

DEVELOPMENT OF A WEB BASED VIRTUAL CLASS ROOM SYSTEM FOR TERTIARY INSTITUTIONS

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ABSTRACT

This paper develops a model of a web based virtual classroom for tertiary institution. The different components of the system allows students to learn or study online by downloading course materials, doing assignment without the need of going to the physical classroom, the lecturers can give assignment, view submitted assignment and also add grade. This paper presents a module for interaction and file sharing between students and lecturers and also the administrator can add student, lecturers, courses, and announcement and as well modify, edit and delete users. The system was developed using JavaScript, MySQL, PHP and Dreamweaver. A practical demonstration was carried out using an Undergraduate Course of the Department of Computer Science in Ebonyi State University, Abakaliki, Nigeria. From the results obtained administrator was able to register all users to the system, lecturers were able to upload course materials and upload assignment, and students were able to download course materials, interact with lecturers and also upload their assignment to the system.

KEYWORDS: Virtual class room, Traditional learning, Electronic learning, Virtual education and Distance education.

1.1. Introduction

"Virtual" as used in this paper describes a course that is not taught in a face-to-face classroom but through a substitute mode that can conceptually be associated virtually with classroom teaching, which means that people do not have to go to the physical classroom to learn. Accordingly, virtual education refers to a form of distance learning in which course content is delivered by various methods such as course management applications, multimedia resources, and communicates via these technologies (Akintola K. G, 2017).

Virtual classroom is a system of learning that involves chat and videoconferencing. This kind of learning tool is real time. Virtual classroom allows students or learner to ask and teachers to answer questions instantly through instant messaging.

Online education includes learning with the assistance of the internet and a personal computer. The term e-learning or electronic learning often is used interchangeably with online learning. The important benefit of online learning is that it can span time and distance (Akintola K. G, 2017).

There are three major types of distance education, these are synchronous, Asynchronous, and Hybrid or Blended e-learning. Synchronous e-learning involves online studies through chat and videoconferencing. Asynchronous e-learning involves course work delivered via web, email and message boards that are then posted on online forums. In such cases student ideally complete the course at their own pace, by

using internet as a support tool. In other words Asynchronous e-learning simply involves the lecturers uploading lecture materials through a platform while the learners use devices to download the materials before learning. (Akinyokun O.C., 2017) Hybrid or Blended e-learning is a combination of synchronous and asynchronous learning which means it takes advantage of the best features of both face-to-face and online learning. A hybrid course is designed to integrate face-to-face and online activities so that they reinforce, complement, and elaborate one another, instead of treating the online component as an add-on or duplicate of what is taught in the classroom (Akinyokun O.C., 2017).

The use of technology in education and training is transforming the way the people learn in today's academic and corporate settings. While stand-up classroom instrument is still the common delivery method for training, web-based training is quickly gaining ground (HarshitYadav, Kapil Sharma, RitikaDavial and SandeepRasgotra, 2018).

The shift from traditional face to face classroom instruction to technology based instruction is expected to continue at an accelerated pace into the new millennium. The rapid growth and integration of E-learning programs has promoted experts, authors, and researchers to question how best to evaluate the effectiveness of such programs. The change in training delivery methods comes at the time when corporate training department are increasingly

charged with demonstrating how their efforts add value to the organization (Obasa A.I, 2018).

(Ibam Emmanuel Onwuka, 2019), Stated that both scholarly research and practical experience have shown that distance learning is educationally effective, with other business values and in many cases more cost effective than other approaches.

The amount and quality of feedback provided to the learner has an impact on learner satisfaction. Feedback in particular is important to the effective delivery of E-learning courses. E-learning delivery methods such as web-based instruction can provide barriers to traditional type classroom feedback. For instance, in a web-based system course learners cannot simply raise a hand and ask for clarification about a point made by the instructor. Hence, the design and integration of feedback mechanism impact the learner's experience and level of satisfaction. (Wichian Premchaiswadi, AnuchaTungkasthan, NipatJongsawat, 2017).

(Chih-Yung Chang and Jang-Ping Sheu, 2018) Stated that distance learners do not receive the day to day feedback available in traditional classroom setting where instructors-student feedback is important as it helps the instructor to gauge the level of student satisfaction regarding a topic or an entire course. Because of the loss of traditional classroom feedback in learning environments, other method to assess learner's satisfaction need to be administered to obtain learner feedback during and after the learning event.

E-learning courses, because of the lack of face to face contact between instructor and student require special effort in order obtain information regarding learner satisfaction. For example, E-learning courses do not allow the instructor to gauge level of learner's satisfaction using traditional methods such as facial expression or body language (Hsu Sam, Oge, Marques, M. Khalid Hamza, and BassemAlhalabi, 2018).

Suggested that questions by (Zongkai Yang, Qingtang Liu 2017) in related to the efficiency of what students have learned and their level of satisfaction with distance learning courses remain largely unanswered until the traditional and of course evaluation forms are completed and reviewed. Special attention must be given to obtain student feedback in E-learning.

Barker conducted student test in two different measures of distance learner's satisfaction with instructors and instruction. The studies were held at a major university known for its early consistent involvement in distance education. The courses were delivered live via two-way audio and video technology.

The first study analyzed the accuracy of a short written survey designed to obtain learners perspective for opportunity to interact in the distance education course. The survey included question regarding interaction between the instructor and

learner to learner interaction. Results it's revealed that instructor to class interaction is positively and moderately correlated with perception of learner to be learner interaction.

1.2. Statement of Problem

The following are the problem encountered in the current mode of learning in tertiary institution:

1. Distance is a major problem of current learning system in which student finds it difficult because they have to transport themselves to the school premises.
2. There is no means where students can learn at their own pace since learning is done in the classroom
3. Time fixed for lectures in traditional means of learning sometimes is not convenient for some students
4. Records of students are kept in files, if not properly handled could be damaged or destroyed.

1.3. Research Aim / Specific Objectives

The aim of this paper is to develop a web based virtual classroom system for tertiary institution. The objectives are to:

1. Create a platform where student will study online without the need of going to class room.
2. Create a module where students can learn at their own pace irrespective of the lecture schedule time.
3. Develop a platform where students and lecturers can interact to do assignments, grade them and view results, and
4. Keep electronic records of students' interaction with lecturers and retrieved them easily and effectively.

1.4 Research Questions

This paper sought answers to the following research questions:

1. Virtual classroom and traditional learning which is more preferable?
2. What are the advantages of Virtual class room over traditional learning?
3. Is there any existing virtual classroom platform and what are their challenges or setback?
4. Are there any limitations in virtual classroom platform?

1.5 Review of Related Works

The limitations of several virtual classroom systems include lack of interactive response and assignment management. An intranet-based virtual classroom system that enhances the interactions between students and teachers is introduced in (HarshitYadav, Kapil Sharma, RitikaDavial and SandeepRasgotra, 2018). The system introduces a new design for e-learning and removes some of the problems of the existing systems as well as increase the interaction between teacher and students with the impression of a real life classroom. The system provides live

streaming of lectures while assignments, questions and answers can be uploaded. The authors in (Mahesh Maurya, ChitvanOza, AlokShah,Sadiya Patel, 2018) proposed a virtual classroom system which incorporates several modules for live video lecture, whiteboard technology, chat-room and several teacher-students feedback modules. The system is an innovative combination of synchronous learning via live streaming video, audio and chat over the Internet. It is blended with asynchronous online interaction and group works in a way that mimics real life scenarios. Failure to incorporate notifications email and mobile phone through short message service (SMS) are the major limitations of the system.

A virtual classroom system using virtual image creation technique is proposed in (Lertkulvanich Suriyong, Nithi Buranajant and SuwannaSombunsukho, 2017). The system comprises of three classrooms. The first classroom is for theory that contains video clips instructions for lecture and practice and online live lectures while the second classroom is a library that connects the e-learning websites concerning radiographic testing. The third and final classroom is a laboratory for observing experiment results. All the three classrooms were designed to be virtual using computer graphic technique. Characters representing learners were also created in order to create interaction between learners and virtual classrooms. The authors in (Obasa A.I, 2018) presented an architectural design for 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 architecture is multi-tier, modular, scalable and built for adaptability to database middleware suite. All functionalities within the application are delivered with web services, communicate via industry standard Extensible Markup Language (XML) messaging and access is strictly via a web browser. The virtual classroom application utilizes an operating system with facilities for providing users web services, data and pre-processor hypertext with a simple and consistent user interface corresponding to the tiers. With the object-oriented design method, three logical categories were identified for application objects; namely, objects that deal with presentation aspects of the application, objects that deal with the business rules and data, and objects that accept and interpret user requests and control the business objects to fulfill the requests.

The authors in (Wichian Premchaiswadi, AnuchaTungkasthan, NipatJongsawat, 2017) presented a virtual classroom by using Real-Time Messaging Protocol (RTMP) which is a sophisticated TCP-based real-time networking protocol that supports the efficient exchange of messages, synchronized data, audio, and video. The system

enables teachers and students to publish streaming audio, video and other data messages to present streaming media with interaction or navigation. On the Internet, the system allows students immediate interaction with teachers with a real classroom impression. A web-based collaborative system that serves as an add-on feature to the learning system for a post class sharing of resources by the teacher and student is also proposed. The web-based virtual classroom system proposed in (Ibam Emmanuel Onwuka, 2017) is based on e-pedagogy with enhanced features for collaboration among participants (instructors and students) in a web-based learning environment. Instructor, course, student and learning performance formed the major objects used in developing the system model, the features of which include course outline, presentation, resources, assessment/opinion poll, chat, hands-up, students' list, course information and collaborate, all harnessed to achieve experiential learning among students.

The authors in (Chih-Yung Chang and Jang-Ping Sheu, 2018) presented the design and implementation of a learning technology project developed to advance the wireless technologies for building an ad-hoc classroom in order to contrive a modern and new learning environment. A wireless platform was developed for teacher and students to establish a classroom dynamically irrespective of location and time bounds. As supported in traditional classroom, information technology that provides teacher with teaching aids was developed. The aids include blackboard, board rubber, colored chalk, microphone, voice and video recorders, and so on for course teaching and discussions in an ad-hoc classroom. Student was also provided with electronic school bag termed eSchoolbag with electronic packing of book, notebook, parents' contact book, pencil case, writing materials, sheets, calculator, address book and so on. In (Hsu Sam, Oge, Marques, M. Khalid Hamza, and BassemAlhalabi, 2017), the primary steps towards building and implementing a successful concept of a virtual classroom are presented. Information on the assessment, planning, design, implementation, and maintenance of a virtual classroom in ten easy steps was explicitly divulged with a summary that failure to follow these steps can ultimately lead to poor, incomplete, inadequate and ineffective solutions to Internet based distance education.

1.6 Existing Problem

The following are the existing problems of already developed virtual classroom platform that requires improvement.

1. Lack of interactivity responds
2. Lack of Assignment Management
3. No means for live streaming
4. Finally lack of examination platform

1.7. Analysis of the Proposed System

Object-Oriented Analysis and Design Methodology (OOADM) methodology was used for the complete design of the system.

The proposed system is very easy to use and effective. It solves the problem of complexity by building a simple web application that can easily be used and understood by users. The proposed system is designed in such a way that it has three users which are student, lecturers, and the administrator. The function of the administrator is to add or register new student, lecturers, add courses to the system and enter announcement. The function of the lecturer is to upload course materials for students, add assignment for students and view submitted assignment, add grade for students and enter discussion class where the lecturer can teach the students online. The function of the students is to download or view course materials, view and do assignment, enter classroom, view announcement and finally check grade from lecturer.

The proposed system is designed to take the form of the traditional means of learning; the only change in the platform that is from a manual platform to an automated platform.

The bedrock of this system is the database, this database is designed for every table to act as various record keeping materials like the student information, records and store grades. The beauty about the proposed system is that any data that needs to be entered with the database automatically shares resources with the data entered. Here students do not need to appear in lecture halls, test venues before lectures/test can be taken. Tests are written and grades are given immediately.

1.7.1 System Modeling

System modeling is the process of developing abstract models of a system, with each model presenting a different view or perspective of that system. The system modeling is described using data flow diagrams. Figure 1 shows the data flow diagram of the proposed system.

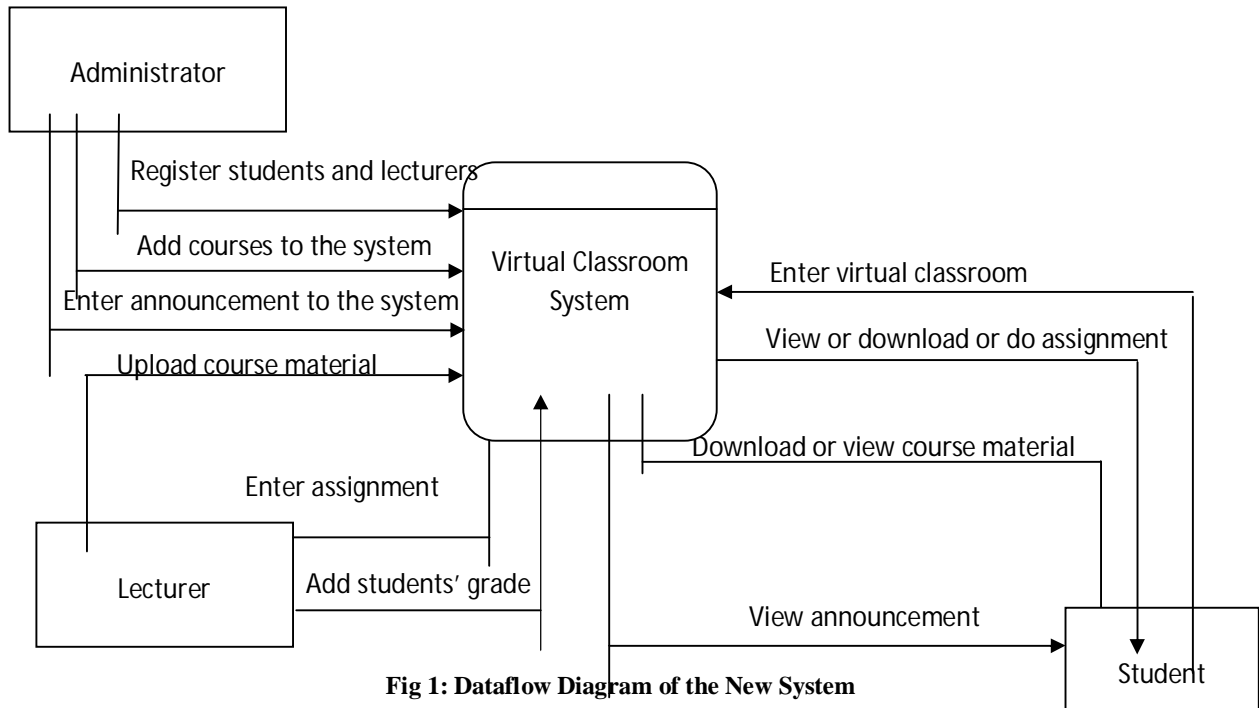


Fig 1: Dataflow Diagram of the New System

The dataflow diagram in figure 1 describes the complete processes involved in the proposed system. Here an administrator will login to the system to register student and lecturers, add courses to the system, and enter announcement if any. The lecturer will login, upload his or her course materials, and enter assignment to the system if any and finally grade students. The students will login to enter virtual class, download or view course materials,

view or download assignment if any, and finally view assignment.

1.7.2 System Use Case Design

A use case is a list of actions or event steps typically defining the interactions between a role (known in the Unified Modeling Language as an actor) and a system to achieve a goal. The actor can be a human or other external system. Figure 2 shows the use case model of the proposed system.

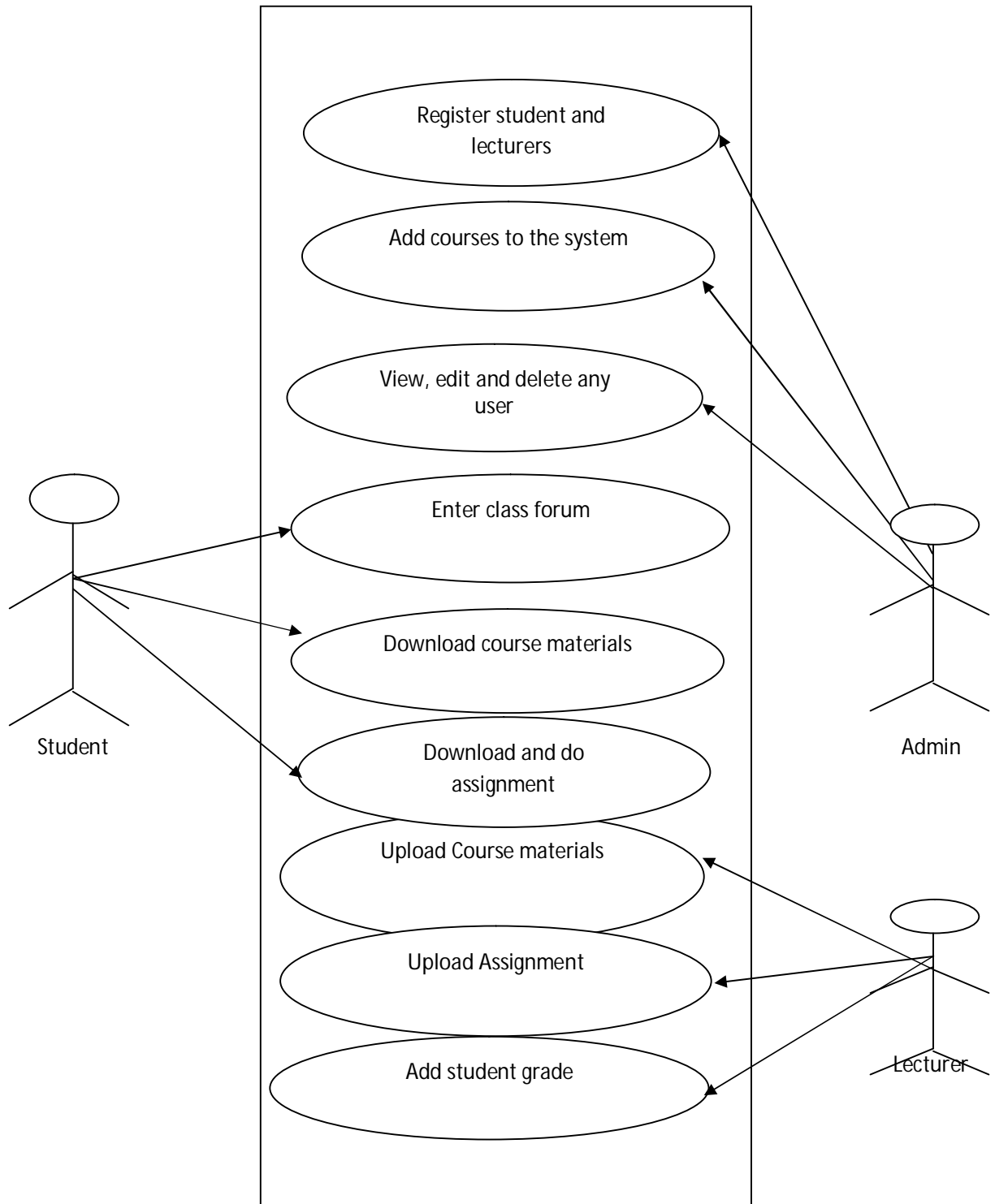


Figure 2: Use Case Model of the Proposed System

The use case model in figure 2 describes the complete processes involved in the proposed system. Here an administrator will login to the system to register student and lecturers, add courses to the system, and enter announcement if any. The lecturer will login, upload his or her course materials, and enter assignment to the system if any and finally grade students. The students will login to enter virtual class, download or view course materials, view or download assignment if any, and finally view assignment.

1.7.3 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. Figure 3 shows the sample of administrator's main menu, figure 4 shows the student main menu while figure 5 shows the main menu of the lecturers.

Sample Main Menu

The main menu serve as the centre point in every structured program through which the user of the software is provided with several options to choose from.

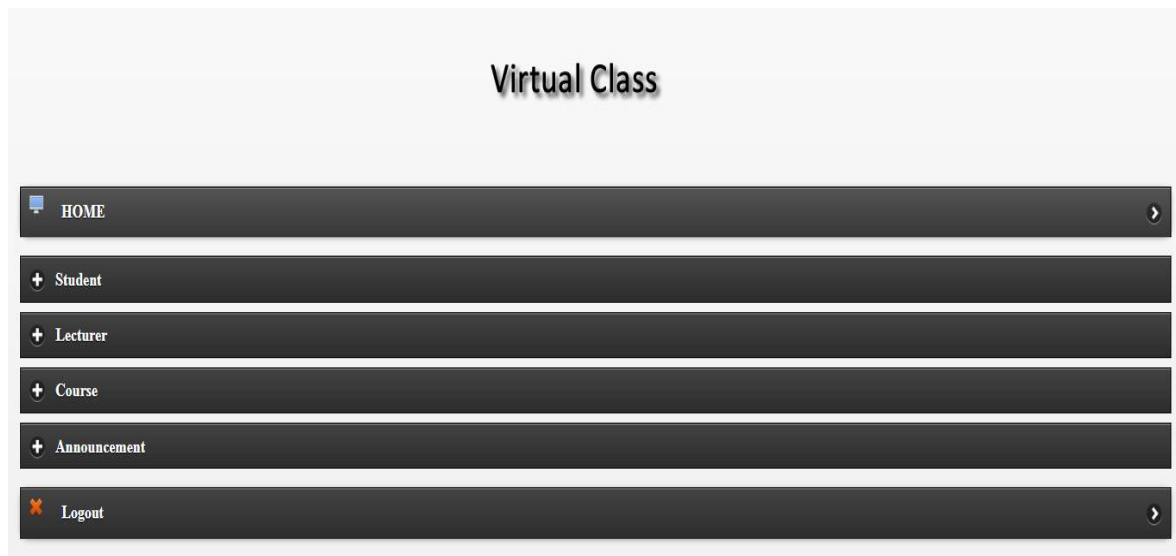


Figure 3: Admin Main Menu Implementation

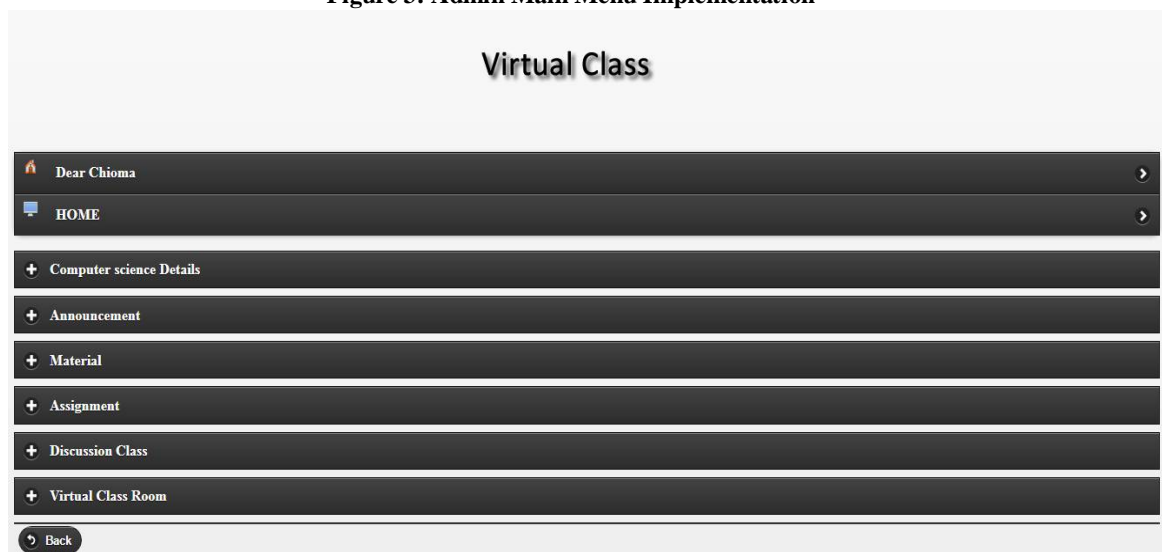


Figure 4: Student Main Menu Implementation

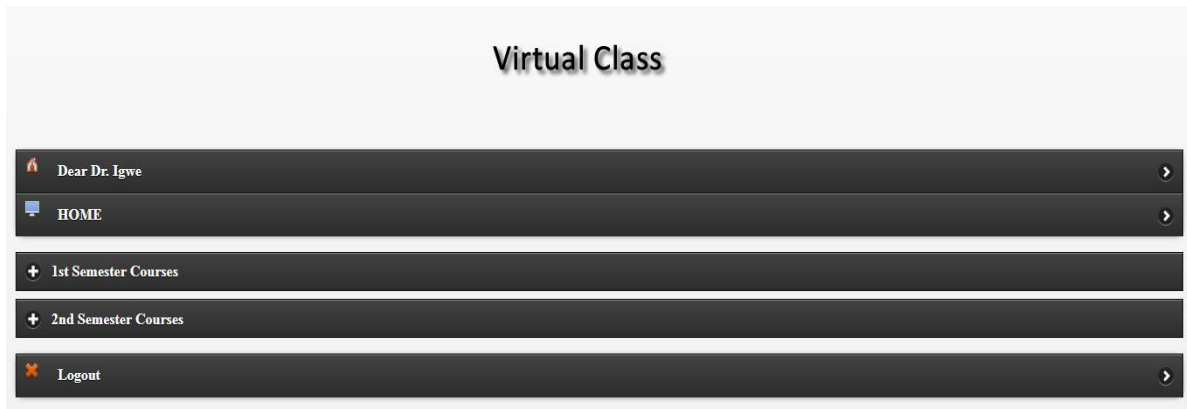


Figure 5: Lecturer Main Menu Implementation

1.7.4 Software Implementation Architecture

Software architecture refers to the fundamental structures of a software system and the discipline of creating such structures and systems. Each structure comprises software elements, relations among them, and properties of both elements and relations. The

architecture of a software system is a metaphor, analogous to the architecture of a building. It functions as a blueprint for the system and the developing project, laying out the tasks necessary to be executed by the design teams. Figure 4 shows the software architecture.

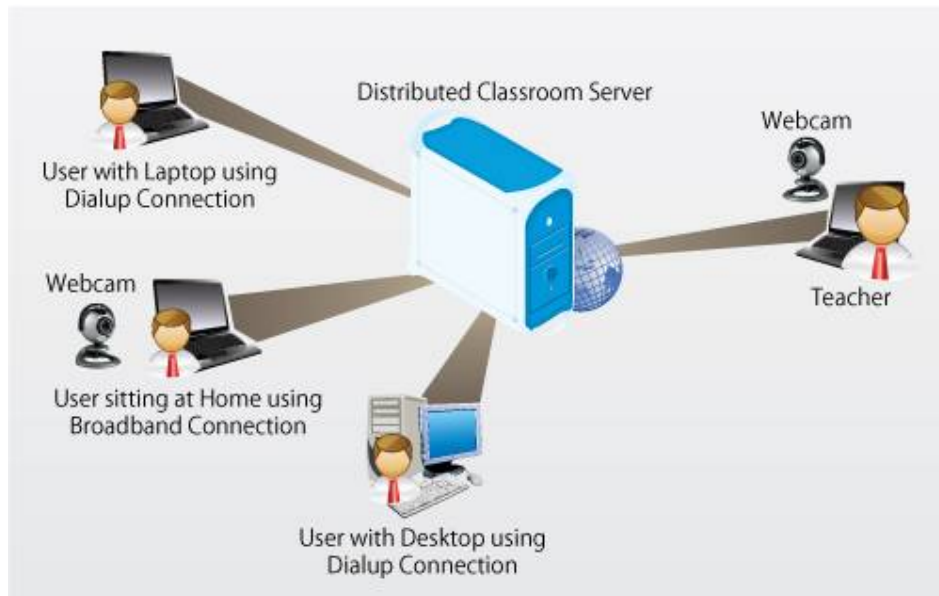


Figure 4: Software Architecture

1.8 System Deployment

Virtual classroom software work strictly with internet, once is launched and running any institutions can use because of the flexibility to create desired functionality and customize the platform according to desired need.

1.9 System Results

A virtual learning system has been developed. The proposed system is expected to serve as a remedy to the problems and weaknesses observed in the

existing 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.

1.10 Conclusion

The system was designed to be as flexible as possible allowing updating to be done. At the same time, multiple updating is allowed in the system and users can download materials. The basic need of this paper is to reduce the difficulties faced by the existing system. In the current system there are many problems prevailing. The existing system is manual based. It is time consuming and faces problem during face to face lectures. In this proposed system, the problems are solved. Also it provides better security facility by given different login details to every user of the system. The basic goal of this project is minimize the problem concerned with the current system.

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