ILIAS platform will help improve my retention ability in learning.					
10	Using ILIAS platform will help me have control over my own learning					
11	ILIAS platform will motivate me to work hard and get a good grade.					
12	Learning with ILIAS platform will enable me to connect the things I am learning with what I already know					
13	The most motivating thing for me in learning educational technology concept is trying to understand the content using ILIAS platform.					
14	Using ILIAS platform during teaching and learning has made me to be more attentive.					
15	With ILIAS platform I can stop once in a while and go over what I have learned.					
16	I think I will be able to use what I learned using ILIAS platform in other related courses					
17	I prefer a learning strategy that motivates me, even if it is difficult to learn.					
18	Using ILIAS platform will help me get support from my peers to complete my learning activities					
19	I think the use of ILIAS platform will help me retrieve from my memory what I have learnt.					
20	When using ILIAS platform, I can stop once in a while and go over what I have read.					

Thank you

Hellen Thaddeus

APPENDIX G

POST-TREATMENT EDUCATIONAL TECHNOLOGY ACHIEVEMENT TEST

GENDER:

INSTITUTION:

TIME ALLOWED: 1 hr 30 MINUTES

INSTRUCTIONS

Read the questions carefully and indicate your choice by ticking the appropriate letter (A-E).

Answer all the question

1.   The arts or design and science in which ideas are expressed and communicated to learners through the use of gamification and ILIAS is known as? (a) communicating graphics (b) learning process (c) two dimensional (d) visual aid (e) pictorial graphics.

2.   One of these is NOT an example of visual images on a surface? (a) canvas (b) screen (c) paper (d) stone (e) ceiling

3. Text, illustration and colour are combinations that make up a? (a) slideshow (b) graphic (c) photograph (d) computer graphics (e) chart.

4. To explain a large piece of data, one can use -------? (a) ?Brainstorm (b) motion (c) chart (d) infographics (e) videos.

5. ------------ graphics helps multimedia content creators communicate an idea using a variety of sensory experiences (a) web diagrams (b) captions (c) motion (d) flow chart (e) video.

6. These are tools found in -------------?

(a) Architectural studio (b) Building studio (c) painting studio (d) graphic studio (e) visual studio.

7 The colour combination below is called?

(a)Colour Wheel (b) complementary colours (c) analogous colours (d) tertiary colours (e) neutral colours.

8 ------------------- is also defined as the application of lines and strokes to a two dimensional surface (a) visual (b) lithographs (c) adaptation (d) graphos (e) stimulation.

9 The following are examples of computer graphics EXCEPT? (a) photographs (b) typography (c) designs (d) maps (e) jigsaw

10 ----------------- represent information or ideas using pictures to make the content easily digestible at first sight (a) GIFs (b) infographics (c) motion (d) web diagrams (e) brainstorms.

11 ------------ are solids which have capacity and real objects. (a) 3D dimensional (b) 2D dimensional (c) 4D dimensional (d) Visuals (e) Solids

12 One of these is NOT a function of visuals? (a) provide ideas in many forms (b) help to explain in a pictorial form (c) enable us communicate ideas which will be difficult (d) helps in retention and remembrance (e) use to decorate the classroom.

13 Graphikos means? (a) representation by means of lines (b) digital technology (c) use of images (d) painting and drawing (e) representation of information.

14 All these are elements of design EXCEPT? (a) line (b) light (c) space (d) value (e) colour.

15 A plan and intended arrangement of all visual element contained in an art piece is termed? (a) graphic (b) design (c) communication (d) visuals (e) shades

16 A digital piece of animation that often incorporates movement and sound is known as? (a) a chart (b) brainstorms (c) web diagrams (d) infographics (e) motion graphics

17	Interactive infographics combine data visualisation, images, language and -------? (a) lines (b) graphs (c) symbols (d) linearity (e) designs.

18	Motion graphics can sometimes be presented as -------------- since they are moving (a) flow charts (b) charts (c) GIFs (d) interactive infographics (e) captions.

19	The systematic way of designing and constructing letters and alphabets without the aid of any lettering instrument is known as? (a) construction (b) lettering (c) supplementary information (d) typefaces (e) label.

20	------------ is used to create special colour effect by addition of black to another colour (a) tint (b) shade (c) polychrome (d) monochrome (e) tone

21	One of these is characterized by straight lines of uniform letters? (a) sans serif (b) cursive (c) pen lettering (d) block lettering (e) classic.

22	Colour scheme where colours are next to each other on the colour wheel is termed? (a) Analogous (b) complementary (c) secondary (d) neutrals (e) tertiary.

23	What is the complement of red? (a) purple (b) yellow (c) green (d) orange (e) blue

24	If you add black to a colour, the colour becomes --------? (a) lighter (b) darker (c) stays the same (d) its own complement (e) brighter

25	A monochromatic work of art contains the following colours? (a) three colours next to one another on the colour wheel (b) one colour plus tints and shades of that colour (c) one colour plus one complement (d) all cool colours (e) all bright colours

26	The subtractive primary colours are? (a) red, green, blue (b) cyan, magenta, yellow (c) red, blue, yellow (d) cyan, red, yellow (e) orange, black, yellow.

27   Formation of colour using more than one colour is termed -----------? (a) monochrome (b) polychrome (c) shade (d) tint (e) colour intensity

28   One of these is similar to handwriting? (a) tones (b) monochrome (c) cursive (d) harmonious (e) shades.

29   The diagram below is represent -----------?

(a)Interactive infographic (b) motion graphic (c) infographic (d) GIFs (e) brainstorm.

30   ----------- is the process that acted as information and it accelerates the learning process. (a) lithographs (b) the efficacy of graphic communication (c) visual aids (d) communicating graphic (e) calligraphy.

31   -----------is the type of lettering below
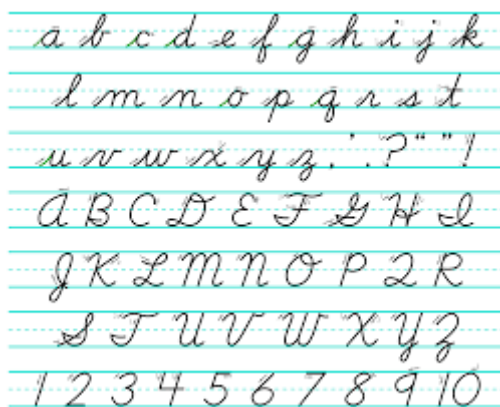
(a)   Cursive (b) classic (c) sans serif (d) pen

32   The acronym 'GIF' means?

(a) graphic interest formation (b) geometry interactive format (c) graphics interchange format (d) graphikos infographic format (e) graphical interactive format.

33   ------------ is the transmission of messages, information from the sender to the receiver. (a) etching (b) transmitter (c) communication (d) design (e) visuals

34   One of these is a tool not found in a graphic studio? (a) air brushing tools (b) stapling gum (c) templates (d) alignment (e) tee square.

35   Posters, maps, cartoons, comics and diagrams are examples of? (a) graphics (b) elements (c) contours (d) pointillism (e) emphasis

36   A purpose-driven poster must contain two main visual elements which are -------------? (a) bold and attractive (b) text and symbolic (c) lettering and pictures (d) typesetting and jigsaw (e) illustrations and clip art.

37   ------------ Posters usually carry some pictorial information which is very colourful and vivid to attract attention (a) Stop and study (b) pictorial (c) single glance (d) brief caption (e) topic and slogan.

38   Red, yellow and blue are called? (a) primary colours (b) cool colour (c) neutral colour (d) harmonious colour (e) warm colour.

39   The combination of two primary colours in the same proportion is termed? (a) smooth colour (b) harmonious colour (c) secondary colour (d) colour intensity (e) analogous colour.

40   What are the colours called that are made by mixing primary and secondary colours? (a) monochromatic colours (b) complimentary colours (c) tertiary colours (d) intensity colours (e) amber colour

41   Answer the colour equation: Red + Blue= (a) purple (b) green (c) yellow (d) orange (e) black

42   What happens when you shade a colour? (a) It gets lighter (b) it gets darker (c) it gets brighter (d) it gets duller (e) it gets pretty.

43   Posters which carry more than one picture and many words are called---------? (a) a purpose driven poster (b) communication poster (c) symbolic poster (d) stop and study poster (e) single glance poster.

44   One of these is NOT the use of poster in the classroom? (a) for decoration (b) to foster interest in art and literature (c) to create awareness (d) to motivate and capture learners' interest (e) to serve as building blocks.

45   Colour is otherwise known as? (a) reflection (b) pigment (c) sensation (d) rhythm (e) harmony.

46   All of these are colour classifications EXCEPT? (a) primary colour (b) secondary colour (c) tertiary colour (d) polychrome colour (e) complementary colours.

47   Pen writing is otherwise known as ------------? (a) typeface (b) tint (c) calligraphy (d) shade (e) script

48   The three major types of block lettering are gothic, roman and ---------? (a) cursive (b) serif (c) classic (d) calligraphy (e) decorative

49   -------------- consist of bold, thick and even or uniform letters (a) gothic (b) classic (c) roman (d) script (e) sans serif

50   Thick and thin strokes and serifs at the base and upper part of it is called -----------? (a) label (b) tint (c) classic (d) serif (e) typeface

APPENDIX H

Post-Treatment Achievement Test marking scheme

1. A
2. E
3. B
4. D
5. C
6. D
7. A
8. D
9. E
10. B
11. A
12. E
13. D
14. B
15. B
16. E
17. D
18. C
19. B
20. B

21. A

22. A

23. D

24. B

25. B

26. B

27. B

28. C

29. A

30. B

31. A

32. C

33. C

34. D

35. A

36. B

37. C

38. A

39. C

40. C

41. A

42. A

43. D

44. E

45. B

46. D

47. C

48. A

49. A

50. C

EDUCATIONAL TECHNOLOGY RETENTION TEST

GENDER:

INSTITUTION:

TIME ALLOWED: 1 hr 30 MINUTES

INSTRUCTIONS

Read the questions carefully and indicate your choice by ticking the appropriate letter (A-E).

Answer all the question

1. Colour scheme where colours are next to each other on the colour wheel is termed? (a) Analogous (b) complementary (c) secondary (d) neutrals (e) tertiary.

2. What is the complement of red? (a) purple (b) yellow (c) green (d) orange (e) blue

3. If you add black to a colour, the colour becomes --------? (a) lighter (b) darker (c) stays the same (d) its own complement (e) brighter

4. A monochromatic work of art contains the following colours? (a) three colours next to one another on the colour wheel (b) one colour plus tints and shades of that colour (c) one colour plus one complement (d) all cool colours (e) all bright colours

5. The subtractive primary colours are? (a) red, green, blue (b) cyan, magenta, yellow (c) red, blue, yellow (d) cyan, red, yellow (e) orange, black, yellow.

6. Posters which carry more than one picture and many words are called---------? (a) a purpose driven poster (b) communication poster (c) symbolic poster (d) stop and study poster (e) single glance poster.

7. One of these is NOT the use of poster in the classroom? (a) for decoration (b) to foster interest in art and literature (c) to create awareness (d) to motivate and capture learners' interest (e) to serve as building blocks.

8. Colour is otherwise known as? (a) reflection (b) pigment (c) sensation (d) rhythm (e) harmony.

9. All of these are colour classifications EXCEPT? (a) primary colour (b) secondary colour (c) tertiary colour (d) polychrome colour (e) complementary colours.

10. Red, yellow and blue are called? (a) primary colours (b) cool colour (c) neutral colour (d) harmonious colour (e) warm colour.

11. One of these is similar to handwriting? (a) tones (b) monochrome (c) cursive (d) harmonious (e) shades.

12. The diagram below is represent -----------?

(a)   Interactive infographic (b) motion graphic (c) infographic (d) GIFs (e) brainstorm.

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14 -----------is the type of lettering below
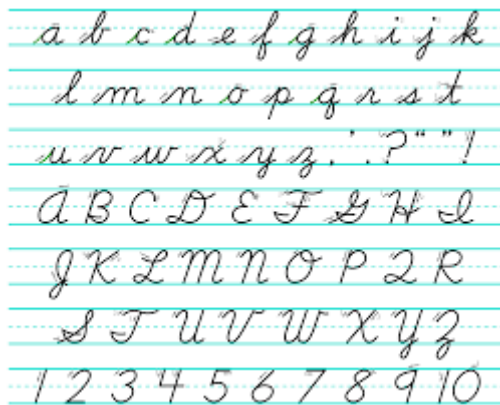
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15 The acronym 'GIF' means? (a) graphic interest formation (b) geometry interactive format (c) graphics interchange format (d) graphikos infographic format (e) graphical interactive format.

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17 One of these is NOT an example of visual images on a surface? (a) canvas (b) screen (c) paper (d) stone (e) ceiling

18 Text, illustration and colour are combinations that make up a? (a) slideshow (b) graphic (c) photograph (d) computer graphics (e) chart.

19 To explain a large piece of data, one can use -------? (a) brainstorm (b) motion (c) chart (d) infographics (e) videos.

20 ------------ graphics helps multimedia content creators communicate an idea using a variety of sensory experiences (a) web diagrams (b) captions (c) motion (d) flow chart (e) video.

21 ------------ are solids which have capacity and real objects (a) 3D dimensional (b) 2D dimensional (c) 4D dimensional (d) Visuals (e) Solids

22 One of these is NOT a function of visuals? (a) provide ideas in many forms (b) help to explain in a pictorial form (c) enable us communicate ideas which will be difficult (d) helps in retention and remembrance (e) use to decorate the classroom.

23 Graphikos means? (a) representation by means of lines (b) digital technology (c) use of images (d) painting and drawing (e) representation of information.

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25 A plan and intended arrangement of all visual element contained in an art piece is termed? (a) graphic (b) design (c) communication (d) visuals (e) shades

26 Interactive infographics combine data visualisation, images, language and -------? (a) lines (b) graphs (c) symbols (d) linearity (e) designs.

27   Motion graphics can sometimes be presented as -------------- since they are moving (a) flow charts (b) charts (c) GIFs (d) interactive infographics (e) captions.

28   The systematic way of designing and constructing letters and alphabets without the aid of any lettering instrument is known as? (a) construction (b) lettering (c) supplementary information (d) typefaces (e) label.

29   ------------ is used to create special colour effect by addition of black to another colour (a) tint (b) shade (c) polychrome (d) monochrome (e) tone

30   One of these is characterized by straight lines of uniform letters (a) sans serif (b) cursive (c) pen lettering (d) block lettering (e) classic.

31   These are tools found in -------------?

(a)Architectural studio (b) Building studio (c) painting studio (d) graphic studio (e) visual studio.

32   The colour combination below is called?

(a)Colour Wheel (b) complementary colours (c) analogous colours (d) tertiary colours (e) neutral colours.

33 ------------------ Is also defined as the application of lines and strokes to a two dimensional surface (a) visual (b) lithographs (c) adaptation (d) graphos (e) stimulation.

34 The following are examples of computer graphics EXCEPT? (a) photographs (b) typography (c) designs (d) maps (e) jigsaw

35 ---------------- represent information or ideas using pictures to make the content easily digestible at first sight (a) GIFs (b) infographics (c) motion (d) web diagrams (e) brainstorms.

36 A digital piece of animation that often incorporates movement and sound is known as? (a) a chart (b) brainstorms (c) web diagrams (d) infographics (e) motion graphics

37 ------------ is the transmission of messages, information from the sender to the receiver. (a) etching (b) transmitter (c) communication (d) design (e) visuals

38 One of these is a tool not found in a graphic studio? (a) air brushing tools (b) stapling gum (c) templates (d) alignment (e) tee square.

39 Posters, maps, cartoons, comics and diagrams are examples of? (a) graphics (b) elements (c) contours (d) pointillism (e) emphasis

40 A purpose-driven poster must contain two main visual elements which are ------------? (a) bold and attractive (b) text and symbolic (c) lettering and pictures (d) typesetting and jigsaw (e) illustrations and clip art.

41 ------------ Posters usually carry some pictorial information which is very colourful and vivid to attract attention. (a) Stop and study (b) pictorial (c) single glance (d) brief caption (e) topic and slogan.

42 The combination of two primary colours in the same proportion is termed? (a) smooth colour (b) harmonious colour (c) secondary colour (d) colour intensity (e) analogous colour.

43 What are the colours called that are made by mixing primary and secondary colours? (a) monochromatic colours (b) complimentary colours (c) tertiary colours (d) intensity colours (e) amber colour

44 Answer the colour equation: Red + Blue= (a) purple (b) green (c) yellow (d) orange (e) black

45 What happens when you shade a colour? (a) It gets lighter (b) it gets darker (c) it gets brighter (d) it gets duller (e) it gets pretty.

46 Formation of colour using more than one colour is termed ------------? (a) monochrome (b) polychrome (c) shade (d) tint (e) colour intensity

47 Pen writing is otherwise known as ------------? (a) typeface (b) tint (c) calligraphy (d) shade (e) script

48 The three major types of block lettering are gothic, roman and ---------? (a) cursive

(b) serif (c) classic (d) calligraphy (e) decorative

49 -------------- consist of bold, thick and even or uniform letters (a) gothic (b) classic

(c) roman (d) script (e) sans serif

50 Thick and thin strokes and serifs at the base and upper part of it is called -----------?

(a) label (b) tint (c) classic (d) serif (e) typeface

APPENDIX J

Educational Technology Retention Test Marking scheme

1. A
2. D
3. B
4. B
5. B
6. D
7. E

8. B

9. D

10. A

11. C

12. A

13. B

14. A

15. C

16. A

17. E

18. B

19. D

20. C

21. A

22. E

23. D

24. B

25. B

26. D

27. C

28. B

29. B

30. A

31. D

32. A

33. D

34. E

35. B

36. E

37. C

38. D

39. A

40. B

41. C

42. C

43. C

44. A

45. A

46. B

47. C

48. A

49. A

50. C

APPENDIX K

LESSON NOTE FOR EXPERIMENTAL GROUP

GRAPHIC COMMUNICATION

1.0 INTRODUCTION

Graphic communication is a 2-credit unit course for students studying towards acquiring

a Bachelor degree in Educational Technology. The course is divided into the following

study unit: meaning of visual, graphics, designs and communication, tools and materials

required in graphic studio, types of graphics, colouring and colouring techniques, lettering and lettering techniques.

2.0 LEARNING CONTENT

LESSON 1

2.1 Meaning of visual, graphics design and communication.

Specific objectives:

At the end of the lesson, you should be able to

1) Define (a) Graphic (b) visual.

2) Explain briefly the efficacy of graphic communication in the learning process.

3) Describe with the aid of a diagram two dimensional (2D) and three dimensional (3D) objects.

4) State the functions of visual.

Introduction to Graphic Design and Communication

Graphic is an adaptation from the Greek word "graphos" meaning: to write graphically and to draw out of art forms, either for illustration message or communication. It can also be defined as fine and applied art including visual arts that involves the application of lines and strokes to a two dimensional surface. It is the reproduction made from blocks, plates or types such as engravings, etchings, woodcuts and lithographs. Communicating graphics in reference to this class refer to arts or design and science in

which ideas are expressed and communicated to learners through the use of gamification, ILIAS, diagrams, pictures, and so on.

The Efficacy of Graphic Communication in the Learning Process

Graphic communication in learning processes has the potential to increase students' learning system, the teacher's instructional materials, in form of graphic design visuals, support and, improve students' outcome. Students not only learn more when visuals are added to their teaching methods, their interaction satisfaction and awareness is improved. Visual aids through graphics communication carry details and relevant environmental information that relates to their areas of problems in which solutions are found

The efficacy of graphic communication visuals is a process that acted as information and it accelerates the learning process because they help students to master more subject matters and sharpen their learning skills in a shorter space of time. Graphic communication devices generates interest which is a key note to instruction, motivation, stimulation and an intimate finding of relevance through the provision of charging experiences.

VISUAL

Visual is regarded as anything human beings can perceive with the eyes. In teaching and learning process, visual materials are defined as instructional contents or messages that appeal to learners' organ of sight.

Types of visual materials

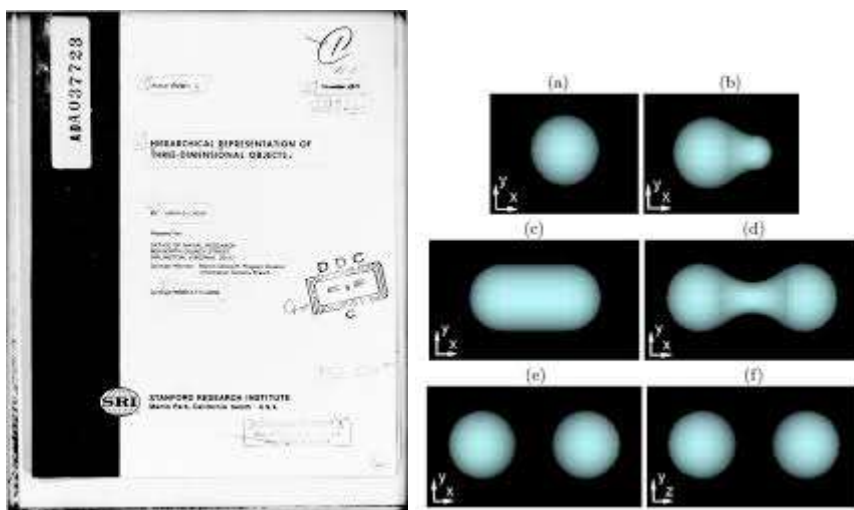1) The three dimensional (3D)

2) The two dimensional (2D)

The three dimensional (3D) are solids which have capacity (volumes, length, breadth, thickness) and real objects (ball, pieces of equipment, hardware and so on).

Fig 2: Three dimensional solids

The two dimensional (2D) are not solids but have surfaces which are flat with length and breadth. Such as charts, posters, pictures, maps etc.

Fig 3: Two dimensional solids
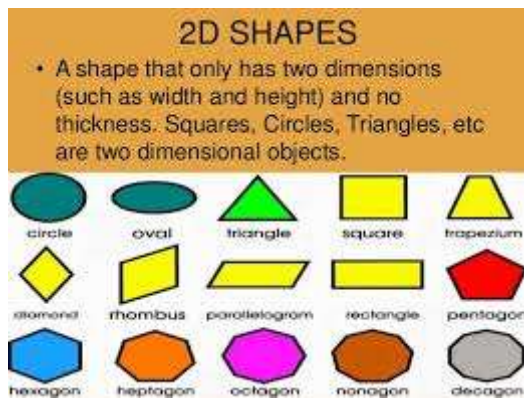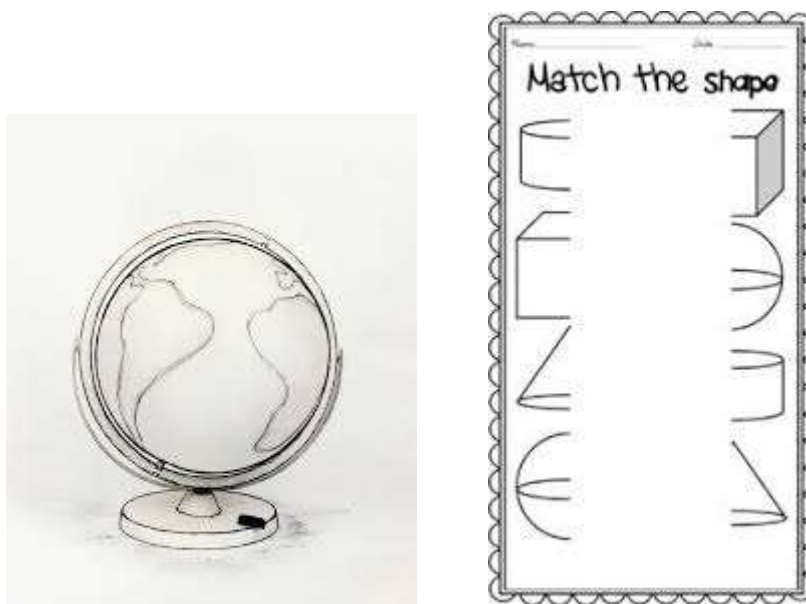

Functions of visuals

i)   Enable us to provide ideas in many forms e.g diagrams and graphs.

ii)   Help to explain in a pictorial form, certain qualities of things and processes, so that we can easily assimilate and understand.

iii)   Enable us to communicate ideas which will be difficult, if not impossible, to describe in words.

iv)   Helps in retention and remembrance

Evaluation

1) Define (a) Graphic (b) Visual

2) Briefly explain the efficacy of graphic communication in the learning process.

3) State the function of visual.

LESSON 2

2.2 List of tools and materials required in a Graphic Studio

Specific objectives:

At the end of the lesson, you should be able to

1) List and explain the function of ten (10) tools found in a graphic studio.

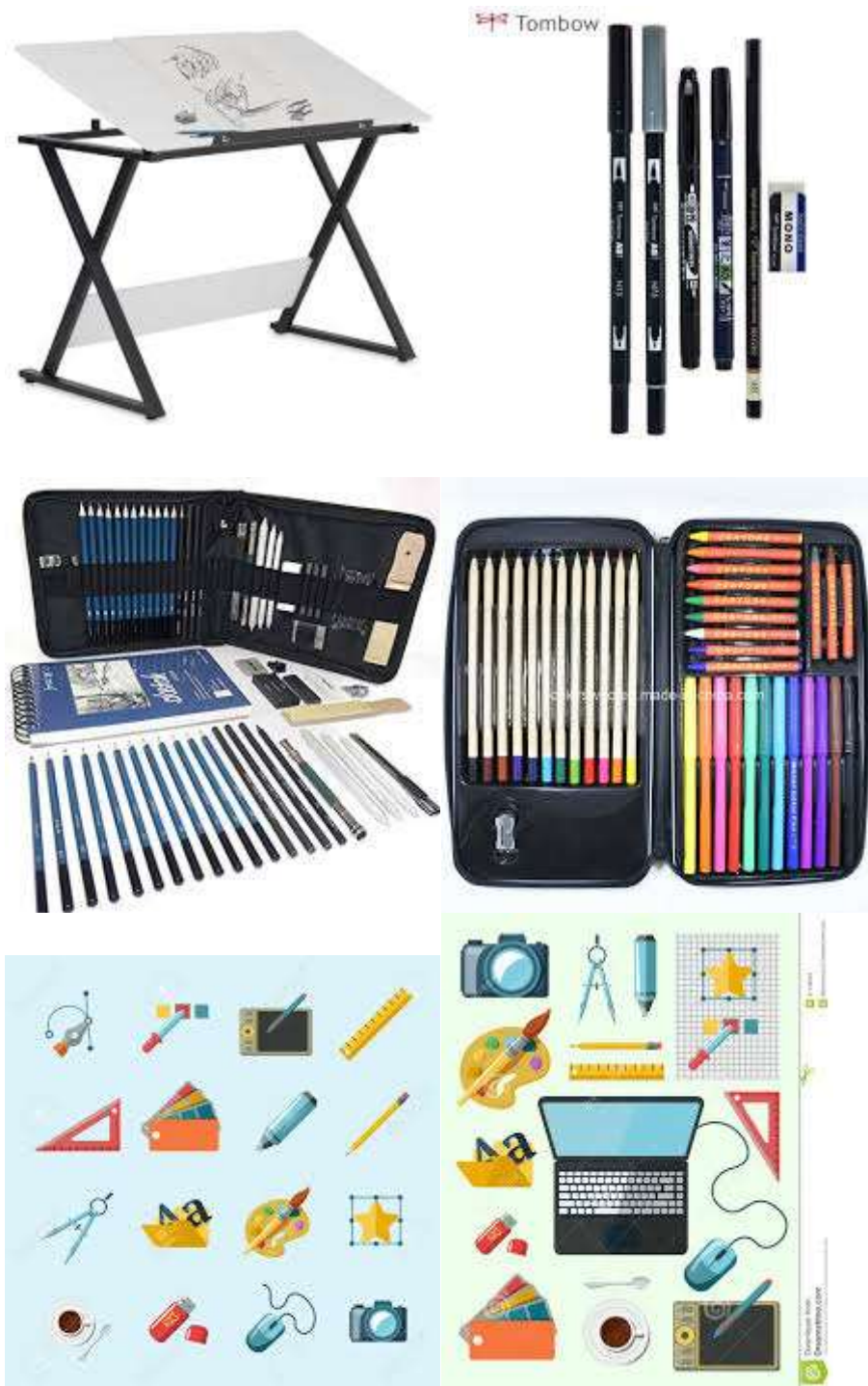Fig 4: Tools found in a graphic studio

Tools found in a graphic studio include:

The drawing set, the lettering set, pens, cutting tools, air brushing tools, etching and embossing tools, tee square, set square, stapling gum, templates, scribers, Drawing table, the enlarger, the air brush unit, typesetting units, the jigsaw, hand drills.

Evaluation

1) With the aid of a diagram, describe the function of seven (7) tools found in a graphic studio.

LESSON 3

2.3 Types of graphics

Specific objectives:

At the end of the lesson, you should be able to

1) Define computer graphics.

2) Explain with the aid of a diagram the following types of graphics

   (a) Graphics interchange format (GIFs)

   (b) Infographic

   (c) Motion graphic

   (d) Interactive infographic.

Graphics are visual images or designs on some surface, such as a wall, canvas, screen, paper, or stone to inform, illustrate, or entertain. In contemporary usage, it includes a pictorial representation of data, as in computer-aided design and manufacture, in typesetting and the graphic arts, and in educational and recreational software. Images that are generated by a computer are called computer graphics.

Examples are photographs, drawings, line, art, graphs, diagrams, typography, numbers, symbols, geometric, designs, maps, engineering drawings, or other images. Graphics often combine text, illustration, and color. Graphics can be functional or artistic. The latter can be a recorded version, such as a photograph, or interpretation by a scientist to

highlight essential features, or an artist, in which case the distinction with imaginary graphics may become blurred. It can also be used for architecture.

Graphics don't have to be pie charts and column graphs. They do however, need to visually communicate an idea or piece of data.

GIFs

Graphics Interchange Format are better known as 'GIFs' are a highly effective way to put forward

information in an online setting. They are basically a snapshot of a moving animation, video or slideshow of images. The Slideshow above is an example of a GIF made using still images.

Infographic

Infographics are a way to visualise data. They represent information or ideas using pictures to make the content easily digestible at first sight. People would usually use infographics if they are trying to quickly explain a large piece of data. Take a look at the infographic below

Fig 5: Infographic on the different types of ocean life to scale

Motion graphic

A motion graphic is a digital piece of animation that often incorporates movement and sound. Motion graphics help multimedia content creators communicate an idea using a variety of sensory experiences. They can sometimes be presented as GIFs since they are moving.

Fig 6: A motion graphic

Interactive infographics

Interactive infographics combine data visualisation, images, language, number, audience interactivity and linearity. Components of the infographic then become clickable for the user.

Other types of graphics include flow charts, brainstorms, web diagrams, charts and images and videos with captions.

Evaluation

1) Define computer graphics.

2) Explain with the aid of a diagram the following types of graphics

    (a) Infographics

    (b) Motion graphic

    (c) Graphics interchange format

    (d) Interactive infographics.

LESSON 4

2.4 Colouring and colouring techniques

Specific objectives:

At the end of the lesson, you should be able to

1) Define colour.

2) Describe briefly the seven classes of colour.

3) List and explain the following colouring techniques

(a) Monochrome (b) Polychrome (c) shade (d) Tint

Colour otherwise known as pigment is the sensation, feeling or effect produced in the eyes when light rays are reflected on objects

Colour classification and types

i.   Primary colours

ii.   Secondary colours

iii.   Tertiary colours

iv.   Complimentary colours

v.   Harmonious or analogous colours

vi.   Neutral colours

vii.   Colour intensity.

1. Primary colours: these are the three basic colours which cannot be produced by mixing any other colours. They are actually sources from nature e.g. red, yellow and blue.

2. Secondary colours: if two of the primary colours are combined in the same proportion e.g

- Red + yellow = orange

- Yellow + blue = Green

- Red + blue = violet/purple

3. Tertiary colours: if any one of primary colour is combined with the secondary colour next to it on the colour wheel, a tertiary colour is formed.
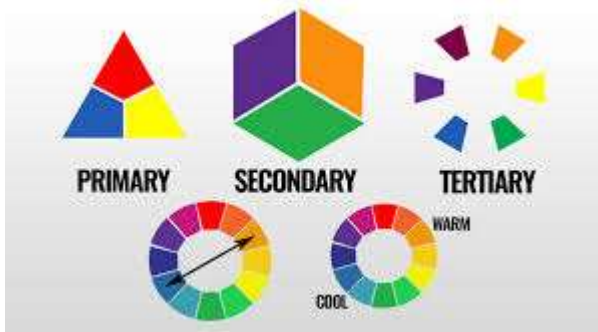
Fig 7: Colour classification

4. Neutral colours: examples are black and white colours. Black is the absence of all colours while white is the presence of all colours. The two colours are called neutral colours because they are used in toning other colours.

5. Complementary colours: these are colours that are directly opposite each other on the colour circle. When placed side by side or used together in a composition, it produces a sharp contrast. e.g. yellow compliments purple, blue compliments orange.

Complementary Colors

6. Analogous or Harmonious colours: these are colours that are closely related when linked and used side by side e.g. red and orange, yellow and green.

7. Colour intensity: this refers to the brightness or dullness of a colour

Colouring Technique

(a) Monochrome: formation of colours using only one colour i.e. to form different tones and shades of colours by addition of black or white.

(b) Polychrome: formation of colour using more than one colour to form different tones and shades by addition of one of the two colours to either tint or shade.

(c) Shade: it is used to create special colour effect by addition of black to another colour to form different tones and shades.

(d) Tint: it is used to create special colour effect by addition of white to another colour to form different tones and tint.

Evaluation

1) Define colour.

2) Describe five types of colour

3) Explain the following colour technique

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(a) Monochrome (b) Polychrome (c) Shade.

LESSON 5

2.5 Lettering and lettering techniques

Specific objectives:

At the end of the lesson, you should be able to

1) Define lettering.

2) Explain with examples the two major types of lettering.

3) Describe the following types of lettering

(a) Gothic (b) classic (c) Cursive.

Lettering is the systematic way of designing and constructing letters and alphabets with or without the aid of any lettering instrument. It helps to identify, label, emphasize, explain, clarify and reinforce and often to add supplementary information.

Types of typefaces in lettering

There are two major types of lettering namely

1. Pen lettering: is otherwise known as calligraphy i.e free and decorative handwriting.

2. Block lettering: there are three major types of block lettering namely: gothic or sans-serif, roman or classic, script and cursive.


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➢ Gothic or Sans serif: gothic consist of thick and bold or even and uniform letters, in other words, it is characterized by straight lines of uniform width and thickness.

➢ Roman or classic: it is characterized by thick and thin strokes and serifs at the base and upper part of it.

> ➤ Script or cursive: script and cursive letters are similar to handwriting and quite ideal if employed for only one or two words which should normally be the key words in the subject matter.
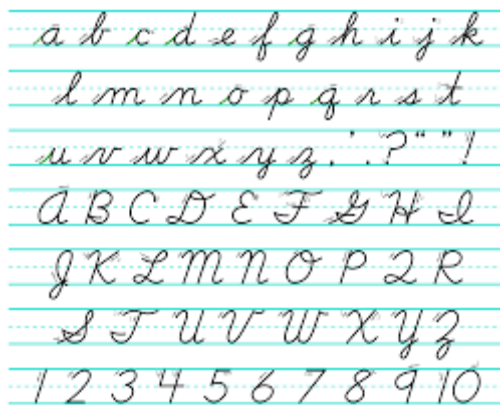
Evaluation

1) Define lettering.

2) Explain with examples the two major types of lettering.

3) Explain Gothic lettering.

3.0 CONCLUSION

Graphic communication is the passage or transmission of two-dimensional still visual from the source/sender to the audience or viewers. The field of graphic communication

encompasses all phases of the graphic communication processes from origination of the idea (design, layout and typography) through reproduction, finishing and distribution of two- or three-dimensional products or electronic transmission.

APPENDIX L

SAMPLE OF LESSON NOTE FOR CONTROL GROUP

School: University of Lagos

Course Title: Graphic Communication

Course code: EDT

Course Tutor: THADDEUS Hellen

Level: 200

No of Credit: 2

Duration: five weeks

Date:

Specific objectives

At the end of the lesson, you should be able to:

1. Define visual, graphics, design and communication.

2.   List the tools and materials required in a graphic studio.

3.   List types of graphics.

4.   Describe colouring and colouring techniques.

5.   Describe lettering and lettering techniques.

Technological modes of instruction: Detailed explanations and demonstration with supported diagrams.

Instructional procedure

Step I: Detailed explanation of visual, graphics, design and communication with diagrams and illustrations which would be given by the researcher.

Step II: Different tools and materials required in a graphic studio would be listed and presented in the class for identification.

Step III: Types of graphics such as posters, charts, maps, globes, flash cards, murals, pictures, tear sheet and their classroom application would be explained.

Step IV: Detailed explanation of colouring, its techniques and application would be explained with diagrams and illustrations.

Step V: Lettering and the different lettering techniques with diagrams showing different classes of lettering would be explained by the researcher.

Students Activities: The students would be allowed to ask questions in the class.

Step IV: Conclusion and summary on the course would be given

Step VII: Evaluation will be done on the following questions

1. Define the following: visual, graphics, design and communication.

2. List five tools and equipment's required in a graphic studio.

3. Discuss briefly two types of graphics

4. Define colour and describe five classes of colour.

5. Describe the techniques involved in lettering.