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EDUCATIONAL SOFTWARE IMPACT ON TECHNOLOGY MEDIATED LEARNING

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ABSTRACT: *There has been a growing concern for transformation, modernisation and restructuring of education system globally. This research investigated the impact of educational software on technology-mediated learning to enable better teaching/learning transformation in the Information Communication and Technology driven world. The study highlighted the use of educational software as a product of technology in alleviating the pressure and difficulties faced in the use of conventional face-to-face teaching method that have hitherto impeded the growth of education system in Nigeria. Massive Open Online Courses (MOOCs) was adopted for this research and blended with the face-to-face teaching method. Four research questions and corresponding hypotheses were formulated to guide the investigation. The study was anchored on Connectivism theory. Experimental research design was adopted with a random sample of 120 first year Accounting university students, randomised into three groups (educational software technology, conventional teaching method, and blended educational software technology with conventional teaching method). Each group learnt Introduction to Financial Accounting, Computer and Entrepreneurship. Data were collected using a highly reliable and valid Introductory Financial Accounting, Computer and Entrepreneurship Achievement Test. The examinees' pre-test and post-test scores were subjected to Analysis of Covariance (ANCOVA) to test the hypotheses at 0.05 level of significance. Results showed statistically overwhelming effect of the treatment as the group that employed Educational Software Technology (EST) performed significantly better than the group that blended educational software technology with conventional teaching method, which in turn, made a substantially greater achievement that the group that adopted conventional teaching method.*

KEYWORDS: Educational Software Technology, Conventional Teaching Method, Educational Software, Massive Open Online Courses (MOOCS), Learning Management System (LMS).

INTRODUCTION

Higher education is the most powerful instrument for social and economic advancement globally. Methodological approaches and efforts towards attainment of excellence in higher education have therefore undergone major changes technologically. Every university operating favourably in the extremely competitive markets demands very high-quality education delivery. For any university to play the leading role expected of it in the ever-changing world of globalization, internationalisation, and digitalisation; the university must adapt its curriculum delivery to suit requirements of the Revolutionary Information Age that we live in (Kpolovie & Lale, 2017). To meet this need, learning in the university must be technologically mediated with the most suitable educational software. Learning Management Systems (LMSs) are used all over Higher Education Institutions (HEI) in Europe, North

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America, South America, Asia, Oceania, and some countries in Africa for the purpose. Unfortunately, however, LMSs are not yet in use in any of the universities in Nigeria because it has not been tested in Nigerian university to infallibly determine its impact, if any in the Nigerian setting, on learning. This research is therefore aimed at the establishment of the effect of educational software on technology-mediated learning in Nigerian universities.

The role of technology in education cannot be overemphasised, it has impacted on many aspects of education, but this may not have been viewed in terms of the software component of technology and its accompanying influence on teaching and learning. It is imperative to understand how vital educational software is in the learning process and how students and teachers could either use it as an alternative form of teaching and learning or blend it with the conventional face-to-face teaching method.

Traditional teaching besieged with lack of practical approach to learning, inadequate contents that are not in line with modern day's realities, prepared and packaged contents that are passed from one generation of learners to other are still the order of the day in Nigeria. These traditional teaching/learning practices are unfortunately very prevalent in our higher institutions of learning today which undermine the integral modern interactive and collaborative components of the modern educational system that eradicate pressure, encourage sharing of knowledge, elicit motivation and self-development, and discovery amongst learners. As a result, traditional teaching methods are apparently giving way to exclusively computer-based learning or liberally to blended-learning in advanced countries (OECD, 2016; 2016a; 2016b; 2017; La-adwan, 2017; Rupande, 2015). It is little wonder that Kpolovie and Lale (2017) asserted conclusively that Learning Management System (LMS) is currently the climax to which educational technology is applied in university curriculum development and implementation that best suits the briskly changing world of globalization and internationalisation.

Many universities in the developing countries, especially Nigeria, have not adopted the new approach to effective and efficient use of technology to enhance teaching and learning (Kpolovie & Iderima, 2016; 2016a), thereby making it very imperative now to understudy the benefits derivable from educational software, its challenges and the possibility of adopting it in the Nigerian higher educational institutions as demonstrated in this research.

Technology-Mediated Learning that encompasses the wide variety of uses of information and communication technologies (ICTs) in teaching and learning is not typically used in Nigerian universities even in this modern age. With the conventional teaching method that is still in use in Nigerian universities, teaching technologies or tools are limited to chalkboards, books, pens and paper; and in a few cases, electronic tools like overhead projectors, televisions and tape recorders (which are long outdated) are used. The tools in the conventional teaching-learning lecture halls are primarily controlled by the lecturer and tend to reinforce instead of reinventing existing norms. Thus, the conventional face-to-face classroom setting is very far from what the Revolutionary Technology Age demands (Kpolovie & Lale, 2017) because these tools merely afford insufficient number of activities (Ololube, Umunadi & Kpolovie, 2014), primarily that of one-directional transmission (i.e., lecturers use a chalkboard to convey information to students who apply pens and paper to receive the information). In other words, in the traditional classroom setting that is prevalent in Nigerian universities, only a one-to-many announcement/newscast mode with centralised control of the tools by the lecturer is the norm in the teaching-learning interaction.

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In the main, the lecturers in Nigeria have not even recognised the current technology-mediated learning tools and the existing educational software like Learning Management Systems on which Massive Open Online Courses (MOOCs and xMOOCs) operate (Kpolovie & Iderima, 2016; 2016b). The lecturers have not personally learnt via LMSs and have no business attempting to make the students learn via LMSs. Up till now, there is no single MOOCs platform that is based in Nigeria. Similarly, there is no LMS that is developed in Nigeria. The routine practice in Nigerian universities is that of digital immigrants (lecturers) teaching the digital natives (students) (Ololube, Kpolovie, Amaele, Amanchukwu & Briggs, 2013; Ololube, Ajayi, Kpolovie & Usoro, 2012; Ololube, Amaele, Kpolovie & Egbezor, 2012). This is the situation that Kpolovie (2014; 2012a) described as 'uneducated lecturers uneducating educated students syndrome.' When it comes to the application of technology-mediated learning, the students are overwhelmingly better than their digital-illiterate or analogue lecturers (Kpolovie & Iderima, 2016; 2016a; 2013). Lecturers in Nigeria have since been found by Kpolovie and Awusaku (2016) to have a very poor attitude towards the adoption of Information and Communication Technology (ICT) in the Nigerian higher educational institutions.

Campus classrooms in tertiary institutions in Nigeria are still in the raw and non-motivational form. The libraries are typical examples of a passive space of row after row, shelf after shelf of mainly outdated books. The day is not yet at sight when the library space in Nigerian universities will be transformed into an active Commons or learning hub that offers access to a broad range of complex electronic tools as well as to passionate personnel who are ever ready to help students use Information and Communication Technology tools in dynamic and vigorous support of their learning. Students and staff adversely lack access to ICT tools for teaching-learning transformation in the country.

All over the world, with the exception of Nigeria, students are increasingly using technology in support of their learning (OECD, 2017; 2016; 2016a; 2016b; 2015; 2014; NSB, 2012; Nafukho & Irby, 2015; Parliamentary Assembly, 2008; MindWires LLC, 2016; Paulsen, 2003; Sewyn, 2011; Spector, 2014; Tomie, 2013) as necessitated by the Revolutionary Information Technology Age that is indeed an All-round Information Age, made possible with the use of educational software, chiefly LMSs and other technology-mediated learning tools (MindFlash, 2017; Lemoine, Yates & Richardson, 2015; VanTassel-Baska, 2014; Wiley, 2017; Mesquite & Peres, 2015; Ololube, Kpolovie & Makewa, 2015; Nachouki, 2017). In fact, Bates and Sangrà (2011) observed that, in over 90% of post-secondary institutions, students are using online learning management systems. In the corridors, classrooms, cafeterias, hostels, laboratories, and indeed everywhere on university campuses outside Nigeria. Students in other countries are using a wide range of complex electronic tools to facilitate and enhance learning in an unforgettable manner. But in Nigeria, the long outdated traditional chalkboard and teacher-talk-students-listen methods are still the routine practice.

Technology-mediated learning is a term with a wide variety of uses. It involves the application of Information and Communication Technology (ICT) in teaching and learning as well as the use of electronic tools, software and hardware components in the delivery of learning in a form that explain, clarify, elaborate, analyze and simplify learners' content and products in a manner that facilitates teaching and learning. It could also be defined as "e-learning tools, software, or computer-assisted activities that intentionally focus on and facilitate learning on the internet" Pishva and Nishantha (2010). The learning tools include

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web-based dynamic, practical and systems, multimedia application, games based learning, and so on. Technology-mediated learning is an environment in which the learner's interactions with learning materials, peers and instructions are mediated through advanced information technology software. It is a social system where the teaching-learning transformation takes place via the use of the internet as the critical environment.

The components of a computer system, both hardware and software, technological products which are used for learning enhancement. Specific software components are created for teaching and learning in educational institutions. The software that best provides a platform for interaction between the teacher and the learner is called Learning Management System (LMS), or E-learning platform (Shawar, 2009). Kpolovie and Lale (2017: 40) defined Learning Management System (LMS) as:

> A Web 2.0 software for scalable and robust curriculum design, documentation, administration, tracking, reporting and unlimited access to educational courses or training programmes. … LMS is an electronic-learning software for the planning and execution of teaching-learning experiences interactively and collaboratively to best capture and maintain the students' attention via a wide range of platforms such as Sharable Content Object Reference Model (SCORM), student portal, admin options, tracking/reporting, multimedia hosting, in-app messaging, in-app testing, gamification, mobile accessibility, integration, content library, course or content authoring (content creation) and open-source coding.

Shawar (2009: 741) referred to LMS as the best possible knowledge management tool and outlined fifteen usefulness of LMS as follows:

1. Simplicity, easy creation and maintenance of courses
2. Reuse, support for existing content reuse
3. CMC, assignments, test, progress learner involvement
4. Security, secure authentication/authorisation
5. Administration, intuitive management features
6. Technical support, active support groups
7. Language, true multi-lingual
8. Affordability, maintenance and annual charges
9. Reducing learning time
10. Increased educational retention
11. Consistency, delivery of content through asynchronous, self-paced e-learning
12. Educational knowledge is communicated with good e-learning and knowledge management systems.

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13. Reducing overall cost associated with tutors salaries, meeting rooms' rental, and student travel.

14. On-demand availability of knowledge

15. Reducing stress of limited lecture time, so slow or quick learners both will be satisfied.

There are thousands of educational software platforms which allow instructors and students to share instructional materials, make class announcements, submit and return course assignment and allow for communication with one another online using an integrated set of web-based tools for learning and course management (Malikowski, Thompson & Theis, 2007). Kpolovie and Lale (2017) listed 373 different LMSs that are in use that include Blackboard, Moodle, CANVAS, Edmodo, Angel, Oracle Taleo Cloud Service, BirdDogHR, Learning Stone, Blue Sky elearn, Totara LMS, Qintil, Capabiliti LMS, EduBrite, Geenio, Coursera, and iCohere Unified Learning System. All these are popular LMSs that are used for delivery of Massive Open Online Courses (MOOCs) that can be found in www.moocs.com (Kpolovie and Iderima, 2016; Steven, 2009). Having understudied some of the popular LMS software, how acceptable they are by the Users, the course contents, cost of adopting them and their flexibility, the current researchers adopted Massive Open Online Courses (MOOCs) for this investigation.

This research is broadly aimed at analysing the impact of educational software as a product of educational technology on students in Nigerian universities. Specifically, its objectives are to:

1. Determine the effect of educational software regarding course content, course delivery, students' interaction, collaboration and social activities in MOOCs educational software platform on students' performance.

2. Ascertain the difference in learning between students who use educational software and those who use conventional face-to-face teaching method.

3. Compare the benefits of using the educational software in learning with the conventional face-to-face teaching methods.

4. Determine which method is more efficient and result oriented.

Research Question

The basic research question guiding this research centres on what extent educational software influences the performance of students in a technology-mediated learning?

The broad question was sprint into four specific questions to aid in data collection and analysis as follows:

1. What is the effect of educational software platform or technology on students' learning of Introductory Financial Accounting, Computer and Entrepreneurship?

2. What is the difference in learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who used educational software technology and those who use conventional teaching method?

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3. What is the difference in learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who blended educational software technology lessons with conventional (face-to-face) teaching and those who use only conventional teaching method in learning?

4. What is the difference in learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who blended educational software technology lessons with conventional teaching methods and those who use only the educational software technology in learning?

Hypotheses

There are four hypotheses in this research all structured in null form (Kpolovie, 2011) to enable the researchers to test the relationship between the independent variable (impact of educational software technology) and the dependent variable (performance of students in technology-mediated learning). The null hypotheses are:

1. There is no significant effect of educational software platform or technology on students' learning of Introductory Financial Accounting, Computer and Entrepreneurship.

2. There is no significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who used educational software technology and those who used conventional (face-to-face) teaching method.

3. There is no significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who blended online lessons with traditional teaching and those who used only the conventional teaching method.

4. There is no significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who blended online lessons with orthodox teaching and those who used only the educational software technology method.

REVIEW OF RELATED LITERATURE

Education Software Technology: Educational Software Technology (EST) has been defined in several ways by specialists such as Mesquite & Peres (2015); Nafukho & Irby (2015); NSBA (2011); OECD (2016a); Ololube, Kpolovie and Makewa (2015); Spector (2014); and Selwyn (2011). In this investigation, Education Software is defined to cover all of its aspects like the use of E-learning and Learning Management System in the development and delivery of the teaching/learning transformation in the educational system. This definition has embedded the ones given by those mentioned authorities.

Education Software Technology (EST) has enabled university curriculum to be designed to adequately meet the needs of modern people living in a world that is full of opportunities and a world that has suddenly become:

a. A small global village.

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b. Where there is increasingly greater connectivity.

c. Where information is accessed with greatest ease and speed.

d. Where knowledge is collaboratively built.

e. Centre of advanced medical practice.

f. Pivot of advanced biotechnology.

g. Where existing digital divide must be ended.

h. Cybercrime must be prevented or eliminated.

i. Cyberwars demand to be stopped.

j. Decreasing physical social interactions needs to be addressed.

k. Cyberbullying risks demand attention.

With education software technology, there is abundance of available information. The curriculum tertiary educational institutions must be designed with education software technology to address information availability in the changing world where every needed information is at the touch of a button. Merely at the touch of the right button enabled by EST, one can pay bills, buy the needed goods and services, attend meetings, and watch films, and so on without going outside the comfort of his home. In fact, every button touched seems to be the right button as each touch produces results that are capable of catching one's attention (Kpolovie & Iderima, 2016; ICEF Monitoring, 2017).

With virtual search via the various search engines (Google, Bing, Dogpile, MetaCrawler, Mamma, etc.) for expert information, better understanding of a plethora of complex information could be got. Abundant information on health, law, engineering, and indeed every profession can be got simply with Internet search. For instance, in countries where data are available, about 80% of those who use the Internet have searched for health-related information in 2016. There is an increasing trend of Internet users becoming much more informed in fields that were once exclusively the domain of experts. The implication is that doctors and nurses, for instance, are much more likely to treat better-informed patients and who may challenge the quality, accuracy and authenticity of their prescriptions. Faculty are more likely to teach students who are much better informed of the topic, course, discipline or profession like the cases of uneducated lecturers uneducating educated students (ULUES syndrome) and digital immigrants teaching digital natives (Ololube, Kpolovie, Amaele, Amanchukwu & Briggs, 2013) and the issues of "Digital Native and Tourist" (Ololube, Amaele, Kpolovie & Egbezor, 2012). The general demand in this regard is for the university curriculum to keep improving to adequately cope with the trend.

Online Shopping has become regular practice in the digital knowledge economy era guaranteed by e-learning. Over 65% of individuals in the OECD countries for instance have done online shopping (ordered goods and services) from the comfort of their homes. Close to 90% of persons in United Kingdom, Denmark, Norway, Sweden, Luxembourg, Netherlands, and Germany ordered goods and services online in 2016 (OECD, 2016). There is need to prompt the realization that faculty and students in Nigeria do not only have to buy online but should more importantly produce and sell their products online for people world-over to

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order. When we start working accordingly, a search for each lecturer's books on the Internet (e.g., Kpolovie Peter James books) shall show his internationally published books in various online stores such as Amazon.com, Alibris.com, Google-Books.com, Igi-Global.com, ebay.com, Chapters.indigo.com, Kobo.com, Bookmanager.com, books-by-isbn.com, Barnesandnoble.com, and so on.

With education software technology, online courses and distance education market are booming. The technological advancements have opened up new markets for the education sector that include online courses and distance learning just at the touch of a button. The understanding of teaching and learning have been transformed beyond imagination. At the touch of a button via virtual learning platforms, professors and students effectively interact when they are physically located in different environments. Every faculty and student needs to take full advantages of opportunities that e-learning offers. Each professional must on daily basis study and acquire greater knowledge and skills in his field from the Internet. Higher curriculum must be designed and adapted for adequate preparation of students with the technologies and skills required to take advantages of the opportunities that education software technologies (ESTs) offer; such as:

1. Abundance of immediate answers to any question online;

2. Equipment of students with the increasing advanced computer programming skills in addition to basic computer literacy;

3. Self-paced, interactive, and personalized learning;

4. Building of critical capacity to use and to contribute to the ever increasing wealth of information;

5. The dramatic growth in the amount of available information;

6. The ease with which anyone can upload materials and units of newly discovered knowledge;

7. Improvement of lecturers to be better prepared for using and teaching of new technologies;

8. Increasing the benefits and reducing the costs of learning with the ever-growing technology;

9. Development of collaborative models for harmonization of social networking with user-generated Internet sites and the core business of formal learning;

10. Determination of content and monitoring the quality of online educational materials and software that have fast become a great market;

11. Taking responsibilities for monitoring students' time online;

12. Establishment of flexible but consistent system-wide policies and standards in online security;

13. Provision of adequate and appropriate training for recognition of cyber-risks;

14. Teaching of the technical skills for self-protection from cyber-threats;

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15. Taking of pro-active stance in encouraging respectful online behavior and reducing anonymous online postings without infringement of freedom of speech and right to privacy;

16. Taking a stand on the use of brain-enhancement drugs for improvement of concentration, memory and productivity in the tertiary education. This is more so as the super-abundance of information all-round has tended to reduce sustenance of attention on the core business of learning to the extent that the cognitive performance-enhancing drugs are becoming popular (Kpolovie, 2012; 2011c).

17. Equipment of students with skills and competencies to work in biotechnology sectors, such as genome sequencing, development of new uses for nanotechnologies, and mechatronics.

18. Provision of formal cum informal opportunities for life-long learning.

19. Big Data management and maintenance skills. This refers to extremely large and complex data sets that the traditional data processing application software or analogue storage is incapable of dealing with. Only digital storage that can be used to handle its capture, storage, analysis, curation, search, sharing, transfer, visualisation, querying, updating, and information privacy for predictive analytics to reveal business patterns, trends, and associations that relate to human behavior and interaction.

E-learning: The concept of E-learning has been explained by various authors according to their knowledge and perspectives (Kinshuk, Chen & Chew, 2016; Wiley, 2017; Dalsgaard, 2013); but they all seem to agree that e-learning comprises all forms of electronically supported learning and teaching which are procedural in character and aim to effect the construction of knowledge with reference to individual experience, practice and knowledge of the learner (Nwabufo, Umoru & Olukotun, 2015). This definition is supported by Umoru, (2015), who said that E-learning in the broadest sense concerns itself with learning that occurs online through the internet. He maintained that e-learning encompasses learning at all levels, both formal and non-formal uses through information network, the internet, an intranet (LAN) or extranet (WAN), whether wholly or in part, for course delivery, interaction, evaluation and facilitation.

Learning Management System (LMS): Kpolovie and Kpolovie (2017: 40) asserted that:

> *Learning Management System (LMS) is a Web 2.0 software for scalable and robust curriculum design, documentation, administration, implementation, tracking, reporting and unlimited access to educational courses or training programmes. Learning Management System (LMS) is currently the climax to which educational technology is applied in university curriculum development and implementation that best suits the briskly changing world of globalization, and internationalisation… Learning Management System (LMS) can also be defined as electronic-learning software for the planning and execution of teaching-learning experiences interactively and collaboratively to best capture and maintain the students' attention via a wide range of platforms such as Sharable Content Object Reference Model (SCORM), student portal, admin options, tracking/reporting, multimedia hosting, in-app messaging, in-app testing, gamification, mobile accessibility,*

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> *integration, content library, course or content authoring (content creation) and open-source coding (NSBA, 2011; Paulsen, 2003; Wiley, 2017; Andone, Holotescu & Grosseck, 2014; Andrew, 2008; Dalsgaard, 2013; Ingwersen, 2017). Other key features that LMS automatically encompasses are Intellectual Tutoring System (ITS), Competence Management System (CMS), Student Information System (SIS), Virtual Learning Environment (VLE), Learner Record Store (LRS), Learning Activity Management (LAM), and almost all that educational technology in the Information Age stands for (Hyland, Trahar, Anderson & Dickens, 2008). For simplicity, Learning Management System (LMS) may equally be defined as a powerful online educational software that most successfully combines managing of complex databases with digital frameworks for managing higher educational curriculum, training materials, and evaluation tools.*

LMS is driven by advances in educational technology (Kinshuk, Chen & Chew, 2016; The University of Edinburgh, 2017). In fact, use of LMS in university curriculum designing and delivery is the current peak of educational technology. In the changed world of today and the future, planning and delivery of learning in line with behaviorism, cognitivism, and constructivism theories of learning can and is with Computer-based Teaching (CBT) that has increasingly been refined to its best form that is termed Learning Management System (EC, 2000) that operates in a multi-user Web 2.0 and Web 3.0 virtual environments (Aparicio, Bacao & Oliveira, 2017; ICEF Monitoring, 2017).

A good Learning Management System most likely possesses some unique characteristics or structures that include the following.

1. Ease of access; it should have app that allows the learners to choose whether to use immobile or mobile devices as many may rely heavily on their smart phones and other handheld devices

2. The LMS should guarantee administrative users to have the ability to access reporting and results, change and update course content, and make changes to student user status, with minimum difficulty.

3. Ease of use, even by non-experts.

4. It should be highly dynamic, interactive, where user can generate sharable content and a detailed varied general reporting style.

5. Multimedia hosting; a right LMS should be able to host images, video, and audio files.

6. Ability to host lesson content and white labelling, support testing, evaluation and grading.

7. Mobile accessibility, software integration, the ability for LMS to play in the other users' programs.

8. The LMS should have in-built contents or course libraries, or an optional add-on icon full of ready-made content on a wide range of subjects.

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9. A quality LMS should have course-authoring tool for content creation that design and contribute one's own content or information to any media.

10. It should contain an intelligent Tutoring system that enables learning in a very meaningful and effective manner by using a variety of computing technologies to solve the problem of student's over-dependence on teacher for quality education.

11. Must provide Virtual Learning Environment (VLE), which is a Web-based platform for the digital aspects of courses of study within educational institutions. Kpolovie and Lale (2017) explain that VLE is an online education curriculum that allows:

    i. Content management – creation, storage, and access to active use of learning resources.

    ii. Curriculum mapping and planning – planning of lesson, assessment, and personalisation of learning experience.

    iii. Learner engagement and administration – managed access to learner information and resources and tracking of achievement.

    iv. Communication and collaboration via email, e-forum, chat, wikis, blogs, notices, twitter, other media, and so on.

    v. The entire course syllabus;

    vi. Course administrative information – prerequisites, credits, registration, payments, physical sessions, and contact with each lecturer (for blended learning version).

    vii. Course content – complete course for distance learning applications, or part of the whole content when used as a part of conventional course. It provides materials such as copies of the e-lecture in the form of text, e-books, audio, video presentations, and visual aids.

    viii. Additional resources – either in integrated form or as functional links to outside resources, and hyperlinks to create unified presentation to students.

    ix. Flexible instruction to students in a manner that is familiar to the current web-oriented generation.

    x. Automatic integration of students' learning results, and transcripts into the campus information system.

12. Should accommodate a Learning Activity Management (LAM). LAM is an open source learning system that LMS uses for designing, managing, and delivering online collaborative learning activities. It provides lecturers with an intuitive visual authoring environment for creating sequences of learning activities that include a range of individual tasks, small group work and whole class activity that is based on both content and collaboration.

13. It should host Student Information System (SIS). This is a data management information system within LMS that allows tertiary educational establishments to

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easily manage student data. It provides for registering students in courses, documenting grading, transcripts, tests results, building student schedules, recording class attendance, and recoding of communications with students. Students' details can be communicated to their parents via SIS.

14. It should encourage Synchronous and Asynchronous Learning models. LMS could be used for both synchronous and asynchronous settings. Synchronous learning occurs in real-time, with all participants interacting at the same time, while asynchronous learning is self-paced and allows participants to engage in the teaching-learning interaction without depending on other participants′ involvement at the same time.

Theoretical framework

Four related learning theories were examined – Behaviorism, Cognitivism, Constructivism, and Connectivism. The research was anchored more on the theory of connectivism by Stephen Downes. The basic ideas of connectivism, according to (Siemens, 2005; Steven, 2009; Downes, 2011; 2017) are:

- Learning and knowledge come as a result of diverse opinions.
- Knowledge does not exist in the mind of one person
- Learning may reside on non-human appliances
- Nurturing and connection are needed to facilitate continual learning
- Decision making is itself a learning process
- Content to be learnt must be up to date.

The Constructivism learning theory stresses that the learner creates knowledge as he engages in activities in order to better understand his experiences. Behaviorism and cognitivism theories of learning aver that knowledge is external to the learner and that the learning process is the act of internalizing knowledge. Constructivism assumes that learners are not empty vessels to be filled with knowledge because the learner actively reorganises, reconstructs and interconnects the meaning of his experiences for learning to occur. Frequently, the learner selects and pursues his personal learning in a real-life complex and messy circumstances; and that the synchronous and asynchronous classrooms are more effective in preparing the learner for life-long learning. Connectivism is driven by the understanding that decisions are based on rapidly altering foundations. New information is continually being acquired. The ability to draw distinctions between important and unimportant information is vital. The ability to recognize when new information alters the landscape based on decisions made yesterday is also critical.

Behaviorism, cognitivism, and constructivism attempt to address how a person learns. These learning theories tend to hold that knowledge is an objective state which can be attained through either reasoning or experiences. Behaviorism states that learning is largely unknowable. That is, the learner cannot possibly understand what goes on inside him as a person in line with the 'black box theory'. According to Gredler (2008), behaviourism consists of several theories that make three assumptions about learning:

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1. Observable behaviour is more important than understanding internal activities
2. Behaviour should be focused on simple elements: specific stimuli and responses
3. Learning is about behaviour change.

Cognitivism learning theory is modelled after a computer information processing system. Learning is a process of inputs, briefly managed in short-term memory, and encoded for long-term recall (Siemens, 2005). That is, the cognitive theories perceive knowledge as symbolic mental constructs in the learner's mind, and the learning process is the means by which the symbolic representations are committed to memory in a relatively unforgettable manner via the sensory memory through short-term memory to long-term memory.

A central tenet of most learning theories is that learning occurs inside a person. The constructivism theory posits that learning is a socially enacted process, promotes the personality of the individual. These theories do not address learning that occurs outside of the person such as the learning that is stored and manipulated technologically. The actual process of learning and the value of what is being learned matter greatly in a networked world, the very manner of information that an individual acquires is worth exploring. With the rapid increase of information and the abundance of knowledge made available by the Internet, rapid evaluation of knowledge becomes very crucial. In today's environment, the action is often needed without personal learning. In individual needs to act by drawing information outside of his primary knowledge. The ability to synthesise and recognise connections and patterns is a valuable skill in connectivism theory of learning.

In connectivism, learning is a self-organising process that is informationally open for it to be able to classify its own interaction and interconnectivity with a rapidly changing environment for structuring the changes in favourable manners that best attains socio-psychological body-equilibrium (Kpolovie & Oguwike, 2017). Self-organization at a personal level is a micro-process of the larger self-organising knowledge constructs created within corporate or institutional environments. The capacity to form connections between sources of information, and thereby create useful information patterns, is required to learn in the radically changing world of the digitalised knowledge economy, internationalisation, and globalisation (Kpolovie 2012, Kpolovie & Lale, 2017; Kpolovie & Oguwike, 2017).

Information units always compete for connections because inter and intra links of units of information represent survival in the complex interconnected world of the Revolutionary Information Age. Units and sets of information that successfully acquire greater profile of values will be more efficacious in acquiring additional connections to become an overwhelmingly more integrated whole that can be very easily recalled and applied in problem resolution. Learning and knowledge rest on diversity of opinions.

Principally, connectivism theory of learning has characteristics that include (Gredler, 2008):

I. Learning is a process of connecting specialised units information sources.
II. Learning may reside in non-human appliances.
III. Capacity to know more is more critical than what is currently known.
IV. Nurturing and maintaining connections is needed to facilitate continual learning.

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V. Ability to see connections between units and sets of information is a core skill in learning.

VI. Connectivism guarantees currency, accuracy, and up-to-date knowledge learning activities.

VII. Decision-making is a crucial learning process. Choosing what to learn and the meaning of incoming information is an ever current reality.

VIII. A right answer to a problem today could become a wrong answer to that problem in the future as a result of alterations in the information climate affecting the decision.

The strength and magnitude of learning in connectivism depend primarily on effective nurturing of information flow. Within social networks of information, hubs are well-connected for people to create, foster and maintain learning of new knowledge. With the Internet, rapidly increased interdependence of information sources culminates in efficient knowledge flow, enabling better personal understanding, interconnectivity, reorganisation and reconstruction of the information individually and collectively or organizationally to best meet current and prospective future realities (Siemens, 2005). The central focus is that little ideas of many could form a pool of ideas in an organisation which becomes a massive effort of a few – the management. Knowledge is not packed and distributed like a piece of furniture instead it is a complicated, distributed mixed of concepts which looks different to various people.

A person's ability to learn what he needs for tomorrow is more important than what he currently knows. A real challenge for any learning theory is to actuate existing knowledge at the point of application. As knowledge continues to grow and evolve in a constant state of swift flux, access to what is needed to learn is more important than the knowledge that learner currently possesses. Connectivism presents a model of learning that acknowledges the tectonic shifts in society where learning is no longer an internal, individualistic activity in the Web 2.0 and Web 3.0 eras. How people work and function is altered when new tools are utilised. The field of education has been slow to recognise both the impact of new learning tools and the environmental changes in what it means to learn. Connectivism uniquely provides the requisite insight into learning skills and tasks needed for learners to flourish in these digital eras of Web 2.0 and Web 3.0. Expert System Semantic Intelligence (2017) asserted that the Web 3.0 is characterised by the following:

> *1) Semantic Web*
> *The next evolution of the Web involves the Semantic Web. The semantic web improves web technologies to generate, share and connect content through search and analysis based on the ability to understand the meaning of words, rather than on keywords or numbers.*
>
> *2) Artificial Intelligence*
> *Combining this capability with natural language processing, in Web 3.0, computers can understand information like humans to provide faster and more relevant results. They become more intelligent to satisfy the needs of users.*

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3) 3D Graphics
The three-dimensional design is being used extensively in websites and services in Web 3.0. Museum guides, computer games, e-commerce, geospatial contexts, etc. are all examples that use 3D graphics.

4) Connectivity
With Web 3.0, information is more connected thanks to semantic metadata. As a result, the user experience evolves to another level of connectivity that leverages all the available information.

5) Ubiquity
Content is accessible by multiple applications, every device is connected to the web, the services can be used everywhere.

Connectivism Theory and MOOCs

Downes and Cormier constructed the first Massive Open Online Course (MOOC), "Connectivism and Connective Knowledge", (Downes, 2011) partly to explain and partly to model a connectivist's approach to learning. Three years later, Downes (2014; 2014a) spelled out, in two presentations called "The MOOC of One" and "This is the next era of learning", respectively, some of the relationships between individual learning, the contribution of individuals to knowledge and its flow, and networks of learners, within a broad interpretation of the connectivism theory. In his presentation, Downes sets out some design principles for connectivist 'courses' or cMOOCs, such as:

- Learner autonomy, the learner chooses his content and what to learn.
- Openness: learners have access to the course, content, activities and methods of assessment all made available to the public view.
- Diversity: different contents, individual perspectives and multiple tools, especially for networking learners and creating opportunities for dialogue and discussion.
- Interactivity: 'massive' communication between learners and resulting in emergent knowledge and social integration.

The whole point of offering a course at all is to provide a starting point, to provide a variety of things to read, watch or play with, Downes (2014; 2014a). There is a lot of content associated with the course, everything from relatively basic instruction to arguments and discussions to high-level interviews with experts in the field. The course is supported by a daily newsletter, which highlights some of the contents the learner can choose from. The newsletter is created fresh each day, and it is not a prepared content. Therefore, delivery may vary. It is composed not only of recommended readings but also articles, videos and recordings made by course facilitators, blog posts, images, videos and other recordings made by course participants, collected tweets from Twitter or facebook, bookmarks from Delicious, discussion posts, and other possible contents and sources. The idea of the newsletter is to aggregate everything that is out there related to the course. This is necessary because the course (like the discipline it models) is distributed. People create content on their blogs, photo accounts or messaging services. The newsletter is one way of bringing these materials together for easy access. Participants are not expected to read and watch everything. Even the

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facilitators cannot do that. Indeed, what the providers of the MOOCs experienced after delivering a half dozen MOOCs was much that they had to tell people at the start of the course to pick and choose what they will read, watch or participate in. They repeatedly stressed that there is no central content to the course, that each person creates his/her perspective on the material by selecting what individually seems essential, and that it is these different perspectives that form the basis for the exciting conversations and activities of MOOCs (Downes, 2014, 2014a).

The underlining idea in connectivism is that knowledge is not something that can be packaged neatly in a sentence and passed along as though it were a finished product. Knowledge is rather complicated, distributed, mixed with other concepts, and looks differently to different people, is inexpressible, tacit, mutually understood but never articulated, and this is provided in cMOOCs.

The use of MOOCs with Learning Management Systems (LMSs) for tertiary education curriculum design and delivery has so much impacted the world to the extent that currently, virtually all higher institutions of learning in the developed world and most Third World countries, apart from Nigeria, (Kpolovie & Iderima, 2016; Kpolovie & Onoshagbegbe, 2017; Kpolovie & Lale, 2017) are adopting them in the development and delivery of their curriculum. The number of tertiary institutions in the United States of America and in the United Kingdom that are employing LMSs in their curriculum delivery are tabulated herein for illustration of the popularity that LMSs in the form of MOOCs have gained.

Table 1: United States collages and universities' use of LMS by March 8 2017

S/No	LMS in Use	Number and Percentage of Institutions Using	Spring 2017 Enrollment of Full Time Students
1	ANGEL	34 (0.92%)	124,679 (0.63%)
2	Blackboard Learn	1185 (32.24%)	7,383,086 (37.40%)
3	Canvas	713 (19.40%)	4,773,367 (24.18%)
4	D2L	360 (9.79%)	2,314,816 (11.73%)
5	Moodle	678 (18.44%)	2,611,762 (13.23%)
6	Sakai	107 (2.91%)	757,643 (3.84%)
7	Pearson	105 (2.86%)	353,686 (1.79%)
8	Other	494 (13.44%)	1,420,744 (7.20%)
Total		**3,676 (100%)**	**19,739,783 (100%)**

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Table 1b: Percentage of European universities that used a given LMS

S/No.	Learning Management System	Number of institutions	Percentage
1	Moodle	1,043	65
2	Blackboard Learn	192	12
3	Ilias	64	4
4	Sakai	48	3
5	Claroline	32	2
6	Itslearning	32	2
7	GUNET eClass	32	2
8	Stud.IP	32	2
9	Olat	16	1
10	Canvas	16	1
11	D2L Brightspace	8	0.5
12	ClassFronter	8	0.5
13	Others	80	5
Total		**1,604**	**100**

While Table 1a has shown that in the United States, 3,676 (100%) institutions use LMSs for 19,739,783 (100%) of their full time enrolled students; Table 1b has revealed that in the United Kingdom, 1,604 institutions which is 100 percent make use of LMSs in the development and delivery of their curriculum (Kpolovie & Lale, 2017).

In spite of the popularity of the use of Learning Management Systems in the developed world, universities in Nigeria are yet to adopt them in the delivery of courses. It is hoped that this current investigation that is experimenting adoption of LMS in Nigeria will explicitly indicate whether the use of educational software technology (the LMS) fully or when blended with the traditional face-to-face teaching method will produce statistically better learning of Introductory Financial Accounting, Computer and Entrepreneurship than when only the conventional face-to-face teaching alone is used in our university system.

METHODOLOGY

Experimental research design is a most careful and thorough written plan of action to be meticulously followed, step by step, for execution of a truly genuine experiment with maximum validity. It shows the entire *what*, *how* and *when* everything that constitutes the whole process of the experiment will be satisfactorily done to arrive at definitive conclusions about the purpose of the investigation (Kpolovie, 2016).

A true experimental research design must adequately represent a sure means for isolating the effect of the independent variable (treatment conditions) on the dependent variable while simultaneously excluding all possible or imaginable extraneous variables. The plan necessarily indicates the procedure for collecting all relevant data and accurately analysing the same for testing null hypotheses and answering research questions of the experiment unambiguously (Kpolovie, 2016; 2012; and 2011a). The design puts all possible extraneous, intruding or contaminating variables under control through randomisation and use of control

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group. While randomization is the only means by which both known and unknown variables are controlled or held constant, use of control group serves as a justifiable source of comparison and as a suitable control for rival hypotheses (Kpolovie, 2016; Christensen, 1985; Myers, 1987; Kantowitz, Roediger III & Elmes, 2005; Graziano & Raulin, 2007; Koul, 2009).

All that has been said above about genuine experimental research design covers or ensures internal validity of the experiment. It is therefore cogent to quickly aver that a true experimental design must adequately cover the other critical part of the experiment, namely external validity. A true experimental design vividly shows the type and extent of population that findings of the investigation can accurately be generalised to.

Finally, a true experimental research design depicts or indicates the manner and strategy of collecting pretreatment measure (pretest) without practice effect. With this, the initial position or condition of the subjects is elicited for more comparability and greater sensitivity of the experiment in capturing and magnifying even small change in the dependent variable caused by the independent variable where such effect indeed exists.

Randomized Between Subjects Before-After Experimental Research Design was employed in this investigation. In this between subjects before-after research design, the 120 sampled subjects were randomly assigned to one control group and two experimental or treatments groups to equate the probable influence of extraneous variables. A pretest was administered to all the subjects to obtain pretreatment measurement of their Introductory Financial Accounting, Computer and Entrepreneurship skills that constitute the dependent variable with the aim of further confirming equivalence of the control and experimental groups with respect to the dependent variable. Next, the experimental Group A are exposed to Educational Software Technology for eight weeks to learn Introductory Financial Accounting, Computer and Entrepreneurship. Those in experimental Group B were exposed to the learning of Introductory Financial Accounting, Computer and Entrepreneurship for eight weeks using blended Educational Software Technology and Conventional teaching methods. The subjects in the Control Group were taught Introductory Financial Accounting, Computer and Entrepreneurship for eight weeks using the Conventional teaching method alone. After the eight weeks treatment period, the same achievement test on Introductory Financial Accounting, Computer and Entrepreneurship was administered to all the subjects to obtain posttest measurement of the dependent variable. If subjects in the two treatment groups significantly differ from those in the control group, then such difference is the effect of the independent variable on the dependent variable. If only subjects in one of the treatment groups (say B) improved significantly in the dependent variable, then the difference can be said to have been caused by the effect of treatment condition B (blended EST with conventional teaching) on the dependent variable.

	Subjects		**Pretest**	**Treatment**	**Posttest**
Experimental Group A	40	R	O_1	(EST) X_1	O_2
Experimental Group B	40	R	O_3	(Blended) X_2	O_4
Control Group	40	R	O_5	Conventional	O_6

***Figure 1*:** Randomized between subjects before-after experimental design.

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If ANOVA of the pretest had shown lack of difference in observations O_1, O_3, and O_5; but after the treatment, posttest ANOVA revealed significant difference between each of observations O_2 and O_4 on the one hand and that of the control group (O_6) on the other hand; then the manipulated independent variable must have been the cause of the difference. For this conclusion to be made, O_2 and O_4 must have each been significantly higher than O_1, O_3, O_5, and O_6. For greater experimental sensitively, Analysis of Covariance (ANCOVA) could better be performed on O_1, O_2, O_3, O_4, O_5 and O_6 to completely remove the influence of pretesting and all other known and unknown extraneous variables by treating O_1, O_3, and O_5 as the covariate.

Population of the Study

Out of the 191,197,655 total population of Nigeria in 2017; there are 13,383,836 students in universities and secondary schools, irrespective of the ownership of the educational institution (World Population Review, 2017). Of the 13,383,836 students, 4,015,151 are in tertiary institutions of learning, 9,368,685 are in secondary schools. Of the university students, 100,379 are in the Departments of Accounting (referred to as Department of Finance and Banking in some universities). Two universities were randomly sampled from which a sample of 120 first year Accounting students were drawn randomly with the aid of Table of Random Numbers. The sample was so derived to allow for effective control in the administration of the experimental treatment conditions of the study. The sample of 120 undergraduates from the total 100,379 Accounting students in Nigeria is indeed a large enough sample for a Between-Subjects Before-After Experimental study in accordance with standard characteristics of a good sample – representativeness, accuracy and precision (Kpolovie, 2010; 2011; 2016; 2017; Krejcie & Morgan, 1970; Kpolovie, 2011). Subjects of the study were further randomised into three groups (A, B, and C) of 40 each as demanded by the three treatment conditions of this investigation (educational software technology, blended educational software technology with conventional, and conventional face-to-face instructional techniques).

Nature/Sources of Data

This study compared the performance of the undergraduates who studied their entire contents by using educational software technology alone, with those who studied their contents by blending educational software technology with the conventional method, and with the undergraduate Accounting students who studied their entire instructional contents (learning materials) by using only the traditional face-to-face teaching-learning method. The teaching-learning contents or subject matters were Introductory Accounting, Computer and Entrepreneurship.

For the Group A, the educational software technology chosen for the study is Massive Open Online Courses (MOOCs) delivered via Learning Management Systems. The learning platform creates a forum where lectures are delivered online by a team of seasoned instructors from different Universities in the world. Students take part in the free social, collaborative and interactive instruction by registering in the platform using the website MOOCs.com. It takes the researcher to a page where he specifies what he wants to do in MOOCs by selecting classes from the Categories List. As beginners, each of the subjects in the Group A was made to create and use Login details such as email address and password. The page then takes the subject to the profile where other personal details were entered. At the completion of this section the subject clicks on Choose Course under the drop down

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option; my course, interest, enrolled, taking now, partially completed, audited and dropped. You click on the interest and the lists of courses come up where the subject selects the courses intended to study (Introductory Accounting, Computer and Entrepreneurship). The person can either choose from the list of courses provided or click on the customized option where he supplies the content of interest intended to study.

The students' free online registration of the courses connects them with a vast number of students registered on that same courses world-over and as well connects them to all the software facilities and social media platforms that the MOOCs LMS provides. Class Central MOOCs provides the time and date of classes of the courses chosen, powered by Coursera Degreed team. The team sends messages through email informing the student of the date and time of the classes, two or three days before time. The students become part of the class by logging in with their user account already created using their laptops and hand devices (Tablet/IPad) provided for them by the researchers at the comfort of their hostels and other suitable environments as they watch and participate in the class proceedings, which has duration of 30 to 40 minutes. The lectures run 3 hours per week for each course and have an average duration period of six weeks for a course. At the end of every instruction, assignments are given to be submitted on a specified date. The subjects in the Group interacted and collaborated using their social media platforms linked to the software or using a personal email address. It also provides the opportunity for certification that cost the researchers $49 for each of the subjects in the group.

The Group B subjects were accorded all that those in Group A had in addition to attending classes where the traditional face-to-face teaching method was used to deliver the course contents or subject-matters. This was necessary to guarantee that subjects in Group B effectively learnt the Introductory Accounting, Computer and Entrepreneurship in a blended mood. The examination of the Group B subjects was by both Paper-and-Pen as well as Computer-Based Testing (CBT).

In Group C, the same course contents as for Groups A and B were delivered via the Conventional teaching methods alone. Subjects in Group C did not make use of MOOCs LMS at all as they were not exposed to the educational software technology. Even the Professors who lectured them had no knowledge of the use of MOOCs and Learning Management System. What is of great importance is that the Professors very carefully, efficiently and effectively lectured the subjects in the lecture hall for the purpose. Each subject in the Group was made to promptly attend all the lectures throughout the six weeks administration of treatment conditions time. Examination of the subjects here was only through the traditional Paper-and-Pen means. The questions were exactly the same as those administered to the subjects in Groups A and B.

Content validity was employed for the validation of the instrument for data collection, titled Introductory Accounting, Computer and Entrepreneurship Achievement Test (IAC&EAT). The IAC&EAT consists of 150 items that were structured into three Sub-Tests (Introductory Accounting, Introductory Computer, Introductory Entrepreneurship). Item-total reliability coefficients of the IAC&EAT are 0.87, 0.89 and 0.85, respectively for the three Sub-tests. The average and median item-total reliability of the data collection instrument (IAC&EAT) is 0.87 that is judged to be suitably high (Kpolovie 2014; 2016).

The data collected were analysed with Analysis of Covariance (ANCOVA) that is capable of partialing out or eliminating the probable influence of the pre-test entirely from the post-test

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performance. Each null hypothesis was tested at 0.05 alpha or level of significance. The data were further analysed by subjecting the omnibus ANCOVA results to Pairwise Multiple Comparisons, using Bonferroni that does the best, most powerful and most sensitive Adjustment to clearly indicate significant difference only when and where such difference exists indeed (Kpolovie, 2017; 2011; 2016; Meyers, Gamst & Guarino, 2013). Execution of the entire analysis was done with the aid of IBM SPSS®, the best statistical software that exists for the purpose (Brace, Kemp & Snelgar, 2016).

RESULTS

Findings of the study are tabulated and briefly explained herein.

Table 1: ANCOVA descriptive statistics that answers the research questions.

Descriptive Statistics

Dependent Variable: EST Post-Test

Treatment	Mean	Std. Deviation	N
EST	80.0750	9.59270	40
Blended	73.3000	6.22732	40
Conventional	58.9000	5.27597	40
Total	70.7583	11.42825	120

The mean and standard deviations for the total and for each of the three treatment conditions are presented in Table 1. The total Educational Software Technology (EST) Post-Test has a mean of 70.7583, 11.42825 and 120 number of cases. The Group A (EST) has a mean of 80.0750 and standard deviation of 9.59270 with an N of 40. Group B (Blended) has a mean of 73.3000 and a standard deviation of 6.22732 with an N of 40. The Group C (Conventional) has the mean and standard deviation of 58.9000 and 5.27597, respectively with 40 number of cases. These descriptive statistics information serve as answers to the research question earlier posed for this study. The descriptive statistics for the EST Post-Test could become clearer and more vivid when presented graphically as in the ANCOVA Profile Plots in ***Fig. 1.*** For purpose of further clarification, the mean and standard deviation of the subjects' scores or performance in Introductory Financial accounting, Computer and Entrepreneurship was just about 30 (30.9667 mean and 4.56684 standard deviation for the total) as against the EST Pot-Test performance that has a total mean of 70.7583 and 11.42825 standard deviation as shown exactly in ***Tab. 1b.***

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Table 1b: ANCOVA descriptive statistics for the EST Pre-Test

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
EST	40	32.2750	3.78247	.59806	31.0653	33.4847	24.00	38.00
Blended	40	30.4000	4.17440	.66003	29.0650	31.7350	21.00	37.00
Conventional	40	30.2250	5.40886	.85522	28.4952	31.9548	20.00	39.00
Total	120	30.9667	4.56684	.41689	30.1412	31.7922	20.00	39.00

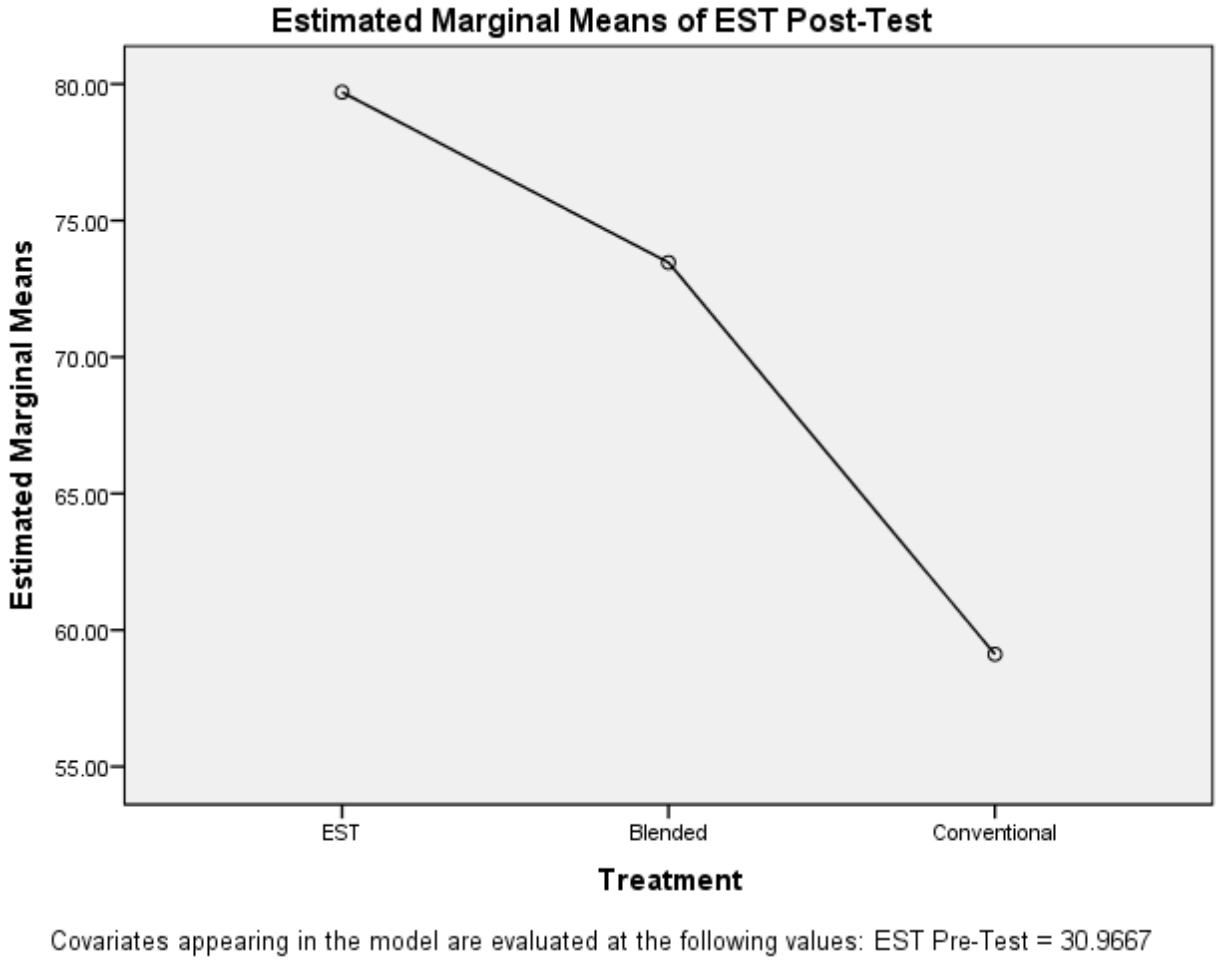

Figure 1: ANCOVA Profile Plots

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Table 2: ANCOVA results (Tests of Between-Subjects Effects) for testing null Hypothesis 1

Tests of Between-Subjects Effects

Dependent Variable: EST Post-Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	9550.351[a]	3	3183.450	61.633	.000	.614	184.898	1.000
Intercept	9308.099	1	9308.099	180.208	.000	.608	180.208	1.000
ESTPreTest	195.134	1	195.134	3.778	.054	.032	3.778	.487
Treatment	8687.908	2	4343.954	84.100	.000	.592	168.201	1.000
Error	5991.641	116	51.652					
Total	616351.000	120						
Corrected Total	15541.992	119						

a. R Squared = .614 (Adjusted R Squared = .605)
b. Computed using alpha = .05

It can be discerned from the ANCOVA summary in Table 2 that the ESTPreTest has 195.134 Type III Sum of Squares, 1 degree of freedom, 195.134 Mean Square and 3.778 F with a probability (Sig) of .054 that is not statistically significant. This exactly denotes that the three groups (Groups A, B, & C) do not differ significantly with respect to their scores or performance in the Pre-Test. In other words, before the introduction of treatment, the three groups performed equally in the Introductory Financial Accounting, Computer and Entrepreneurship Achievement Test (IAC&EAT). But the whole scenario radically and overwhelmingly changed when they took the test after administration of the treatment conditions (i.e., during the Post-Test) as can be seen in the Treatment row of Table 2. In the EST Post-Test, the Treatment has 8687.908 Type III Sum of Squares, 2 degrees of freedom, 4343.954 Mean Square and 84.100 F with a probability (Sig) of .000 that is statistically significant. The computed F when the influence of the Pre-Test has been totally eliminated is 84.100 that is statistically significant even at 0.01 alpha. Therefore, the first null hypothesis (Ho:1) that "there is no significant effect of educational software technology on students' learning of Introductory Financial Accounting, Computer and Entrepreneurship" is rejected [$F(2, 116) = 84.100$, $p < 0.05$]. It can as well be seen in Table 2 that the at the Post-Test without the influence of the Pre-Test, the Error (Within group) has 5991.641 Type 111 Sum of Squares, 116 degrees of freedom and 51.652 Mean Square. Since the omnibus null hypothesis (Ho:1) is rejected, there is indeed a statistically significant effect of EST on students' learning of Introductory Financial Accounting, Computer and Entrepreneurship in Nigerian universities. To ascertain the specific pairwise comparisons that differ with an overwhelming preponderance, the ANCOVA results were further subjected to Bonferroni's Multiple Comparisons analysis, and the results are as revealed in Table 3.

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Table 3: Pairwise Comparisons with Bonferroni for testing the second, third and fourth null hypotheses.

Pairwise Comparisons

Dependent Variable: EST Post-Test

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
EST	Blended	6.238*	1.631	.001	2.277	10.199
	Conventional	20.588*	1.635	.000	16.616	24.560
Blended	EST	-6.238*	1.631	.001	-10.199	-2.277
	Conventional	14.350*	1.607	.000	10.446	18.254
Conventional	EST	-20.588*	1.635	.000	-24.560	-16.616
	Blended	-14.350*	1.607	.000	-18.254	-10.446

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

It can be discerned from Table 3 that the EST group (GROUP A) significantly learnt better than the group that blended (Group B) [Mean Difference = 6.238, $p < 0.05$] as well as the Conventional group (Group C) [Mean Difference = 20.588, $p < 0.05$]. The group that blended (Group B) in turn, learnt significantly better than the group that learnt the subject matters via the Conventional method (Group C) [Mean Difference = 14.350, $p < 0.05$].

The second null hypothesis that "there is no significant difference in learning of introductory accounting, computer and entrepreneurship between students who used educational software technology and those who used conventional (face-to-face) teaching method" is rejected as the subjects in Group A that learnt exclusively with educational software technology significantly learnt better than their counterparts in Group B that learnt by blending EST with the conventional teaching-learning transformation methods.

The third null hypothesis that "there is no significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who blended Educational Software Technology with conventional teaching method" is rejected in favour of the subjects who blended.

The fourth null hypothesis that "there is no significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who used only the Educational software Technology only and these who blended Educational Software Technology (EST) with conventional teaching method" is rejected in favour of the former. Subjects in the group that employed only EST method learnt significantly better than their counterparts who learnt by blending EST with the conventional face-to-face methods.

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CONCLUSION

From the findings, it is unequivocal to conclude thus;

1. There is a significant effect of educational software platform on students' learning of Introductory Accounting, Computer and Entrepreneurship.

2. There is a significant difference in the learning of Introductory Financial Accounting, Computer and Entrepreneurship between students who used educational software technology alone and those who used conventional teaching method in favour of the former.

3. There is a significant difference in the learning of Introductory Accounting, Computer and Entrepreneurship between students who blended educational software technology with conventional face-to-face teaching and those who used only the traditional face-to-face method in favour of those who blended.

4. There is a significant difference in the learning of Introductory Accounting, Computer and Entrepreneurship between students who blended EST with conventional face-to-face teaching and those who use only the Educational Software Technology method in favour of the subjects in the group (Group A) that used only EST.

This research is of great significance to the entire education stakeholders at all levels of Nigerian educational system (Kpolovie, 2014; 2012a). To the students; it would save the cost of attending lectures as lessons could be taking at the comfort of their homes. It would enhance collaboration and knowledge sharing from the surplus areas to the deficit units, therefore, giving all the students unlimited access to limitless information (Downes 2017; 2014; Kpolovie & Iderima, 2016; 2016a). To the teachers, it would enable them to deliver detailed lectures in a compressed form even at the comfort of their homes or offices, and enhance objectivity in assessment (Kpolovie & Lale, 2017). To the school management, it would make evaluation of contents and procedures very easy as well as quick access to students and teachers' contents. Parents would also find it worthwhile, it would help them determine the performance of their children, have access to contents of what their wards learn in the university. For the Government, it is the basis of meeting up one of the millennium goals on education, and providing quality higher education for all who are in need as expressed by Kpolovie and Obilor (2013a).

Recommendations made include the following:

1. The universities should key into the pursuit and attainment of the Millennium Goals of 'Education-For-All' which provides for making education more accessible, affordable and liberal by the used of Learning Management System referred to in this study as Educational Software Technology.

2. Universities should set up a committee that will encourage instructors on the use of internet and recommend Educational Software Technology that will be affordable, accessible and most user-friendly. This will help the lecturers and students to be internet friendly.

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3. Teaching instructions, class work, assignments, and tests should be given to students using open educational software in the first instance to widen their horizon of understanding and broaden their learning scope.

4. Students should form reading group and enrol in free courses online, and work assiduously to successfully earn additional certificates from online courses.

5. Free or at least affordable network for fast Internet accessibility should be made available for students and lecturers on all university campuses in Nigeria and at designated areas in every city across the country.

6. Regular, reliable electricity supply should be guaranteed in the country to encourage the use of Learning Management Systems in the Nigerian educational system.

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