

# DESIGN AND IMPLEMENTATION OF A VIRTUAL CLASSROOM SYSTEM

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## Abstract

In the last few decades, education has witnessed some advances in technologies involving computer-aided learning that promises to drastically change the methods of teaching and learning. The World Wide Web has played a major role in information storage and dissemination in the educational community. Conventional classroom based teaching involves the delivery of course materials by the lecturer in a particular place at a defined time. Hence it imposes a constraint of time and place on both the instructor and the student. Due to human factor arising from the traditional classroom method, the lecturer may not always be able to put in optimum effort towards preparing and delivering course materials. There may also be inconsistencies in the pedagogy and learning style due to repetitive nature of teaching/learning. The objective of this paper is to develop a virtual classroom system to enhance learning on campus. 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 model for e-learning in which the course material is presented using multimedia and hypermedia.

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

## 1 INTRODUCTION

With the increasing use of network computers, the Internet and advances in telecommunication technology, e-Learning has been widely recognized as a valuable tool for learning and training [1]. The traditional means of higher education has remained dominant in schools in some developing countries. With the significant growth of e-learning, teachers and students normally explore new ways of constructing knowledge [2]. The current technology being heavily researched as an educational platform is the World Wide Web (WWW). The WWW which represents a platform for information storage and dissemination can be accessed in minimum time, and this is very important to the educational community. The fact is that the transition from digital divide society to a global village information society causes the traditional instructional model to be unable to cover the instructional needs of modern societies. The globe is faced with a transition from a static economy to a new knowledge driven economy.

Population explosion and increasing admission request into schools in every region of the world brought greater constraints on the resources of several schools. For instance, there is problem of inadequate number of human and material resources to cater for the education of the large population. The population of school age citizen in most places has grown tremendously to the extent that only a small percentage can be offered admission [3]. A new learning environment needs to be created which will provide autonomy and flexibility, establish contacts and easy communication between centers of culture and knowledge, and facilitate easy access for all citizens of a knowledge based society [4]

Conventional classroom based teaching involves the delivery of course lectures by the lecturer in a particular place at a specific time. Hence it imposes a constraint of time and place on both the instructor and the student. Due to the human factor, the lecturer may not always be able to put the optimum effort towards preparing and delivering course models. Direct interaction with the student is not easy because of the large number of students needing attention.

The remedy to this situation seems to be the learning techniques that are based on modern technologies such as the Internet and WWW combined with traditional classroom teaching. One of the ways this can be achieved is through the use of virtual classrooms. A virtual classroom is an environment conducive for learning, which takes place in the cyberspace. It provides the tools that

learners need and brings together educators and learners to share information and ideas. The virtual classroom is a special form of e-learning that finds relevant applications in enriching the conventional learning methods [5] opined that e-learning can be deployed using a wide range of technologies and media.

The virtual classroom has its roots in the study of computers in education such as computer-mediated instruction and multimedia as an instructional tool. These broad fields covered not only hypermedia, such as web-based hypertext, but also non-internet instructional software design ranging from media school surgery tutorials to interactive CD-ROM geography atlases. Many of the issues facing these virtual classrooms, such as evaluation of interface design, integration of computers into course design, and social issues of computing are highly relevant to the design and use of internet-based virtual classrooms.

Present technologies enable the creation of virtual classrooms using the Internet and its resources. For the educators and trainees, a benefit of the Internet as platform for virtual classroom is that the information that can be stored is almost limitless. One of the contributions of Virtual Classroom (VCR) is that access to high quality and flexible learning technologies [6]. The information being electronically stored can be accessed or downloaded by learners at their own pace, thereby overriding the constraint of time and place experienced in classroom based learning. The involvement of the distance learning includes teaching using telecommunication tools, which transmit and receive numerous materials through data, voice, and video [7]. There is also an increased use of virtual classrooms (online presentations delivered live) as an online learning platform and classroom for a diverse set of education providers. In addition to virtual classroom environments, social networks have become an important part of e-learning [8].

The aim of this project is to provide a web enabled interactive model of e-learning in which the course material is presented using the advantages of multimedia and hypermedia. The rest of this article is organised as follows: Section 2 describes the literature review. Section 3 depicts the system design and modelling. Section 4 described the system implementation and section 5 concludes the paper.

## **2 LITERATURE REVIEW**

Quite a lot of studies exist relating to e-learning, distance learning and virtual learning. These terms are sometimes used interchangeably. According to [9], e-learning means the learning that makes use of a network for delivery, interaction or facilitation. This type of learning includes distributed learning and distance learning. Computer-Based Training (CBT) is delivered over a computer network and web based training (WBT). It may be computer-based, synchronous, asynchronous, instructor-based or a combination of the aforementioned. Some universities in Africa have implemented notable e-learning platforms. University of Nairobi for instance has implemented three different learning management systems in the last five years: Wedusoft, Chisimba and Claroline. A member of staff of the university specifically developed Wedusoft while Chisimba was adopted and implemented through collaboration with development partners. Currently, the university is using Claroline. A good number of available teaching and learning platforms use facilities like e-mail, wikis and bulletin board to provide students interaction, while some others use Learning Management System (LMS) [10]. Currently, the University of Cape Town is using Sakai as the major LMS. This has been customized and branded Vula. In the past, the university has deployed Moodle and WebCT as well. However, they still continue to seek for virtual learning platforms that would satisfy most of their requirements [10].

Previous works in the area of virtual classroom will be discussed in this section following their historical development of VCR, architectural design and system implementation and provision of e-learning platforms for the disabled. The paper in [7] addresses the history of distance learning, current issues, the federal government's role, and four specific areas of improvement including: curricula change, new patterns of interaction, changes in organizational structures, and the roles and activities of participants in both business and academic distance-learning environments.

A model for improving online educational systems for both teachers and learners was proposed in [8]. The model allows for more accurate assessment and more effective evaluation of the learning process. The model includes logistics systems to show that it could be necessary to integrate systems that handle shipment of textbooks and other physical materials to distance students. The study in [11] discusses the architectural design of an integrated system for the delivery of lectures in a virtual environment. The architecture and description of the system components are presented with the techniques and recommendations for the implementation of the designed system. The system

architecture is multi-tier, modular, scalable and built for adaptability to database middleware suite. All functionalities within the application are delivered using web services, communicate via industry standard XML messaging and access is purely via a web browser. The study in [12] discusses experiences in developing VCM with different authoring tools and evaluates their effectiveness. The results of the survey shows that this research proved that the respondent students very well received the Virtual Classroom Module (VCM) developed.

The article in [2] attempts to develop a better understanding of students' experiences of learning with the specific online learning technology of Adobe Connect virtual classroom. The research was carried out in a university in New Zealand using the method of case study. In [13], an investigative study from Norway was reported on the use of a virtual classroom and it affects learning and teaching. A student Master class was for two sessions exposed to the use of the Centre, being observed during the sessions and interviewed thereafter. An activity theory was engaged to frame the study. The research in [14] was aimed to investigate the impact of a number of e-learning activities on the students' learning development. The results show that participation in virtual classroom sessions has the most substantial impact on the students' final grades. This paper presents the process of applying data mining methods to the web usage records of students' activities in a virtual learning environment. The main idea is to rank the learning activities based on their importance in order to improve students' performance by focusing on the most important ones. The purpose of the study in [15] reported in this paper was to identify why instructors adopt synchronous virtual classrooms and how they use them after their adoption. In describing their reasons for adopting the technology, respondents most frequently cited institutional resource availability, increasing social presence, enhancing student learning, and the availability of technology.

Students on various campuses of tertiary institutions are facing certain level of challenges that affect their participation in classes and learning generally. Some of these students may be physically challenged, and hospitalized due to illness or may be involved in one type of job or the other to be able to meet up with their financial needs. Web-based learning therefore offers interesting opportunities and democratic advantage to these categories of students [16]. Certain studies in the past also addresses provision of assistive learning technology for the physical challenged. For instance, a paper in [17,18] reported a voiced-based learning system for the virtually impaired learners. More so, the paper in [19] presents a central learning system, whose goal was to facilitate teaching and learning for both teachers of the deaf and deaf impaired persons in Jordan.

### 3 SYSTEM DESIGN AND MODELLING

The system design is described using data flow diagrams. Figure 1 shows the data flow diagram of user validation module. At the top of the hierarchy is the user validation module. The remaining are all same-level process related to the three different categories of users-System administrator, Lecturer and Students.

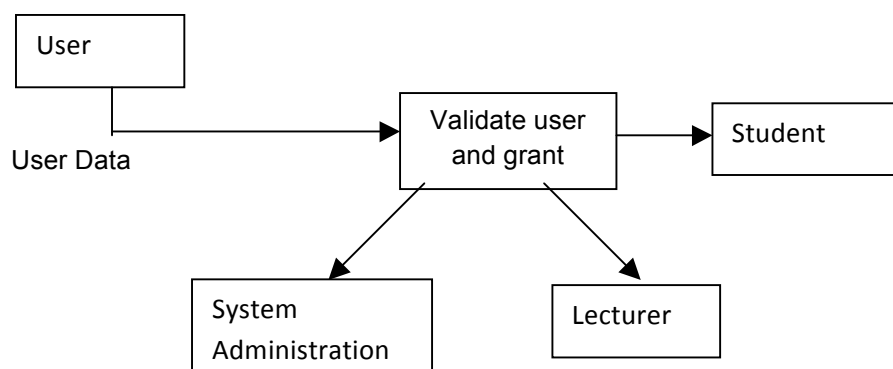


Figure 1: Data flow diagram showing the User validation module.

Figure 2 is the data flow diagram showing the various information exchanged between the lecturer and user module.

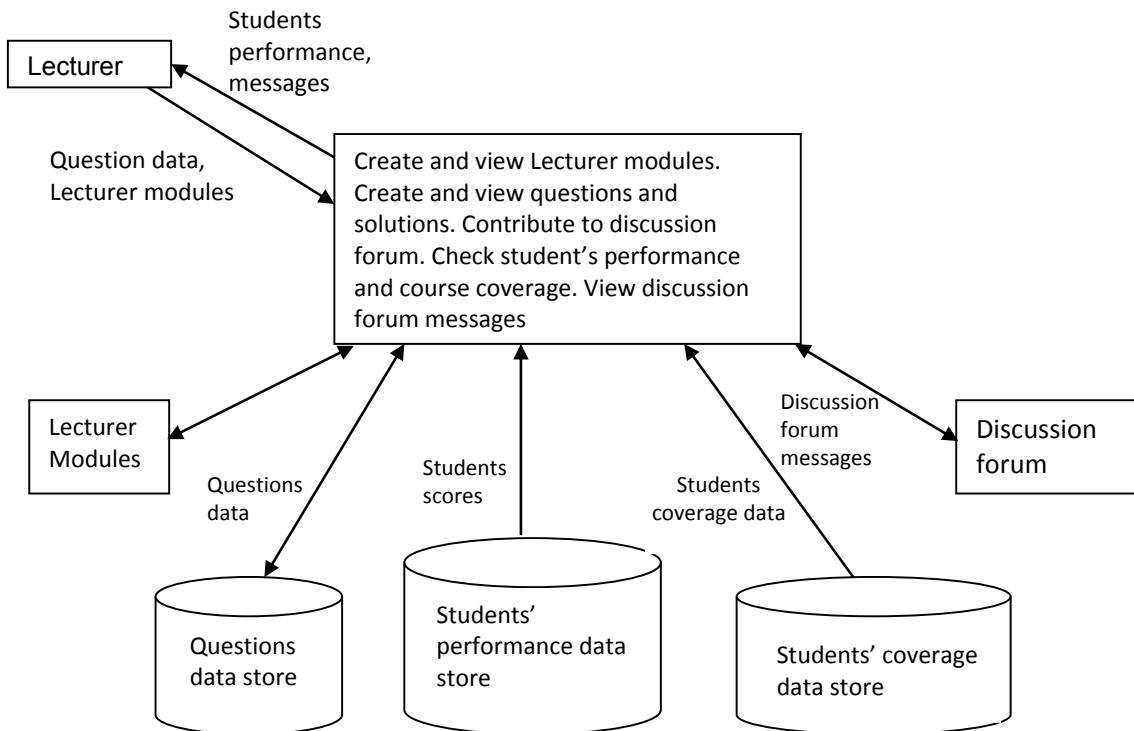


Figure 2. Data flow diagram showing the Lecturer user module.

Figure 3 is the data flow diagram showing information exchange at the student user level. The diagram contains lecture modules, answer questions and view solutions module, check performance module, contribute to forums, view discussion, and forum messages modules.

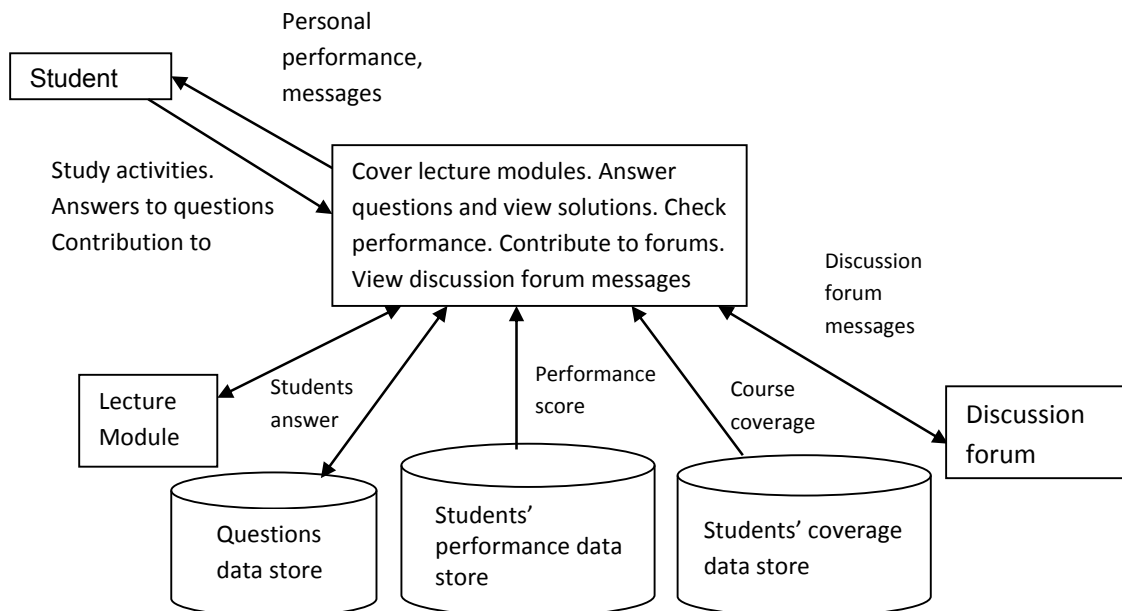


Figure 3. Data flow diagram showing the Student user module.

#### 4 SYSTEM IMPLEMENTATION

The system was implemented using HTML as the front end, PHP as the server side-programming tool, Apache as the middleware and MySQL database as the backend. The screen interface to view course page is contained in Figure 4, where as the exam page screen is contained in Figure 5.

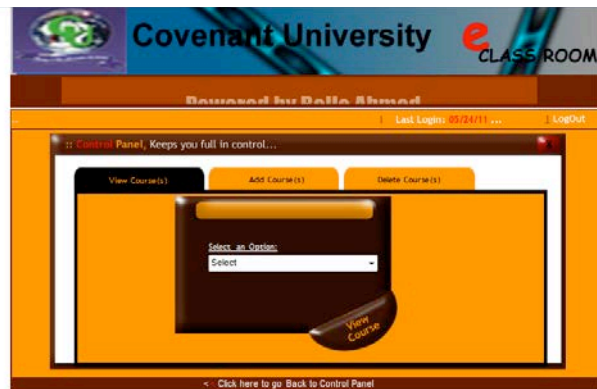


Figure 4. View Course page.

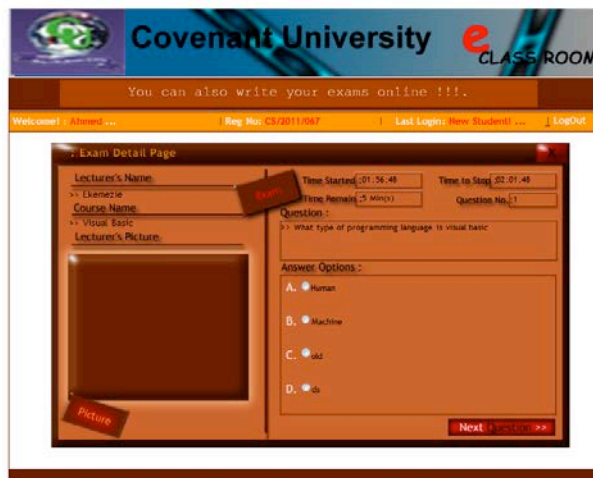


Figure 5. Exam page.

In using the virtual learning system, certain operational activities have to be followed from the starting operation to the finish. First you start the virtual tutor, you log into course session and follow the instructions. The benefits of the Virtual Classroom includes amongst others: Flexibility and Convenience, Keeps People On-the-job, Cost Saving, Interaction and retention, Teamwork, Bringing teams together, Post-Course Reinforcement, On-line Reference Materials [20].

## 5 CONCLUSION

In this paper, a virtual learning system has been developed. The new system is expected to serve as a remedy to the problems and weakness observed in the old system. It will combine open learning techniques based on new technologies (in this case, the world wide web) with conventional classroom teaching, The main intention is to make the learning experience more flexible, stimulating and available around the clock and at any place with Internet facilities. The students will be able to navigate freely within the virtual classroom environment and enhance information resources used by the students.

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