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Design and Implementation of a Prototype Integrated Web-Based Virtual Classroom

[1]*Akinyemi I. O.,* [2]*Afolabi I. T.,* [1]*Taiwo, O. and* [3]*Agono F.*

[1]Department of Computer Science and Mathematics,
Mountain Top University, Ibafo, Ogun State, Nigeria.

[2]Department of Computer and Information Sciences,
Covenant University, Ota, Ogun State, Nigeria.

[3]Department of Computer Science,
Landmark University, Omu-Aran, Kwara State, Nigeria.

Abstract

The penetrating influence of Information and Communication Technology (ICT) in education has over the last few decades revolutionized education by bringing some drastic changes to the methods of teaching and learning. Nevertheless, a number of challenges are still imminent for the African countries especially Nigeria and some other developing countries because very many of the institutions are still using the traditional classroom method of lecture delivery where course materials are given by the lecturer at the instance of time in a particular location. This situation more often than not, imposes a number of constraints such as time and place on both the instructor and the student, hence their inconsistencies in the pedagogy and learning style due to repetitive nature of teaching/learning. To this end therefore, this paper presents a conceptual approach to develop a virtual classroom system to enhance learning on campus, which we referred to as learning varsity in this work. The system was developed using PHP and MySQL as server-side programming and database respectively. The web-based virtual classroom provides a web enabled interactive learning environment in making education accessible and available to students by providing educational services.

Keywords: Virtual classroom, e-learning, education, teaching.

1. Introduction

The essence of teaching in any society is to impact knowledge which is engendered through comprehensive lecture materials and effective delivery (Rufai, *et. al.*, 2015). The evolvement of new technologies to learning in the educational system has brought about paradigm shift from the conventional classroom system to a more interactive computer-based system for resource sharing, learning and collaboration between learners and teachers (Olayiwola, *et. al*. 2014).

Nowadays, teaching and learning practices are based on the information transfer prototype where information is transferred from the teacher to the student via electronic means called electronic learning. The electronic learning (e-learning) has become the most important standard of interactive learning and knowledge sharing (Ibam, 2012). The growing popularity of e-Learning has introduced a new term to education – the virtual classroom. A virtual classroom is a collaborative teaching tool to assist the students to learn in an interactive manner. Virtual classroom platforms provide collaborative learning facility, which is an integral component of teaching and learning system as well as instant feedback with facilities like e-mail, wikis and bulletin board at the disposal of teacher and

the students (Akinyokun & Iwasoku, 2014). It has evolved to cater for the high demand for education and learning so as to alleviate the numerous challenges associated to traditional classroom teaching (Obasa, *et al.*, 2011).

This paper provides a web-based learning environment in which the course material is presented using the advantages of multimedia and hypermedia. The rest of this article is organized as follows: Section 2 describes the related works. Section 3 depicts the architectural framework. The system design and implementation is discussed in section 4 and section 5 concludes the paper.

2. Related Works

Virtual classroom is an integrated digital system propelled by computer-based system to support teaching, learning and academic research collaboration in a learning system. A virtual classroom not only makes course materials available to the learners, but also provides a live, contextual and interactive environment for them. In addition, teachers can control the learning and teaching process as they do in the traditional classroom (Yang & Liu, 2007).

Several research works have been carried out in time past on the fundamental benefits of virtual classroom in order to make learners and teachers more objective. However, there is no one, single way to implement a virtual classroom. There are various mechanisms that can be employed to implement a virtual classroom as done by educators. Hiltz (1988) accentuated collaborative learning for implementing virtual classroom. Bower (2006) used the Macromedia Breeze meeting platform to implement virtual classroom. Similarly, the idea of deploying group work activities in synchronous online classroom spaces was investigated by Bower (2007). Also, Koppelman and Vranken (2008) used synchronous technology to implement the virtual classroom. A virtual classroom that combines both synchronous learning and asynchronous online interaction was proposed by Mahesh *et al.,* (2011). In their work, a number of modules were developed for live video lecture, audio and students-teacher feedback but with a shortcoming of not having email and SMS functionalities. HarshitYadav, *et al.,* (2012) developed an intranet-based virtual classroom system that facilitates the interactions between students and teachers in the version of a real life classroom. The system provides life streaming of lectures that allow upload of assignments as well as questions and answers. A web-based virtual classroom system that serves as a learning platform with events based synchronous and asynchronous modes wash presented by Akinyokun and Iwasoku, (2014). The work of Barney, *et al.*, (2016) gave a description of student

teachers undertook classroom role plays within the VirtualPREX virtual classroom environment in Second Life, where majority of students found the role plays valuable, with the opportunity to experience being in the role of a teacher, practise in responding to student behaviours, and experience in playing the role of school students we found valuable.

3. The Architectural Framework

The web-based model architecture for the virtual classroom being proposed in this paper is a modified Maye's e-Learning Model (Rufai, *et. al., 2015*).
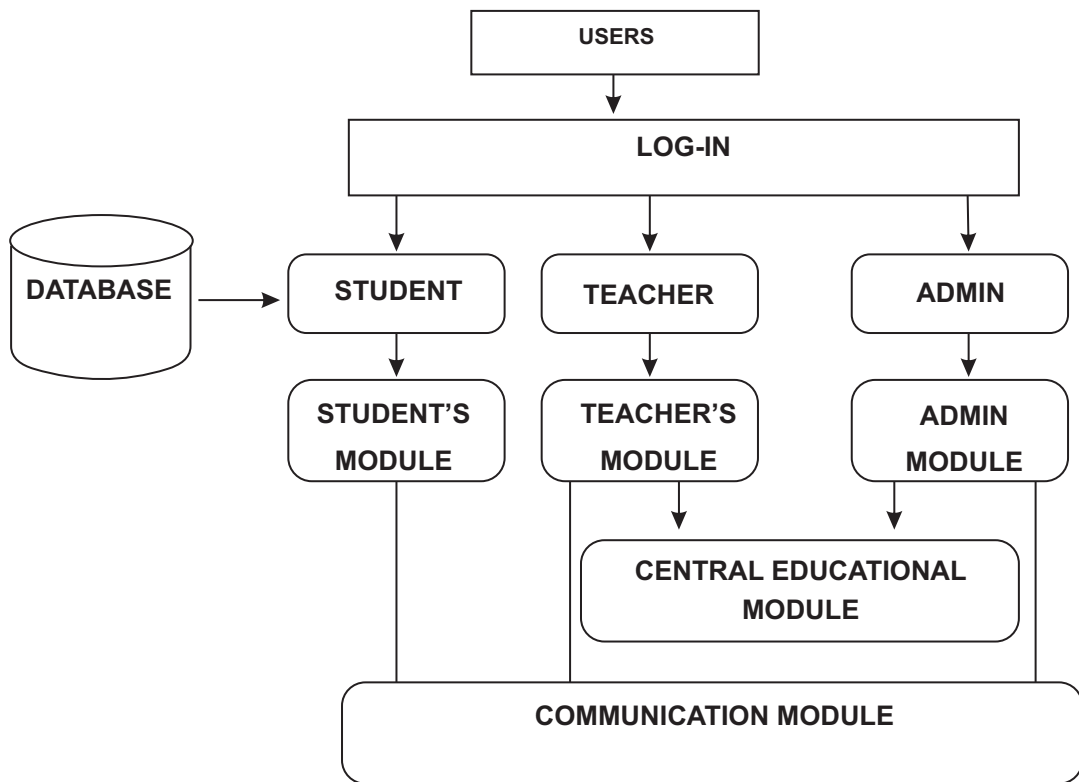

Figure 1: Architecture of a Virtual Classroom

The model revolves round three phases. The first phase is called **e-learning conceptualization phase**. This phase provides the learners with the content of what they need to learn and understand. Here, the lecturer uploads resources, such as PowerPoint files or word handouts to a Web Based Learning Environment (WBLE). The second phase is the e-learning construction**.** This phase provides learners with meaningful online tasks that allow them to apply the concepts outlined to them in the conceptualization phase. This usually take the form of online self-marking tests which then provide students with feedback based upon their responses or final score. The third phase is the e-learning dialogue phase where learning actually takes place using computer-based technology.

4. System Design and Implementation
4.1 System Design

The main idea in the VC design is that users can log on from anywhere within the campus and utilize the resources of the VC. There are three categories of users that can participate in the VC, they are: The Administrator, The Lecturers and The Students as represented in figure 2.

Figure 2. The Use – Case Diagram
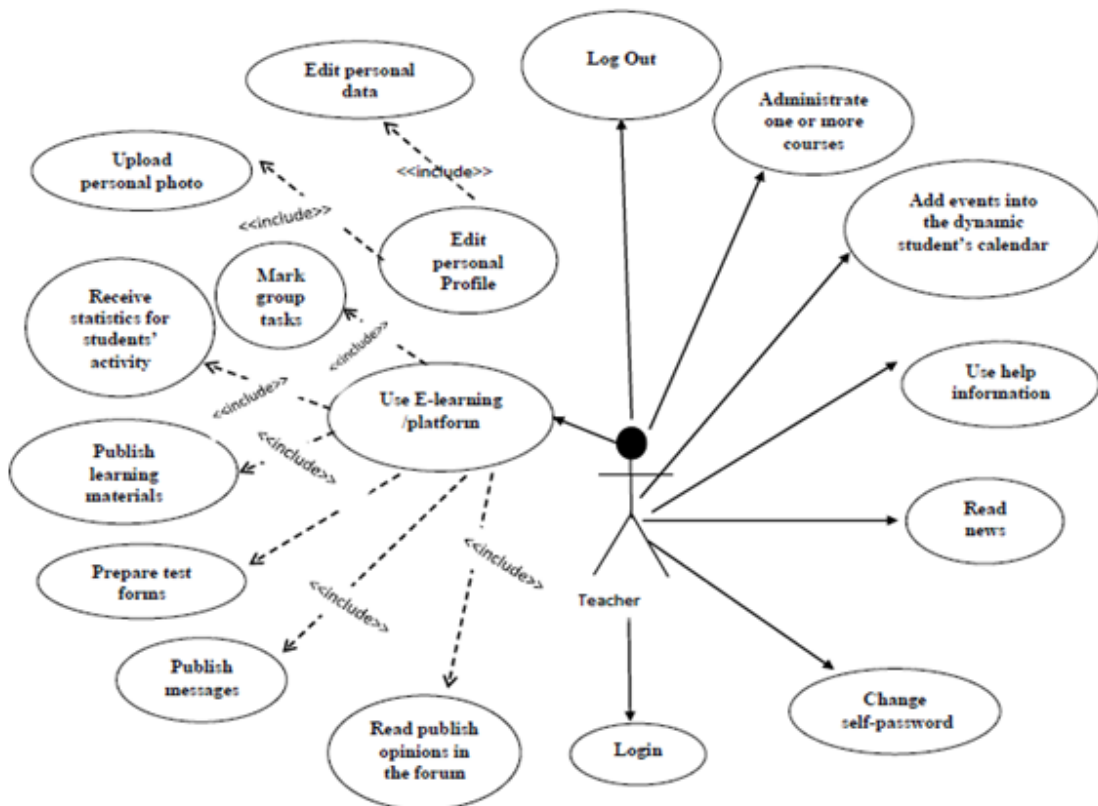
The Use – Case Diagram described the interaction and collaboration that takes place in the proposed virtual classroom model. The diagram spelt out the responsibilities assigned to each category of users. The application models a web-based student course delivery system and its application interface is presented to the students through a web site where students interact with the application using a web browser. The application presents the student a catalog of courses for selection and registration. New students are required to register using administrator assigned username and password. The Administrator is saddled with several responsibilities such as Creation and editing of user's account, Course creation and deletion, Administration of Instructor/Teacher accounts, Editing of the site-wide settings like themes, among other things. The lecturers post notes, create collaborative class, manage student discussion, post assignments, mark assignments and manage announcements. The students (main users) view notes, join collaborative class, engage in discussion, view assignment and published answers for assignments.

4.2 Implementation Details

The technological approach adopted for the development of the Virtual Learning System (VLS) is an integration of web technology, database technology and programming technology, using open source solution (Apache, MySQL and PHP) running on Windows 9x/NT environment. The VL service is as shown in figure 3. The Implemented VLS is modular with various interfaces and each depicting the connection between the system and the user. The application functional modules that have been identified with responsibilities in the system design are given thus:

a. **User registration module:** The application tracks student information. This includes a student id and password and various types of contact information (email addresses, phone number, and so on). Student information is in the database.

b. **Course registration module:** The application allows the user to search for courses and be able to display details of individual courses. The catalog includes descriptions of individual course offerings.

c. **Assignment module:** The application enables students to upload written assignment to the lecturer. It also allows course-teacher to grade assignment and publish the result to students.

d. **Chat module:** A chat module is used for live-time discussions. Chat is a very efficient way to have real-time discussions.

e. **Lessons module:** This feature allows for the addition of lessons

that guide the student based on the student's answers. It might be helpful to think of a lesson as a kind of flowchart.

f. **Search result**: The queries sent into the system have the related results displayed here. Thereafter, the student selects the desired material (audio or video), and it can be viewed and downloaded at will.

On accessing the system, the landing post is the home page. The home page basically contains the login panel; create account link (for first time users of the system), a post saying welcome to LEARNIVERSITY and a background image. At the home page, a registered user can login to access the facilities available on the system. A new user will have to register before he/she is given access to use the system. The entire representation of the system design is as shown in figure 3 below while the video preview page that present the video resource is as depicted in figure 4.
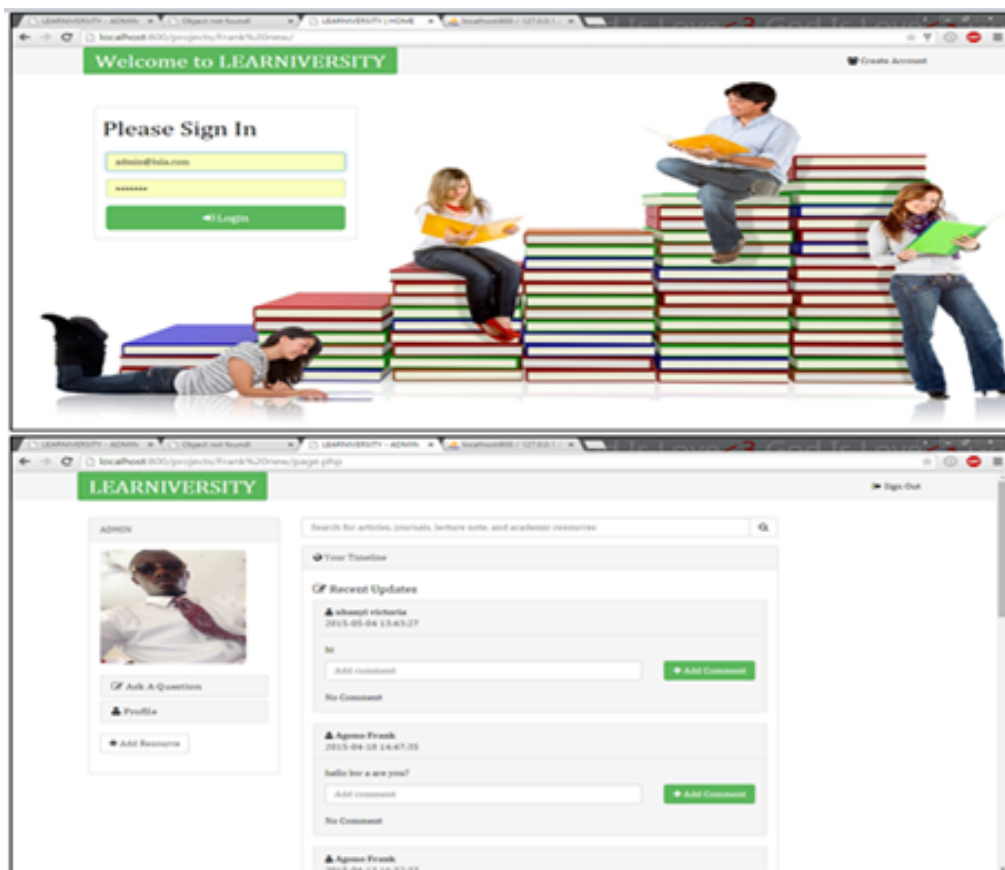

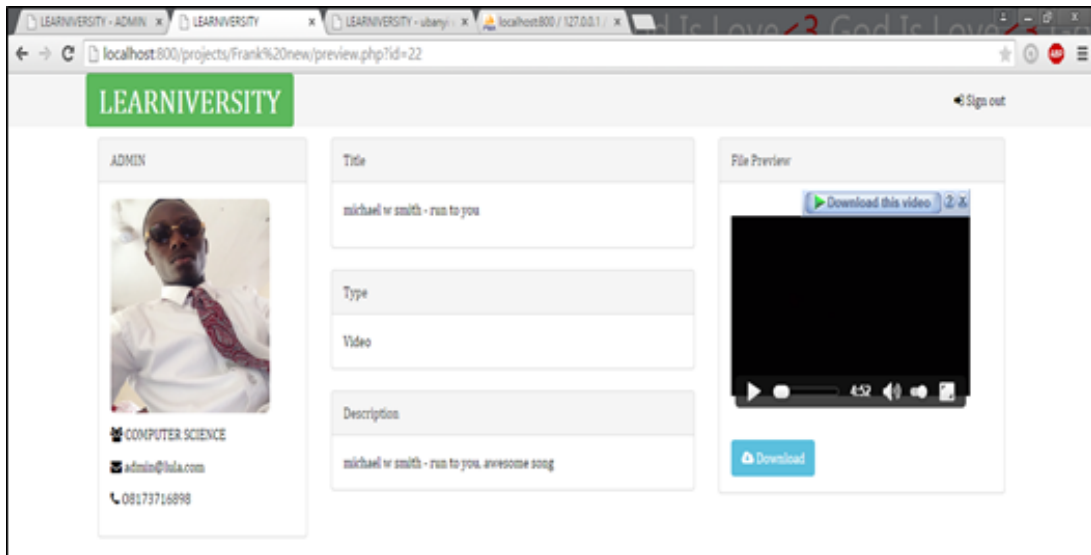**Figure 3:** A Representation of the System Design

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Figure 4: Video Preview Page

5. Conclusion

In this work, a virtual learning system called learniversity has been developed. It is a web-based learning platform that uses the advantage of the internet resources to make learning available to students, lecturers and other interested member of any community regardless of their current geographic location and financial budget any time of the day. It serves as a complement measure to the efforts of the lecturers and provides lecture materials with just few clicks of a button

Further research work can be done in the evaluation of assignments given to learners. Oral and essay questions can be introduced and assessed at real time so that learners get to view their results immediately after assessment. Also, live experiments and demonstrations can be included so as to have a rich knowledge base for courses with practical content. This feature should be made available for both the learners and lecturers.

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