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An Interactive Virtual Classroom System for University Education

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Abstract

Knowledge transfer is an essential ingredient in the development of any country or society. Its effectiveness is determined by the actual assimilation of the subject matter or learning performance by the beneficiaries. This is a problem due to the large number of admissions into higher institutions in this part of the world. This project seeks to solve this problem by presenting an interactive virtual classroom for Electrical Engineering degree course; which will definitely be applicable to any degree with a little variation. The program was designed using computer programming languages and web technologies such PHP, MySQL, etc. The students' response to the work showed that over 50% agreed that the program was easy to use and efficient.

Keywords: Virtual, Classroom, Web-based, Learning, knowledge.

Introduction

Engineering as a field of study seem to be one of the viable fields in the educational sector. This has resulted to the large number of JAMB applications into this field of study in tertiary institutions in Nigeria. However, with the globalization of the world system, Information Technology (IT) has taken over a lot of human processes and in turn is solving a lot of problems in every sphere of life such as Virtual shopping etc. According to Enoch and Saturday, (2016), the quest for knowledge is increasing in an alarming gradient; including the use of digital technology

Virtual Classroom is a learning environment created in the Virtual Space. This is a classroom that separates the student and the teacher by time and space and it is comparably less expensive than other modes of learning in higher institutions (Siddiqui, 2013). As a matter of fact, many higher institutions urge faculties to create online versions of their courses (Dutton et al, 2002 cited in Yilmaz, 2015). Most of the very large colleges and universities such as Princeton University, Rice University, University of Derby, Vassar, and Open University (UK) use the virtual classrooms – "Second Life", WebCT, Moodle, eFront, ATutor, WebEX (Siddiqui, 2013). It is gradually being adopted by most developed countries and developing countries to enhance knowledge transfer and effective learning. Countries such as India has adopted Virtual Classroom as an alternative way of learning. Virtual Classroom could be web-based, or software-based which can be executed after downloading. In this mode of learning, the teacher and the students log into the virtual environment at the same time which could be termed as synchronous learning. Multiple synchronous technologies is usually adopted; such as live streaming, video conferencing, web conferencing, web-based VoIP. It could be presented asynchronously using communication tools like chat capabilities, message boards etc.

Relevance to Educational Growth

Education is key to the developmental stages of every individual and learning is the evidence of knowledge transfer. Virtual classroom is a form of distance learning and the way knowledge is been transferred determines the terminology used such as: e-learning, distributed learning, networked learning, tele-learning, virtual learning or web-based learning (WCET, 2004 cited in Yilmaz, 2015).

In order to replace or supplement for a physical learning or asynchronous learning, synchronous technologies are adopted because it can add value to teaching and learning models (Schull et al, 2007). It is important to note that students tend to interact more over the course as the course progresses because they were comfortable using technology while learning (Tsui and Ki, 1996 cited in Yilmaz, 2015). This can yield more qualified graduates in their

different field of study if properly and adequately deployed in any institution. Learning is also encouraged irrespective of the location of the individual. Also, Virtual classroom enhances collaborative learning process.

In most of the developed countries, there is high disparity of teacher and students ratio as well as less teaching facilities. This mode of learning will help to minimize some of the challenges of educational growth in Nigeria. It can help students think more independently thereby moulding a good and outstanding graduate; most times, their relationship with teachers are not parasitic.

Materials and Methods

In this paper, the following web technologies were deployed:

PHP, an open source programming language was used for scripting the server-side.

MySQL, an open source database structured query language was used in writing the database queries on web-based applications.

HTML (Hypertext Markup Language) was used to create the web page

WAMP (Windows, Apache, MySQL, PHP) Server was used for testing the web application on the local machine

Notepad++, an editor used for writing the web page script

The method used is the Object-Oriented paradigm which involves the identification of Nouns, Actors, attributes etc.; and informed the decision to create Classes and Objects and Methods.

System Design

The system was designed using the Unified Modelling Language such as Use Case Diagrams, Class Diagrams; and Entity Relationship Diagrams for the Database design. A Use Case Diagram was designed to show the actions and interactions to be performed by actors or another system in the system. Figure 1 shows a detailed behavioural description that can be performed by the actors in this system. In other words, it shows the functionality of the system. A Class Diagram shows the structure of the software system, thereby describing the system with Classes, their Attributes, Methods and also show the relationship among objects. Figure 2 shows the structured description of this system with thirteen (13) Classes and their Attributes/Methods. The Database Design shows the Entities which represent the tables and how they are related to enable interactions among tables and the system. Figure 3 shows the Database design for this system with detailed representations of each table and their corresponding fields. This will support data manipulation in the system.
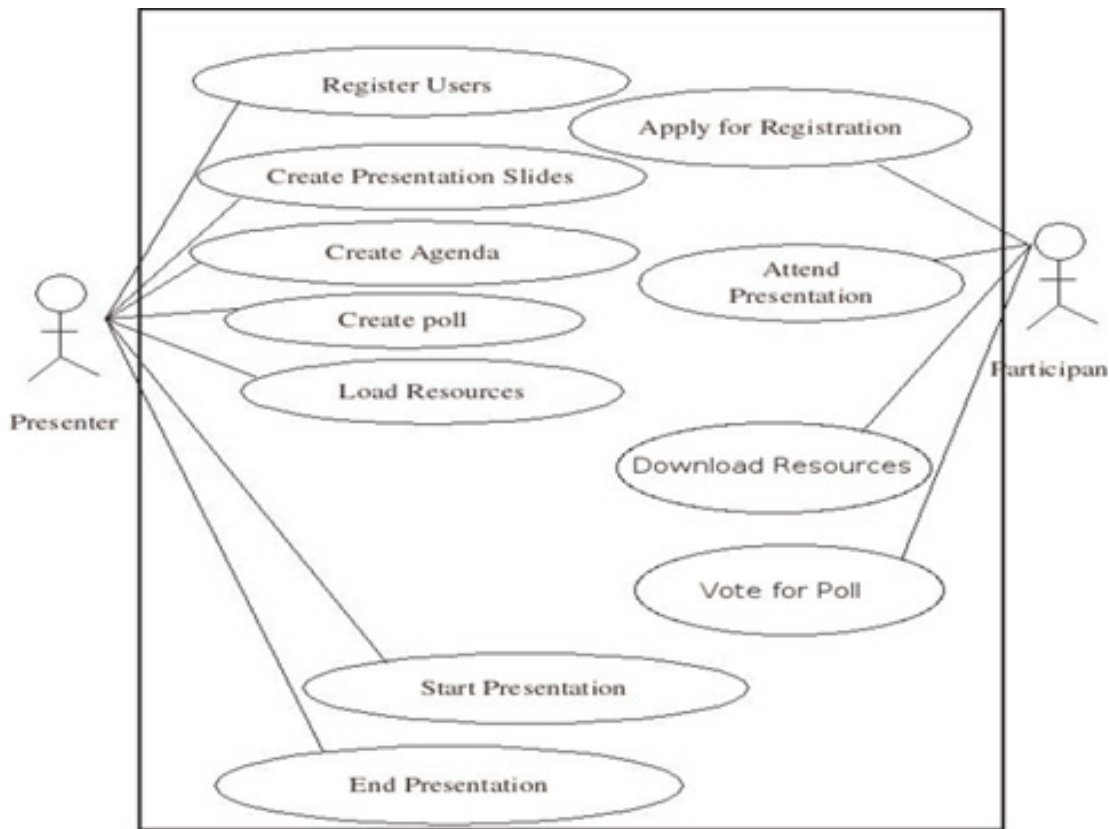

Figure 1: Case Diagram for Virtual Classroom

Figure 2: Class Diagram for Virtual Classroom

Figure 3: Entity Relationship Diagram for Virtual Classroom

Implementation

The implementation of this Virtual Classroom system development, an integration of web-based technologies, database technologies and programming will help to achieve a functional system. PHP, MySQL and HTML which are open source were used to implement this system. The system was deployed and tested on a local machine using WAMP as the local server; all running on Windows Operating System. As shown in figure 4, an interface for user login, the presenter or participant can login to the system application with a username and password. Figure 5 shows the interface for creating a new classroom so that partici-pants can join the classroom for a particular course. This interface has features that can aid the presenter to append assignments for students, notices, manage number of students for the course etc. Figure 6 shows an active classroom; describing the objectives of the course, the students involved in the classroom, the presenter of the course, tab to upload materials for the course etc. Figure 7 affords the participant (students) to test his/her knowledge on the course in which a question can be displayed with optional answers, so that a participant can choose from the options. Also, all recent questions are logged to enable the participants know the recent questions that has been answered.

Figure 4: Presenter and Participant login screen
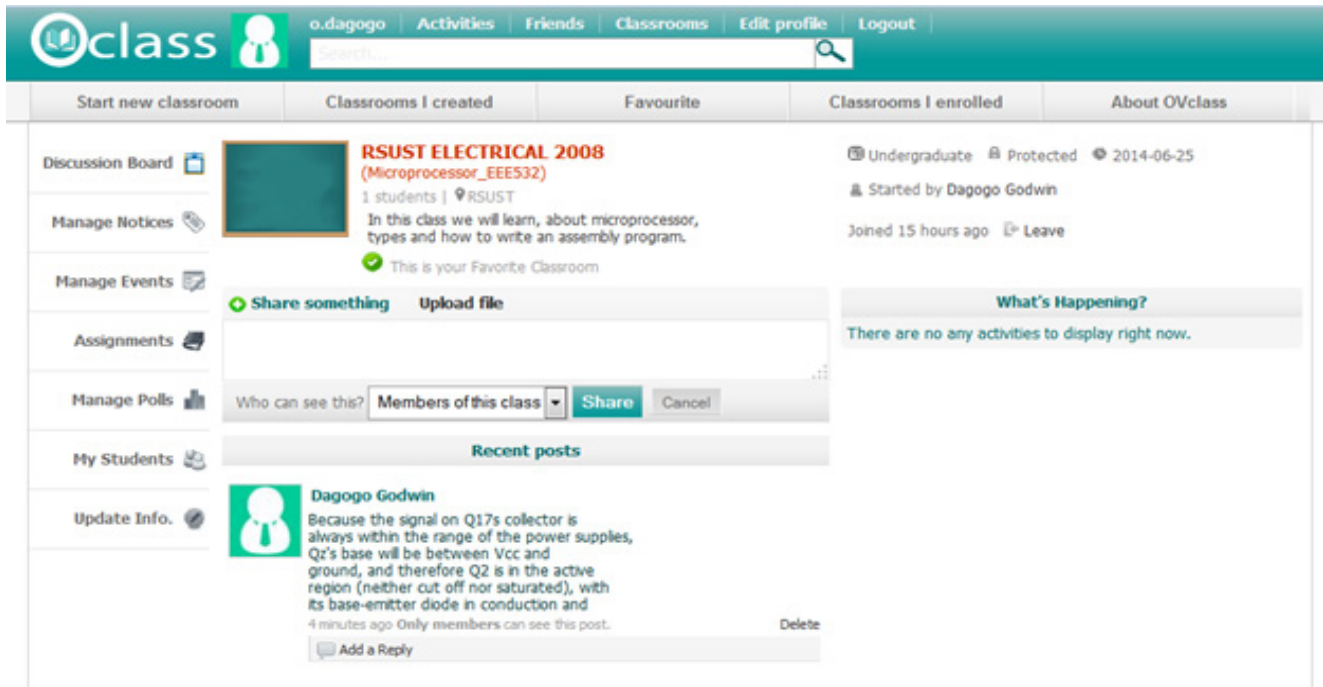

Figure 5: Virtual classroom setup page

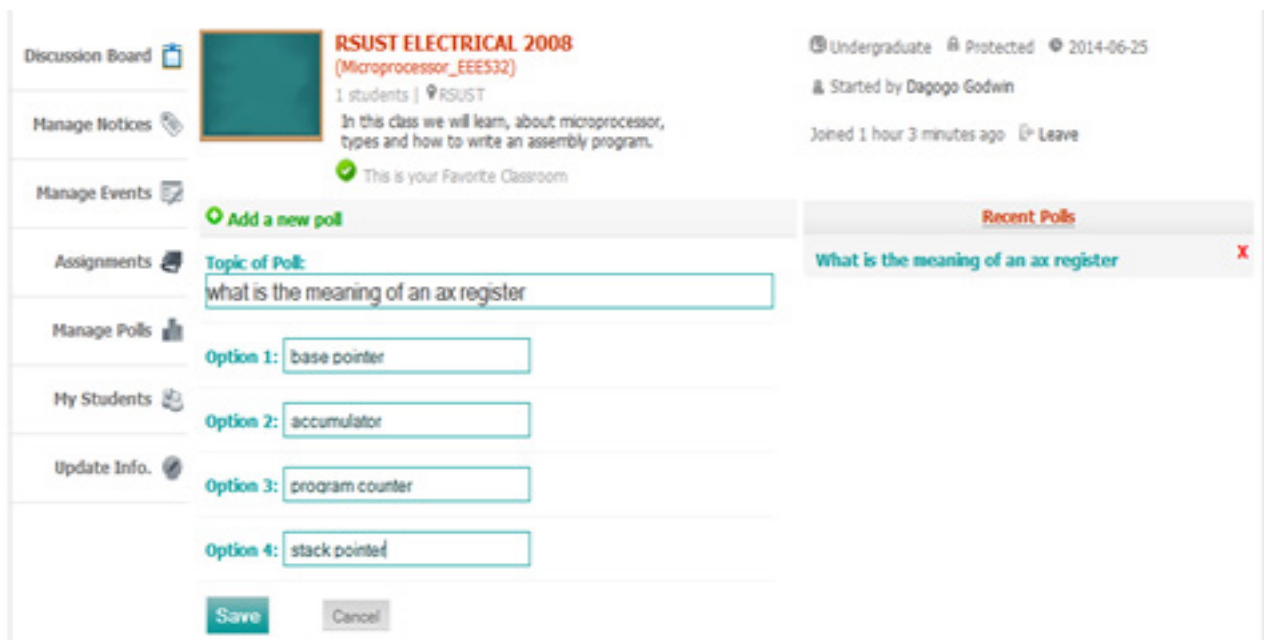Figure 6: Structure of a typical created classroomww

Figure 7: Poll creation page

Results and Discussions

In order to determine the functionality of the system and relevance, sampled rating was carried out as shown in figures 8 through 10. Figure 8 shows the ease of usability rating of the program by students. The figure shows that out of 100 students, 40 students agreed that it was easy for them to use the Virtual Classroom, 30 students rated it fairly and 20 students strongly agreed that it was easy to use the Virtual Classroom while the rest disagreed. In figure 9, the efficiency rating tends to be positively supported by more than 50% of the students. 35 students agreed that the Virtual Classroom was efficient, 40 students strongly agreed that the Virtual Classroom was efficient while 20 rated it fairly.
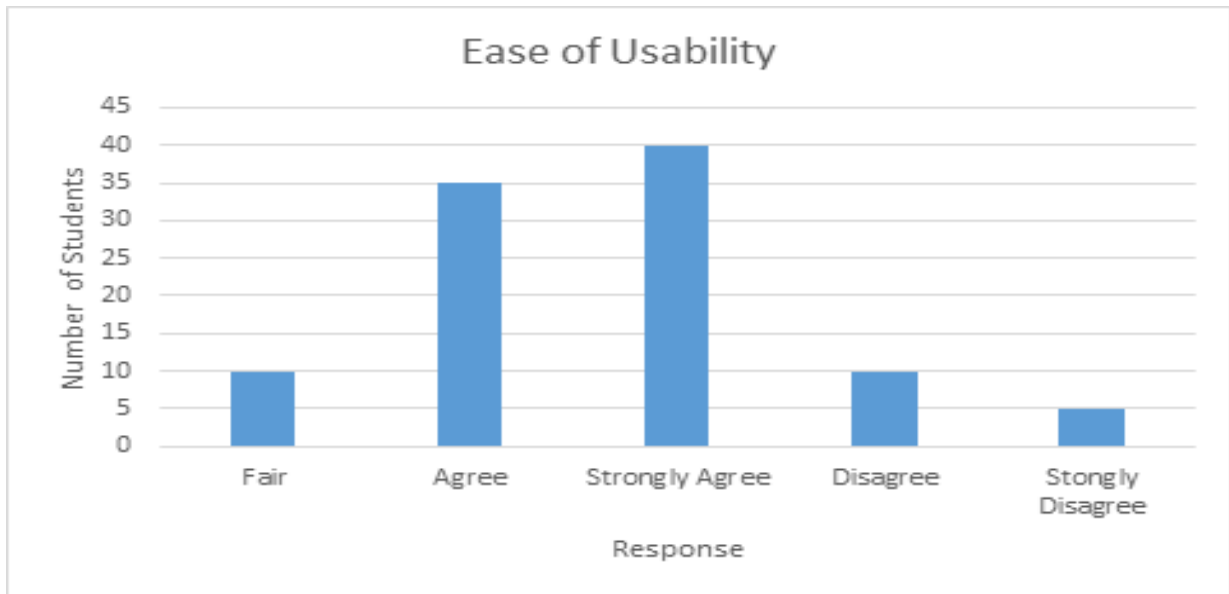

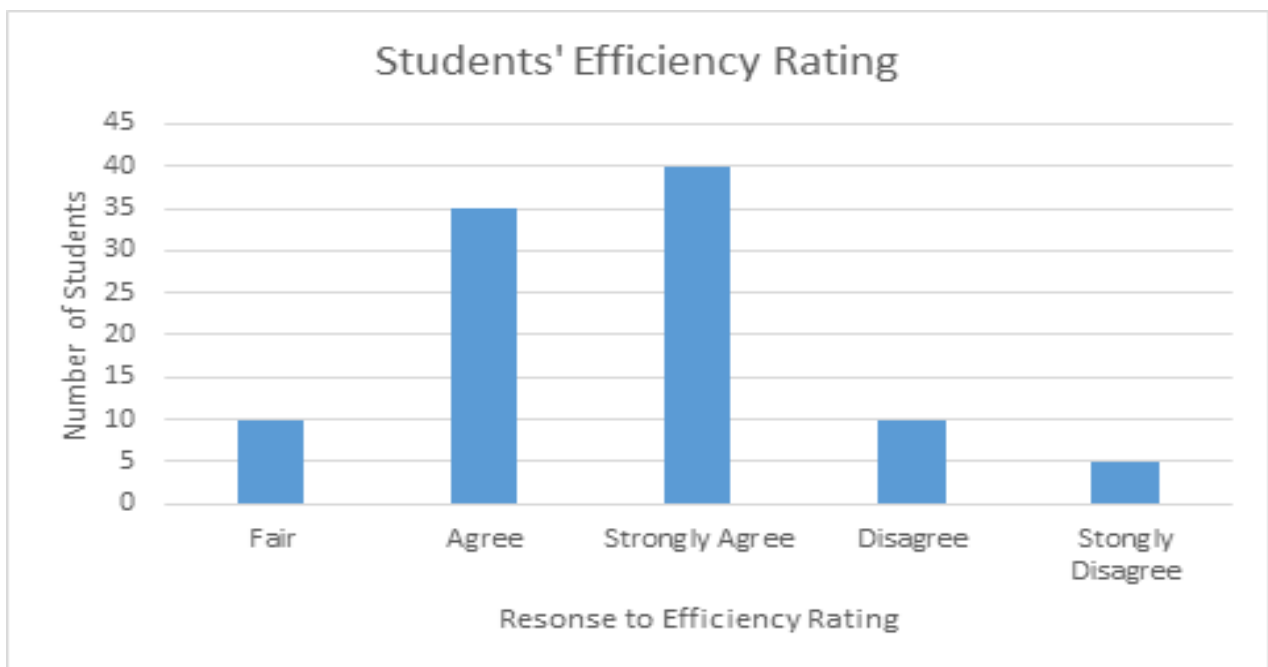Figure 8: Graph to show students Response on Ease of Use.

Figure 9: Efficiency rating by Users.

Conclusion and Recommendation

This work has presented a functional virtual classroom which when deployed, can serve as an alternative to the traditional method of learning. This work will encourage more people to learn from remote areas and can solve the problem of students to teacher ratio, less classroom infrastructure to accommodate large students. On a successful implementation of this system in our tertiary institutions, it will enhance our learning process and quality education. However, provision of all necessary ICT infrastructures can be of high importance for prospective participants from remote communities. Subsequent research should be made to integrate all departments in tertiary institutions and also it can be implemented on other tiers of education.

References

1. Siddiqui, M.H. (2013): Virtual Classroom Learning for Higher Education: A Result of Information Technology. International Journal of Management and Social Sciences Research (IJMSSR), 2(2): 2319-4421.

2. Yilmaz, O. (2015): The effects of Live Virtual Classroom on Students' Achievement and Students' Opinions about Live Virtual Classroom at Distance Education, The Turkish Online Journal of Educational Technology, 14(1): 74-81

3. Schullo, S.H., Venable, M. and Barron, A. E. (2007): Selecting a Virtual Classroom System: Elluminate Live vs. Macromedia Breeze, MERLOT Journal of Online Learning and Teaching, 3(4), 331-345.

4. Mysql publisher (2002): About Mysql. http://www.mysql.com/about. Retrieved 14th December, 2017.

5. PHP. (2000): What is PHP. http://www.php.net/manusal/en/intro-whatis.php, Retrieved 10th January, 2017.

6. Microsoft publisher. (2000): A History of Microsoft. http://windows.microsoft.com/en-us/windows/history#T1=era0. Retrieved 18th January, 2017.

7. Enoch, J.D. and Saturday, N.R. (2016): Customized E-Learning System for Niger Delta Universities, International Journal of Engineering and Technology, 6(11): 392-400.