



Planning and Designing an Online E- Learning Platform

¹Akanbi, M.B, ²Raji, A.K. & ³Agboola, O.M

¹²³Department of Computer Science

Institute of Information and Communication Technology

Kwara State Polytechnic

Ilorin, Nigeria

E-mail: akanbiforu@gmail.com, kamalayour2004@gmail.com, oladiranagb@gmail.com

Phone: +2348034397941+23408038020843, +2348034094286

ABSTRACT

With the recent closure of all schools and higher Institutions of learning in Nigeria and most parts of the world to prevent the spread of Coronavirus (COVID-19), the federal government has recently directed all Tertiary Institutions in Nigeria to resume Academic session through online teaching to enable students continue their studies as the Federal Government cannot afford to shut schools for a long period. Since physical distancing can curb the spread of COVID-19, e-learning platform to complement traditional face to face teaching methods in the delivery of lectures for Computer Science Department, Kwara State Polytechnic, Ilorin is proposed. The proposed e-learning system allows students to receive lectures and take tests from their remote locations. It also gives room for lecturers to upload their lectures either online or offline and assesses students' performance. Main users' module in the system includes Administrator, Lecturer/Instructors, Lector and Students. The dynamic and flexible nature of the proposed e-learning system has so many advantages over other commercially available Learning Management Systems (LMS) as most LMS have default pre-configured structure. The proposed system was designed and implemented using JavaScript, HTML, PHP and MySQL for Database. Future studies can extend the e-learning system to the whole polytechnic. The e-learning system can also be implemented as Mobile learning system for easy access.

Keywords: e-learning System, Borderless global classroom, Learning Management System (LMS)

24thiSTEAMS GoingGlobal Multidisciplinary Conference Proceedings ReferenceFormat

Akanbi, M.B, Raji, A.K. & Agboola, O.M. (2020): Planning and Designing An Online E- Learning Platform.Proceedings of the 24th iSTEAMS GoingGlobal Multidisciplinary Conference Proceedings. The University of Ghana/Council for Scientific & Industrial Research Ghana – Virtually Stationed in June, 2020. Pp 211-220. www.isteam.net/ghana2020

1. BACKGROUND TO THE STUDY

In recent times, the world has witnessed an increase in the use of computers and internet. This led to the rapid development and utilization of information and communication technologies (ICT) in various Sectors including educational sector. With the help of modern information technology, e-learning and distant education becomes more popular and feasible (Yan, Shang and Liu, 2011). It is an established fact that computing technologies can expand the reach and range of traditional residential colleges, universities and organizational training programs (Jayanthi, Srivatsa, and Ramesh, 2007). ICTs has transformed the way many lectures offer their courses as some have opted for e-learning, while some for blended learning courses in which students attend brick-and-mortar schools where they alternate between online and in-person instruction



Basically, the idea of e-learning is to provide students access to formal education at their own pace and time, as well as lowering the average overall per-student cost (Hew and Cheung, 2013). E-learning is the application of information technology such as Internet, mobile and other computer aided systems in the teaching and learning process, either asynchronously (Asynchronous e-learning is used mainly for content management system where users access information at different times without real time collaborations) or synchronously (Synchronous E-learning also known as pedagogy is designed for online users who collaborate at the same time) (Madar and Willis, 2014). The global demand for higher education is rising rapidly. In the higher education context, e- learning implies the use of flexible learning approaches as well as distance learning, and the use of e-learning technologies as a communication and delivery tool between and among students and instructors to support and improve the management of learning.

The main role of technology in e- learning is to get remote learners into a position to learn as though they were in-campus (Dutta, Mosley and Akhtar, 2011). Apart from making education independent of time and location, e-Learning is becoming a crucial resource for higher institutions as it opens up new possibilities for implementing pedagogical innovations where learners are expected to function as active, independent, self-reflected, and collaborative participant (Hadjerrouit, 2007). Finally, it can help teachers to manage their online courses so that they can create, add, modify, customize, and reuse digital course content and learning objects. e-learning can be used by students for reviewing course materials, forum discussion, lecturer assessment, exams date, publishing marks without reduction of face-to-face class time. e-learning helps students to improve their skills and help them for better understanding. e-learning is the reuse of information and can be presented in different forms such as: text, sound, video, pictures and animation (Abdulazeez, Zeebaree, and Abdullah, 2018). The e-learning information can be stored for long period of time in various formats. The idea of e-learning is to use technology to achieve better outcomes, better engagement and interaction for the new digital generation, effective assessment and more cost-efficient way of bringing the learning environment to the learners.

1.1 Statement of the Problem

According to Elsaadany and Abbas (2016), there are many problems that face traditional academic learning systems. Lectures nowadays at most of the educational institutions require the students to attend the lectures at specific location and time (location & time dependency). Students sometimes cannot attend the lectures as scheduled as they have to bear the time and cost of travelling to the university campus to attend the lectures. Also, lecturers and teaching staff may waste valuable time in marking assignments and quizzes manually while they can spend the time enhancing the course materials. Students may need to review some points from a previous lecture but they cannot find the lecturer at a suitable time. Some lectures take place in big lecture halls and are attended by large number of students where questions of all the students cannot be answered within the lecture.

The students may not have the means to post a question to all the colleges in a particular course. Although there are many e-learning systems existing on the web currently, they commonly present the same materials to all students without considering individual differences and the presented materials in most web-based courses, are only suitable for students who are homogeneous, highly prepared and motivated (Surjono,2011). Dang and Foster (2015) also reported criticisms on how the current teaching with e-Learning systems is often ineffective due to the fact that teachers use a Learning Management System (LMS) to disseminate content without applying any principled pedagogy.



With their default pre-configured structure e.g. structured course content, functional buttons such as discussion, syllabus, and quiz making, a typical LMS supported environment makes it easy for instructors to teach online without needing to work out their own pedagogical style. Based on the variety of problems with the traditional face-face method of teaching and closing of institutions during this COVID-19 pandemic, there is the need to develop e-learning system for higher institution of learning.

1.2 Aim and Objectives

The aim of the study is to develop an online e- learning platform for Computer Science Department ,Kwara State Polytechnic, Ilorin. The specific objectives are to:

1. develop a robust package that would create a medium for leaning, in line with the Federal Government directive to prevent the spread of Coronavirus (COVID-19), that get students from their remote locations into a position to learn and take exams as though they were in-campus.
2. create an environment for lecturers to load their lectures either online or offline and assess students performance to improve the quality of graduates by utilizing modern instructional materials and methods, including increased use of ICT.
3. design and implement e-learning platform to complement traditional teaching methods in the delivery of courses to students to provide greater access to Higher education and find solutions to the challenges posed to the Institution's school calendar by Coronavirus Disease (COVID-19) pandemic.

2. RELATED WORKS

The internet provides opportunities for the development of a 'borderless global classroom' where individuals can learn from distant locations, at different times, and at their own pace (Gupta, Marsden, Oluca, Sharma, and Lucas, 2017).e- learning can assist the students to be more involved in learning. It also allows for collaboration between teachers and students practically. The selection of learning methods, learning techniques, learning strategies, learning facilities, motivation and interest of students in learning are some of the factors that influence the success of learning process (Ismarjati, Rusdin, Herawati, Nurulia, Sulisworo and Fayanto, 2019). In Gupta, et al. (2017), it was reported that factors like cost implications associated with both the initial acquisition of required hardware and software, its long term maintenance and eventual replacement are often not sufficiently considered.

The researchers also argued that in some cases where financial constraints are met, lack of suitably qualified and experienced personnel may be a serious limitation, given that the success of e-learning projects is often dependent on the skills and quality of technical support provided to end-users. Furthermore, without such support, the ability of even the most enthusiastic teachers and students to access and use the technology effectively may be severely hindered. Users need continuous and timely help from technical departments, which may prove very difficult to provide when resources are severely limited. According to research carried out by Eze, Chinedu-Eze and Bello (2018), It was revealed that while some believed that e-learning and 'face to face' method complement each other as e-learning cannot be chosen over 'face-to-face' method but they support each other, others are of the opinion that they still prefer the face-to-face method of delivery to e-learning.

Students could share knowledge among each other by sharing their answers to the discussion assignments, create educational quizzes and shared them with the rest of participants, and also could use private communication among themselves and instructors. As a result of evaluation in Abdulzeez, Zeebaree, and Abdullah (2018); about 78% of students thought that the Facebook is useful in learning process and the 55% thought that the Facebook is helpful in learning and teaching.



The researchers stressed that, the social networks such as Facebook could be helpful and useful in E-learning, but the main drawback was that, the institution could not depend on Facebook as an official system. It just could be used for discussion and knowledge sharing. Hence it is impossible to keep data for long time to be used later for statistical purposes. Many research has been carried out on the field of e- learning.

Abdulazeez, Zeebaree, and Abdullah (2018) proposed implemented a e learning system which was tested practically on six institutions located at three different campuses: Duhok, Zakho and Shekhan. The students and staff of the selected institutions participated in the implementation and the obtained results was evaluated by using System Usability Scale (SUS). The evaluation score of the questionnaire was (71.82%) which can be considered as a good percentage. The proposed system has been designed and implemented using the tools: (MySQL, HTML, CSS, PHP, JavaScript, JQuery, Ajax and Bootstrap). Elsaadany and Abbas (2016) designed e-learning system using off-the-shelf and open-source software engineering model, programming tools and database models. The system was tested to prove the new design concepts and features. The method used in the back-end and front-end design and implementation allows flexible usage and integration of the e-learning systems by the educational institutions in smart cities.

Madar and Willis (2014) came up with a Funnel model in place of other models which has made other systems unused or inefficient, and compromised educational quality. Therefore, the proposed Funnel model should help tertiary education institutions adopt and develop effective and efficient E-learning system which meets users' requirement. Eze, Chinedu-Eze and Bello (2018) adopted a qualitative approach to investigate the adoption and utilisation of e learning facilities by lecturers in a Nigerian private tertiary institution using 15 semistructured interviews from the academic staff of M-University. Raw data gathered were analysed using data driven thematic approach (a similar approach to grounded theory).

The findings revealed that M-University's e-learning facilities are adequate and accessible to users, and most teachers are comfortable with utilisation of various facilities during classes compared to most public tertiary institutions although, the utilisation has not been maximised. Štěpánek and Šimková (2013) created a system that allows lecturer to create quizzes and observe students success.

The proposed E-learning system also offered graphs and charts of student's results. This system was based on linear workflow that means students can see new learning resources and tests only after the previous test was done. Students can also create their own learning plan by defining dates. System was able to export this plan into general calendar format or remind students via e-mail. The research described process of design and creation of e-learning system with all mentioned features.



3. METHODOLOGY

The proposed system consists of modules that provide four groups of services. First group relates with student services: Lecturers Feedback, Discussion Forums and Course materials that include: Lectures, Assignments, Schedules, Marks and Objections. Second group relates with department services: Academic Staff Authentication, Students' result, Clearance and Training. Third group relates with Lecturer: Preparing Course Materials and Discussion Forums. And fourth group relates with institution services: Exam Committee, Quality Assurance, Curriculum and Statistics.

The requirement analysis for the development of e- learning is as follows:

1. Users

There are four types of users in the system:

- a. **Administrator:** Administrator has control over all entities used in the system. Administrator also creates courses, learning materials and tests.
- b. **Lecturer/Instructors:** Upload lectures, give instruction to students.
- c. **Lector:** Lector cannot create courses or tests. His role is only for observing students results. Lector can see all tests done by students, overall charts, group average etc
- d. **Students:** Students are ordinary user of the system. Their role is based on studying learning materials and doing tests.

2. Learning materials

Learning materials are provided in combined form. Each learning material contains multi-media presentation and additional files like PDF etc. After studying the learning material, student must do a test. Test contains single choice, multiple choice and open questions.

3. Test and Grading

System is able to create tests for students.

4. Students' progress observing

The system provide set of tools for observing progress of students. The main idea is observing and early warning will help teaching assistant to solve problems the better way.

5. Learn process planning

System provides learn process planning which specifies dates when learning task will be done. This learning plan must be created for each subject in which student is subscribed. System will automatically remind student to upcoming events.

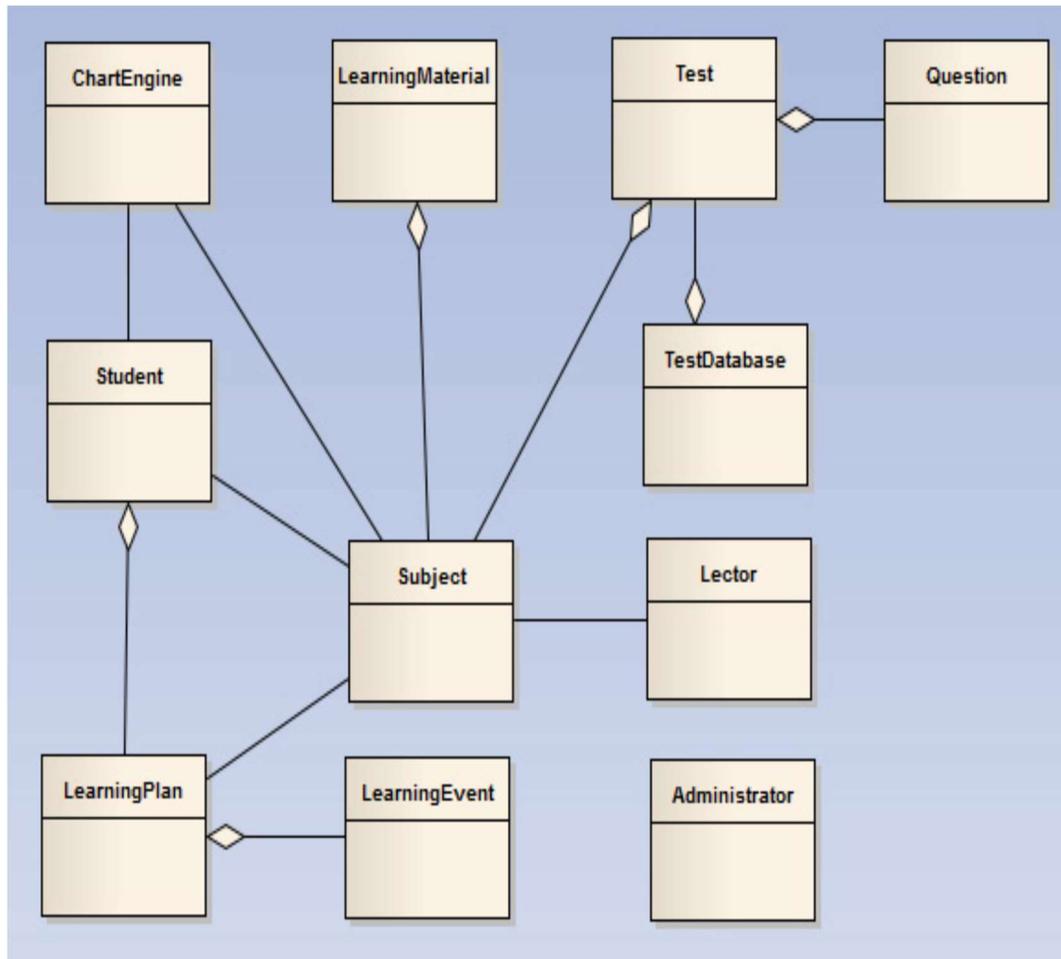


Fig1: Architectural Design of the proposed System (Source: Stepanek and Simkova, 2013).

3.1 System Implementation Requirements

What follows are system implementation requirements

Hardware Requirements

1. 2 Set of Corei7 Laptop Computers
2. Internet MiFi Router

Software Requirements

1. Windows Operating system(Windows 10)
2. Web site Design Software
3. MySQL Database Software
4. Web Browsers
5. HTML
6. e-books to be procured online and learning materials



3.2 Cost Implications

Below is a table showing cost implications

Table 1: Estimated Cost of Hardware

S/No	Description	Quantity	Estimated Unit Price (₵)	Estimated Cost (₵)
1.	Core i5 HP Laptop with 2.4 GHz, 6.0 GB RAM and 1TB Hard Disk Space.	2	180,000:00	360,000:00
2.	4G Internet MiFi Router	4	100,000:00	400,000:00
3.	DeskJet A4 Printer	1	80,000:00	80,000:00
5.	HP Scanner	1	50,500:00	50,500:00
Sub-Total A				890,500:00

Table 2: Estimated Cost of Software

S/N	Material	Quantity	Estimated Unit Price (₵)	Estimated Cost Price (₵)
1.	Window 10 Operating System	1	Pre-installed	Pre-installed
2.	Window 2016 Server Network Operating System	1	150,000:00	150,000:00
3.	Internet Explorer	1	Pre-installed	Pre-installed
4.	Program Design and Development	1	Designed by the Researchers	Designed by the Researchers
5.	Licensed Adobe Dreamweaver CS6	1	85,000:00	85,000:00
6.	Licensed Adobe Flash MX,	1	50,000:00	50,000:00
7.	Adobe Fireworks	1	46,000:00	46,000:00
8.	Licensed MS Office 2013(Microsoft Access and FrontPage)	1	83,000:00	83,000:00
9.	Norton 360 Anti-virus and Internet Security	2	30,000:00	60,000:00
10.	System Integration and Implementation	1	Designed by the Researchers	Designed by the Researchers
11.	System Networking and Configuration		100,000:00	100,000:00
12.	Client and Server side Scripting Language (Php and JavaScript)	1	102,000:00	102,000:00
13.	Dedicate Cloud Server Web Hosting with 4 Cores, 500GB Storage, 4GB RAM, 5TB Bandwidth and 2.4GHz for 3 Years	-	1,200,000:00	1,200,000:00
14.	Secure Sockets Layer (SSL) Certificate and Transport Security Layer (TSL) for Offline Database Synchronization with Daily Backups.	-	250,000:00	250,000:00
15.	Server/Web Pages Maintenance and Management, Consultant Backup and Miscellaneous.	-	300,000:00	300,000:00
Sub Total B				2,426,000:00
Grand Total = Sub-Total A + B				3,316,500:00

5. DISCUSSION OF FINDINGS

The proposed e-learning system delivers lectures in courses to utilize blended learning methods mixed with deployment of streaming video solutions whereby all courses will have not less than 7 levels, and short test after all levels of the lecture. The students can ask questions after each class and submit assignments. New courses can be added and students can be graded.

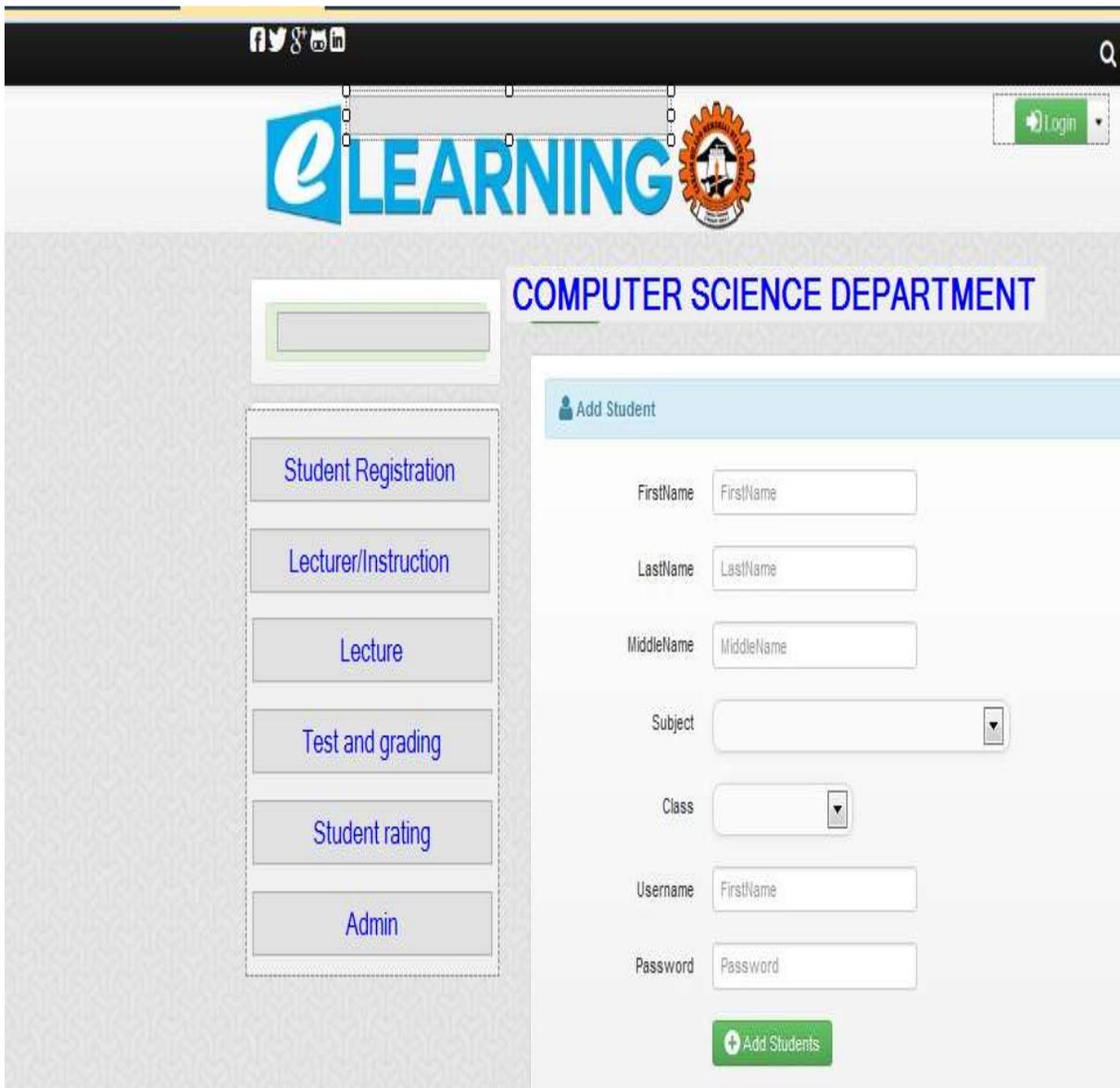


Fig 2: Interface showing the modules in the e-learning system

Results show that e- learning assisted the students to be more involved in learning. Although e-learning cannot replace the traditional method of teaching 100%, it allows for collaboration between teachers and students practically.

6. CONCLUSION

In higher Institution of learning, there is considerable enthusiasm for the idea of using new technology both to enhance the experience of their own students and to make their courses available to a much wider audience. Since no one knows when the Coronavirus (COVID-19) pandemic will end, the study designed and implemented an online e-learning system in Computer Science Department, Kwara State Polytechnic, Ilorin to allow students learn from their respective locations without being physically present on campus in line with the Federal Government's directives.

The system's software and hardware requirements as well as the estimated costs for the online e-learning platform were presented. With the new system, a student can receive lectures, take tests and access previously asked questions from previous offerings (semesters) as there are recordings of this history.

7. CONTRIBUTIONS TO KNOWLEDGE

E-learning systems can be used to facilitate students' learning process by enabling the students to navigate through the system and access scientific materials available there. After the students registered to the system, they could follow course activities, collaborative with other students, discuss with tutor, download lectures and assignments, carry out self-tests and join exams. The e-learning system proposed for Computer Science Department can also be implemented by the Polytechnic.

The following recommendations are suggested for Kwara State Polytechnic, Ilorin:

- i. The e-learning system is expected to be economically and academically useful to the entire Polytechnic, It is therefore recommended that Kwara State Polytechnic should have one.
- ii. The e-learning system if implemented will promote the image of the Polytechnic and will also move other Polytechnics and other higher Institutions of learning in the state to implement such e-learning systems.

REFERENCES

1. Abdulazeez, A. M, Zeebaree, S. R. M and Abdullah, A.I (2018) Design and Implementation of Electronic Learning System for Duhok Polytechnic University. Academic Journal of Nawroz University (AJNU) Volume 7, No 3 pp 249-258.
2. Dang, T.C and Foster, J. (2015) Implementing e-Learning in a Vietnamese University: A Configurational Approach. In Conference 2015 Proceedings, pp1-13.
3. Dutta, A.K, Mosley, A and Akhtar, M.M (2011) E-learning in Higher Education: Design and Implementation, International Journal of Computer Science Issues (IJCSI), Vol. 8, Issue 4, No 2, Pp 509-516.
4. Elsaadany, A. and Abbas, K.(2016) Development and Implementation of E-Learning System in Smart Educational Environment, 39th International Convention on Information and Communication Technology, Electronics and Microelectronics(MIPRO), pp 1004-1009.
5. Eze, S.C, Chinedu-Eze, V.C and Bello, A.O (2018) The utilisation of e-learning facilities in the educational delivery system of Nigeria: a study of M-University, International Journal of Educational Technology in Higher Education, pp 1-20.



7. Gupta, M., Marsden, S., Oluka, T., Sharma, R. and Lucas, H. (2017) Lessons Learned From Implementing E-Learning for the Education of Health Professionals in Resource-Constrained Countries, *The Electronic Journal of e-Learning* Volume 15 Issue 2 , pp144-155.
8. Hadjerrouit, S. (2007) Applying a System Development Approach to Translate Educational Requirements into E-Learning, *Interdisciplinary Journal of Knowledge and Learning Objects*, Vol.3, pp 107-134.
9. Hew, K.F and Cheung, W.S (2013) Designing and Implementing e-Learning Courses: A Comparative Analysis of Policy Guidelines from Nine Professional Organizations, *International Journal of e-Education, e-Business, e-Management and e-Learning*, Vol. 3, No. 3pp 178-182.
10. Ismarjati, M.T.N, Rusdin, M.E, Herawati, R., Nurulia, E. Sulisworo, D. and Fayanto, S. (2019) Implementation of E-learning Using Schoology to Improving the Interest Learning Physics at DeBritto High School, *International Journal of Research and Innovation in Social Science (IJRISS)* Volume III, Issue VI, pp 185-189.
11. Jayanthi, M.K, Srivatsa, S.K and Ramesh, T. (2007) Object Oriented Analysis and Design of e-Learning System, *Information Technology Journal* 6(6) pp 818-826.
12. Madar, M. J and Willis, O. (2014) Strategic Model Of Implementing E-Learning, *international journal of scientific & technology research (IJSTR)* volume 3, issue 5, pp 235-238.
13. Surjono, H.D (2011) The Design of Adaptive E-Learning System based on Student's Learning Styles, *International Journal of Computer Science and Information Technologies (IJCSIT)*, Vol. 2 (5), pp 2350-2353.
14. Štěpánek, J. and Šimková, M. (2013) Design and implementation of simple interactive e-learning system, *Science Direct*, pp 413 – 416.
15. Yan, S., Shang, J. and Liu, L. (2011) Design and Implementation of Status Monitoring System for E-Learning Web Service, *Communications in Computer and Information Science*, (CCIS), pp. 158–165.