DEVELOPMENT OF A COLLABORATIVE LEARNING ENVIRONMENT FOR FEDERAL UNIVERSITY OYE-EKITI

BY

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(CSC/11/0276)

BEING A PROJECT REPORT SUBMITTED

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CERTIFICATION

This is to certify that this project was carried out by **FAREMI BISOLA** with Matriculation number **CSC/11/0276** in the department of Computer Science, Federal University Oye-Ekiti, Ekiti-State.

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DEDICATION

This work is dedicated to the Almighty God for his kindness, protection, and provision for my family- he has been so faithful. Also to my parent Mr. and Mrs. Julius Faremi, they shall live long to eat the fruit of their labor

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Blessed be the name of the Almighty God, the Supreme Being for seeing me through this project work despite all odds. It is my great pleasure to express my profound gratitude to my supervisor, Dr. T.M. Fagbola, who has patiently put me through and guide me during my project work.

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I pray that you will all mount up wings like eagle and sow high in life.

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ABSTRACT

The fields of Learning Management Systems (LMS) and Learning Content Management Systems (LCMS) are full of open source and commercial products including Blackboard, WEB CT, and Moodle. These systems are tutor-oriented, not designed to facilitate personalized learning support for an individual learner. Lecturers and students, frustrated with current LMS, need a new, innovative, user-friendly alternative to encourage and empower students to take control of their systems. The main aim of this study was to develop a collaborative learning system for Federal University Oye-Ekiti. The improved system enables the student (even with moderate English level and general IT knowledge) to navigate through the system, and collaborate through simple tools such as group chat, post and access forums, manage individual profile, post comments to the lecturers, contents as well as communicate with fellow students among other provided tools.

Basically, this system is a medium where lecturers and students can communicate with each other and is conducted online. Furthermore, this system is provided to support class activities by giving students opportunities for further exploration, discussion and exchange of ideas outside class while lecturer can manage and upload lecture notes, slide presentation, images and artwork directly to the students. The prototype was made available for the users' to examine and evaluate. Feedback was analyzed and an enhancement was done on the prototype to meet the specific users' requirements. The method for developing this system was done by using Apache, PHP and MySQL. PHP and MySQL are a powerful combination that makes it easy to create web applications.

ACRONYMS

LMS - Learning Management Systems

LCMS – Learning Content Management Systems

ICT - Information and Communication Technology.

WBLE - Web Based learning environment

CAS - Course Authoring System

DKMS - Distributed Knowledge Management System

CSCL - Computer Supported Collaborative Learning

SASSE - Synchronous Asynchronous Structured Shared Editor

XML - Extensible Mark-Up Language

PHP - Hypertext Preprocessor

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CHAPTER ONE

1.1 Background to the Study

As constructivism becomes a widely accepted learning theory, education has been undergoing a paradigm shift moving away from teaching-centered instruction to student-centered learning (Witney and Smallbone, 2011). The central notion of constructivist learning approaches is to acknowledge learner's engagement in the active learning process and in knowledge construction (Poore, 2013). Collaborative learning is important across all educational levels from the primary to the tertiary level as it seems to be a crucial factor in academic achievement, personal development, and student satisfaction (Elgort, Smith and Toland, 2008). It can not only enable students to build on their knowledge and skill to a higher level of development, but also can help students develop skills in jobs and professional situations after graduation (Knowles and Hennequin, 2004). As such, collaboration and communication skills have been included as one of the important skills for the 21st Century (Bell, 2010).

Based on social constructivist principles, collaborative interactions among students have been shown to enhance learning through exposure alternative perspectives (Brett and Nagra, 2005). Collaborative learning also emphasizes social and intellectual engagement, and mutual responsibility (Smith and MacGregor, 1992). As such, peer interactions that ensue from a collaborative approach is an important component of the learning experience (Pascarella and Terenzini, 2005). Since collaborative learning places great emphasis on the extent of the exchanges that occur among students in a given environment (Dillenbourg and Schneider, 1995), the use of social media, going beyond traditional delivery formats, can provide great significant support (Huertas, Casado, Córcoles, Mor, and Roldán, 2007; Sigala, 2007).

Social media has been defined as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content" (Kaplan and Haenlein, 2010). Wiki technology is one of the more widely explored social media in schools, colleges and universities (Parker and Chao, 2007). Most of the educational benefits of social media apply to wikis. But because wiki technology has an active role in compelling students to work together, it has been predicted as a new and most effective form of software capable of supporting the collaborative learning environment (Wang, and Xing, 2013). A growing number of researchers have been investigated the application of wikis, explored their effects on student learning, and assessed their effectiveness for instruction at different levels across different subject disciplines. As such, the increasing use of wiki technology for teaching and learning appears to hinge on its usefulness as a CSCL environment.

1.2 Statement of the Problem

Currently there is lack of a collaborative learning system that meets the requirements of users in Federal University Oye-Ekiti. These environments typically consist of a many-to one scenario, in which multiple students share a single computer; this creates dominance patterns and unequal access to educational materials. A collaborative learning system will overcome the difficulties met by Lecturers in traditional systems. These difficulties are mainly related to the lack of tools that facilitate their tasks during the preparation of their learning materials, distance is a barrier to some people who seek to be educated. Thus, it is required to develop a collaborative learning system capable to provide the necessary collaboration tools that facilitates learning between the Lecturers and the students.

1.3 Aim and Objectives

The aim of this study is to develop a collaborative learning environment for Federal University Oye-ekiti to support learning activities of learners and the collaboration of lecturers and the students.

The objectives of this study are to:

i. Design a collaborative learning environment.

ii. Implement the system design in (i) for easier access to students and lecturers.

iii. Evaluate the implemented collaborative learning system prototype for Federal university Oye-ekiti.

1.4 Significance of the Study

Collaborative learning environment can provide benefits for individuals involved in Federal University Oye-Ekiti. It can:

i. Improve performance: it is interactive to the students thereby improving their productivity.

ii. Increase access: it enables people from any part of the world to be educated.

iii. Provide convenience and flexibility to learners: learning process is structured in units; this makes the learner study at his own convenience without getting too bored with lectures.

1.5 Scope of the Study

The study concentrated on collaborative learning system, Federal University Oye-Ekiti was used as a case study focusing on users requirements of the prototype where both the

lecturers and students were involved. The area of collaborative learning environments was particularly handled in the study and the users' requirements of the learning system.

1.6 Motivation

There is a high need to develop systems that not only considers the vision of a single lecturer but allows the confrontation of several points of view on the same subject (i.e., collaboration among various lectures). And the use of simple collaboration tools such as chat, forums, and use of comments among the participants in order to facilitate effective learning process that will facilitate the knowledge sharing.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of Collaborative Learning Environment

Collaborative Learning Environment is a web-based education system that provides collaborative learning specific functionalities like structuring and managing the collaboration as well as other supporting functionalities for online learning (designing, managing, and delivering learning content). (Wang and Xing, 2013) stated that many instructors are ill-prepared to develop activities for online groups due to a lack of familiarity with learning in an online environment. The lecturer may apply the technology into the online course without consideration of adopting the appropriate pedagogics. Marjanovic (2012) suggested several potential learning activities for online collaborative learning: interactive lecturing, group dictionary, collaborative problem-based learning, collaborative writing, and the collaborative exercises. To encourage and foster the collaborative attitude online, Trentin (2010) suggested that instructors should:

i. Stimulate discussion through open-ended questions that facilitate the creative thinking of students.
ii. Encourage students to find the answers by themselves from the resources instead of providing the answers.
iii. Help students to post the questions repeatedly to the group or the forum to other individual students again.

Designing an ideal collaborative learning environment as a starting point allows the learners to gain insight and develop strategies for their own learning environments especially on the web. It is also important for the instructors to understand and rationalize how and why the various features of the web are exploited and used.

2.2 Collaborative Learning and Social Interaction

Collaborative learning refers to a situation in which student's works as a group for a particular academic goal. Collaborative learning leads to deeper level learning, critical thinking, shared understanding, and long term retention of the learned material (Garrison, Anderson, and Archer, 2001). It also provides opportunities for developing social and communication skills, developing positive attitudes towards co-members and learning material, and building social relationships and group cohesion Individuals build on their knowledge and skill through social interaction with others, who provide them with learning support for constant progress. In a learning environment, scaffolding can be provided not only by lecturers but also by peers (Puntambekar and Hübscher, 2005).

Research has shown that peers engaging in pair or group work are able to support each other in the processes of knowledge building (Lai and Law, 2006), critical thinking (Sharma and Hannafin, 2005) and problem-solving (Fawcett and Garton, 2005). As such, peer interactions that ensue from a collaborative approach represent an important component of the learning experience (Pascarella and Terenzini, 2005). In this regard, learners should be given the opportunity to participate in activities that encourages social interaction. The belief that social interaction is a key element in group learning is shared by many (distance) educational researchers. Gilbert and Moore (1998), Liaw and Huang (2000), and Northrup (2001), confirm the notion that social interaction is a condition for effective learning.

2.3 Collaborative Learning Supported by Computer Technology

Using technology to support collaborative learning is an emerging field of study which researches deem as "the emerging paradigm of computer-supported collaborative learning (CSCL)" (Resta and Laferrière, 2007). CSCL arose in the 1990s, which is a paradigm of instructional technology to combine the ideas of computer support and collaborative learning (Koschmann, 1996). CSCL focuses on how collaborative learning supported by technology can enhance peer interaction and group learning processes and hence facilitates knowledge sharing and distributing (Lipponen, 2002). The meaning of 'support' is that "CSCL implementation is not limited to introducing a new technological environment, but rather that it requires the alignment of technology with learning/teaching objectives which is not readily accomplished in technical environment" (Strijbos, Kirschner, and Martens, 2004).

Computer technology is a central element of CSCL development and research. The exciting potential of new technology to support people for communication and collaboration in innovative ways provides a stimulus for CSCL research. Crook (1994) considers computers as a context for social interaction, and he describes different types of collaborative experiences of learning with computers in four forms:

i. Involving computer-based tutoring systems, in which the student interacts with computers in solitary,

ii. Integrating broader social engagement, in which collaborative interactions of teachers and students are organized in relation to computers,

iii. At computers involving peer collaboration with a joint activity that provides a point of shared reference and understanding for students to co-construct a piece of writing or to work together at the site of a problem,

iv. Around and through computers, in which a wider learning community of individuals or small groups share a common working space accessible to shared files, and in which social exchange is possible through communicative means without participants necessarily co-present in the same place at the same time. Resta and Laferrière (2007) summarizes four instructional motives for the use of technology in support of collaborative learning to:

i. Prepare students with collaboration skills and knowledge creation for the knowledge society;

ii. Enhance student cognitive performance or foster deep understanding;

iii. Add flexibility of time and space for collaborative learning;

iv. Foster student engagement and keep track of student collaborative work.

According to Arvaja, Häkkinen and Kankaanranta (2008), collaborative technology in connection with corresponding pedagogical practices is usually called a CSCL environment. There has been wide-spread interest to explore the potentials of social media as CSCL.

2.4 Project-Based Collaboration

These include:

1) Project-based learning
2) Collaborative project-based learning

2.4.1 Project-Based Learning

Nowadays, projects play a large role in the context of educational environments because the project method is seen as a way to reach education goal (Parker and Chao, 2007). The project method is an instructional approach that engages students in learning knowledge and skills

through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks. Sola and Ojo (2007) have assessed and compared the relative effectiveness of project, inquiry or lecture-demonstration method on students' achievement. The results showed that the project method enhanced better performance better than the other two methods. In view of the results, this study concluded that the use of project method can motivate the learners better to want to learn which should be embraced by all lecturers.

Project-based learning appears to be an effective educational strategy used by teachers worldwide to this day, mostly in university for promoting student learning. Project-based learning is an essential model embodying the constructivist perspective of learning in educational settings (Harris and Katz, 2001; Milentijevic, Ciric, and Vojinovic, 2008). The constructivist approach in teaching helps students to:

(1) Construct knowledge by engaging them in stimulating learning encounters and through these experiences and thus forming a personal perspective of the world with the knowledge they already know (Kuhlthau, Maniotes and Caspari, 2007)

(2) Actively develop their understanding by combining their knowledge with reasoning and thinking skills (National Science Education Standards, 2007).

Project-based learning facilitates the development of ownership by affording learners the opportunity to select topics and take responsibility of their own learning (Alloway *et al.*, 1997; Worthy, 2000). It encourages learners to resolve realistic life problems with in-depth investigation in order to gain deep understanding of the facts and key concepts in the subject matter, rather than learning by rote (Grant, 2002; Williams, 2009). PjBL is individual or group activity that goes on over a period of time to complete a complex and open-ended task, resulting in a tangible product such as design, written report, presentation and performance (Helle, Tynjala, and Olkinuora, 2006; Prince

and Felder, 2006). Jung, Jun, and Gruenwald (2001) classify the values of PjBL including the following aspects:

i. PjBL is a model for classroom activities that shift away from the traditional classroom practices of teacher-centered to student-centered. PjBL provides many unique opportunities for teachers to build relationship with students. Teachers play the role of facilitator or co-learner instead of instructor.

ii. PjBL is the unique way that can motivate students by engaging them in their own learning. It provides opportunities for students to pursue their own interests, questions and make decisions about how they will find answers and solve problems.

iii. PjBL provides opportunities for interdisciplinary learning. Students apply and integrate the content of different subject areas at authentic moments in the production process, instead of in isolation or in an artificial setting.

iv. Students' project production, which includes documentation of the learning process as well as the students' final projects, can be shared with other teachers, parents, mentors, and the business community who all have a stake in the students' education.

2.4.2 Collaborative Project-Based Learning

There has been an increasing interest in collaborative learning using group projects across most disciplines (Nicol and MacLeod, 2004). Group project encourages students to work together over a considerable length of time to explore an open-ended theme or problems which interested them (Harada, Kirio and Yamamoto, 2008). This requires collaborative investigation

where team members need to plan, implement, and co-ordinate their activities and to share information and knowledge (Laffey, Tupper, Musser and Wedman, 1998). This process promotes collaborative learning, which in turn, collaborative learning is a learning technique through which students working as a group to create a project. As such, PjBL and collaborative learning are highly compatible for effective implementation into the classroom (Lou and MacGregor, 2004).

In collaborative Project-based learning, active participation should be in the entire process and students must feel involved, otherwise the group project will be bound to fail (Polman, 1996). Besides, collaborative projects typically involves students carrying out tasks that lead to an artifact, which in many cases, consists of a written report (Helle *et al.*, 2006). Co-authored document is in a "constant state of potential collaborative change" (Kessler, 2009). Co-authoring of documents by group members is a key aspect of collaborative learning within the context of group projects.

Since interaction among group members is the key factor for Collaborative PjBL, one big challenge arises when incorporating this method in traditional classroom settings, that is, students' interactions are limited in face-to-face contexts (Krajcik, Czerniak and Berger, 2002). If learners are given more opportunities to work together with fewer time and space limitations, they might obtain more productive outcomes from project work. Larruson and Alterman (2009) states, ''using collaborative technology to extend the physical borders of the classroom can be of significant value''. Students need to be encouraged not only to work individually but also to work collaboratively in both face-to-face classrooms and online environments (Lou and MacGregor, 2004). Thus, at the operational level, collaborative PjBL approach normally uses information and communication technology to support the learning activities. (Santoro *et al.*, 2003).

2.5 Building Interactivity into Web-Based CSCL Environments

Interactivity is the degree a delivery technology is capable of establishing a two-way connection between distributed participants for the exchange of audio, video, text and graphical information (Wagner, 1994). Zhang and Fulford (1994) distinguish interactivity that relates to learner-content interaction and interactivity that relates to social interaction outside the instructional context (social interaction in the social (psychological) dimension). This corresponds to the two functions of social interaction depicted. Gilbert and Moore (1998) use the term social interaction for the socio-emotional and affective exchanges between learners in the task context and instructional interaction for leaner-content interaction.

They state that "it is important to distinguish between interactivity which is primarily social in nature and interactivity which embraces key instructional objectives". Within the context of social and instructional interaction, Northrup (2001) propose a framework of interaction attributes; each embedding possible strategies and tactics that can be used to facilitate instructional and social interactivity. The framework includes interaction with content, collaboration, conversation, intrapersonal interaction, and performance *support.* She first discusses the pedagogy used to promote the interaction and then a web-based software tool that allows the interactivity that is needed to support this. In this view, tools which fulfill the functions proposed in the framework increase the environment's interactivity and thus the level of interaction,

2.6 Changing the Instructor's and/or Learners' Role

The ways instructors could playa (new) role in stimulating social interaction between group members in collaborative learning environments and/or how the members should socially interact within the group. Three factors drive this changing of roles, namely the shift from teacher-centered to learner-centered learning, the shift from individual learning to group learning, and the shift from contiguous learning groups to asynchronous distributed learning groups.

Burge (1994), in examining on-line courses, found four types of peer behaviors required in on-line collaborative learning, namely participation (for example, giving alternative perspectives, attending to the experiences of others), response (e.5g. giving constructive feedback, answering questions), affective feedback (for example, using a person's name, being patient, complimenting others), and focused messaging. They also found two types of instructor behavior, namely discussion management (for example providing structure, pacing and focusing the class discussions), and contribution (for example, giving fast and relevant technical help, sending timely and individualized content-related messages and feedback).Clark (2000) suggests that instructors initially start a discussion which students must continue on their own. This requires the instructor to relinquish control and avoid dominating the discussions, many instructors find it difficult to make the transition from complete control of the classroom to unobtrusive monitoring

2.7 Usability and Collaborative Learning Environments

Preece *et al*, (2004) described usability as a key concept in Human-Computer Interaction, "deals with making systems easy to learn and easy to use" and also distinguishable from the notion of 'user experience', which encompasses a wider set of concerns such as creating systems that are satisfying, enjoyable, helpful, or emotionally fulfilling. Also (Preece *et al.*, 2002), explains that" designing interactive products to support people in their every day and working lives" this means "creating user experiences that enhance and extend the way people work and interact" (Preece *et al.*, 2002),

The collaborative learning environment should be easier to learn and to use so that the learner is not frustrated in struggling to use the system. Much of the time should not be spent on learning how to use the system but the course content. Nielsen (2001) has remarked that general usability standards apply equally to e-learning, but additional considerations should be taken, for example the need to keep content fresh in learners' minds so that they do not forget things while trying to accommodate new concepts. Laurillard (2002) addresses issues of usability from a pedagogical point of view; she focuses on three aspects: user interface, design of learning activities, and checking whether learning objectives have been met.

Laurillard (2002) emphasis that "the aim is to design an interface that never intrudes on the task in hand". The graphical design should not be given a high priority at the expense of usability (Brinck *et al.*, 2002), so that a page looks attractive but difficult to read. Interface designers of the collaborative learning environment should not design a fancy interface in the expense of usability.In order for a collaborative learning environment or an e-learning to attain the usability that meets or exceeds the users' expectation, it should possess the following according to (Norman1993) Interactive, provide feedback, have specific goals, motivate, and

provide suitable tools. And avoid any factor of nuisance interrupting the learning stream. The e-leaming environment should engage the user and also provide feedback within the appropriate time. This will make the learner more active and not bored. The continuous feedback to the learner by the e-learning environment enables the user to move to the .next task or action.

The user becomes confident when the system provides feedback depending on the action performed by the learner. The system should help the learner achieve specific goals, and motivate the learner. The e-learning environment should provide the necessary and suitable tools for the learner to effectively perform his/her tasks to meet his/her goals, therefore a collaborative learning system should integrate the above strategies to ensure the environment that satisfies the learners' goals.

2.8 The Design Goals for a Collaborative Learning System

The following is a summary of the main design goals from most research for an ideal collaborative learning system.

i. Provide a client interface that allows multiple users to access and manipulate the information, store so as to: create and edit documents, manage individuals groups and classes, navigate and find documents and components, and gather information about project and user activity.

ii. Provide an information store that will: allow multiple classes, types, and subtypes of documents, allow decomposition into subcomponents, allow composition of parts into larger aggregates, and allow a variety of relationships between parts.

iii. Provide a server with the capability, information, and intelligence needed to control the information store and the users including the ability to: model the information store at

various levels, facilitate the communication between group members, provide for controlled access to documents and document support functions.

iv. Provide an application protocol that will, support communication simply and completely, allow objects of any type to be moved, maintain minimal state information, be extensible, and, provide look-ahead and caching schemes that minimize network traffic.

v. Provide a database schema to manage the document components, store information about documents and components, store information about users manage the component relationships and manage the user access to the information store.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 System Overview

The collaborative learning system run on Wampserver (Window, Apache, MySql, and PHP). The system was developed using PHP script, JavaScript and HTML interface and MySql database management system. The architecture is a client/server model where the users access the server through the network on HTTP protocol. Most of the tasks are performed in the server hence this increases the performance of the client computers. They only request and get responses from the server which processes their requests. In the architecture of the WWW, the client is normally a web browser such as Netscape or Internet explorer. Server may be any of the mentioned above, these servers support the HTTP protocol.

3.2 Design Architecture

The architecture of the system is client/server architecture since the system is a web-based. Client/server architecture is an arrangement used on networked devices that makes use of "distributed intelligence" to treat both the server and individual clients as intelligent, programmable devices, thus exploiting the full computing power of each. This is done by splitting the processing of an application between two distinct components: a "front-end" client and "back-end" server as shown below

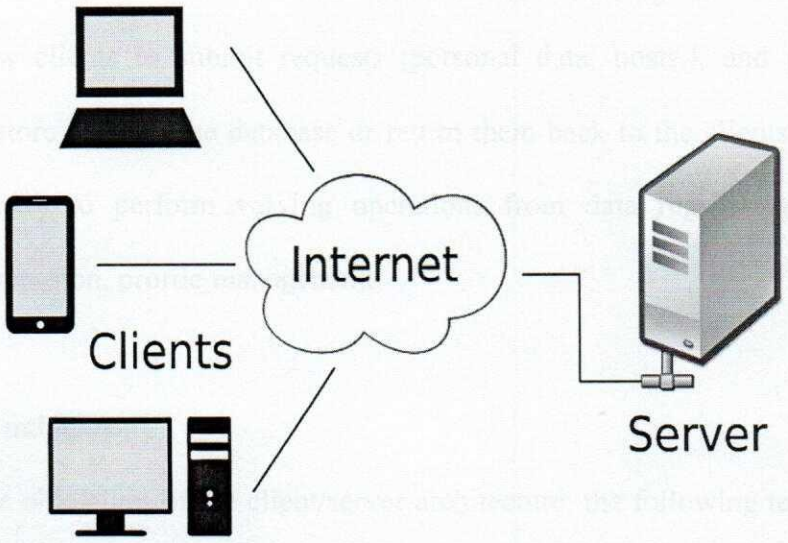

Figure 3.1 Client/Server Architecture of the System

The client component is usually a stand-alone personal computer whiles the server component, which can be another personal computer, minicomputer or a mainframe services requests from client computers. The advantage of the client/server architecture over older architectures is that the client and server machines work together to accomplish the processing of the application being used. Not only does this increase the processing power available, but it also uses that power more efficiently. The client portion is typically optimized for user interaction, whereas the server portion provides the centralized, multi-user functionality.

Servers allow clients to submit requests (personal data, posts.), and processes these requests and either store them in the database or return them back to the clients. Clients on the other side allow users to perform varying operations from data registration, forum post, shoutbox/general discussion, profile management.

3.3 Design Technologies

To realise the objectives of the client/server architecture, the following technologies will be employed in designing the system and they include:

i. Design Tools: Under this section, tools such as Adobe Dreamweaver and Adobe Fireworks will be used to write mark-up tags (HTML), edit graphics, build user interfaces, structure contents, and lots more.

ii. Scripting Languages: Here, tools that will be used to write the program code and scripts to add more flexibility and dynamism to the designed web pages, to process, store, transfer and retrieve data and connect to the database and server engine falls under this category. The ones that will be used for the system in view are Javascript and PHP.

iii. Database Engine: This consists of the tool that will store organize, manipulate, process and retrieve data for display at the front-end. The database technology that will be employed for this project work is MySQL. MySQL was designed for three principles, which are performance, reliability and usability. It is a cheap, distinctive, fast and efficient RDBMS (Relational Database Management System) created by following those principles. MySQL is a perfect tool for developers and administrators to establish maintain and configure complex applications.

iv. Server Engine: This project will need a testing server on the system acting as the local host since it uses the client/server approach. The server engine that will be used for this work is the Apache Web Server. Its job is to parse any file requested by a browser and display the correct results according to the code within that file. Apache is quite powerful and can accomplish virtually any task that a Webmaster requires.

3.4 Input Design

In order to achieve the desired output, an appropriate input structure that will receive inputs from the clients must be designed. For the forms, input data are captured using text boxes, drop downs, check boxes, radio buttons and commands are executed using submit buttons. Input data are then forwarded to the server for further processing.

3.5 Process Design

This stage involves the step needed to take to arrive at the output desired by transforming the input. Firstly, the input data are verified and validated using edit routines to check for correctness, missing data format and input errors. Next, data are worked on through the

execution of program routines that will handle such request made. Processed requests are returned by the script that resides on the server as feedback response to the client and/or stored in the database as the case may be.

3.5.1 Design Structure

The process design of this system starts from the homepage where registered users (Students, Lecturers) key in their login details so as to gain access to the system's services which include uploading and downloading of course materials, general forum chat, posting of discussion topic, taking online quiz .Voluntary exit is made possible by clicking on the logout link. Each of this process will be embodied in the development section of the web pages that will be displayed as output. The diagrammatic diagram showing the flow chart is shown below:

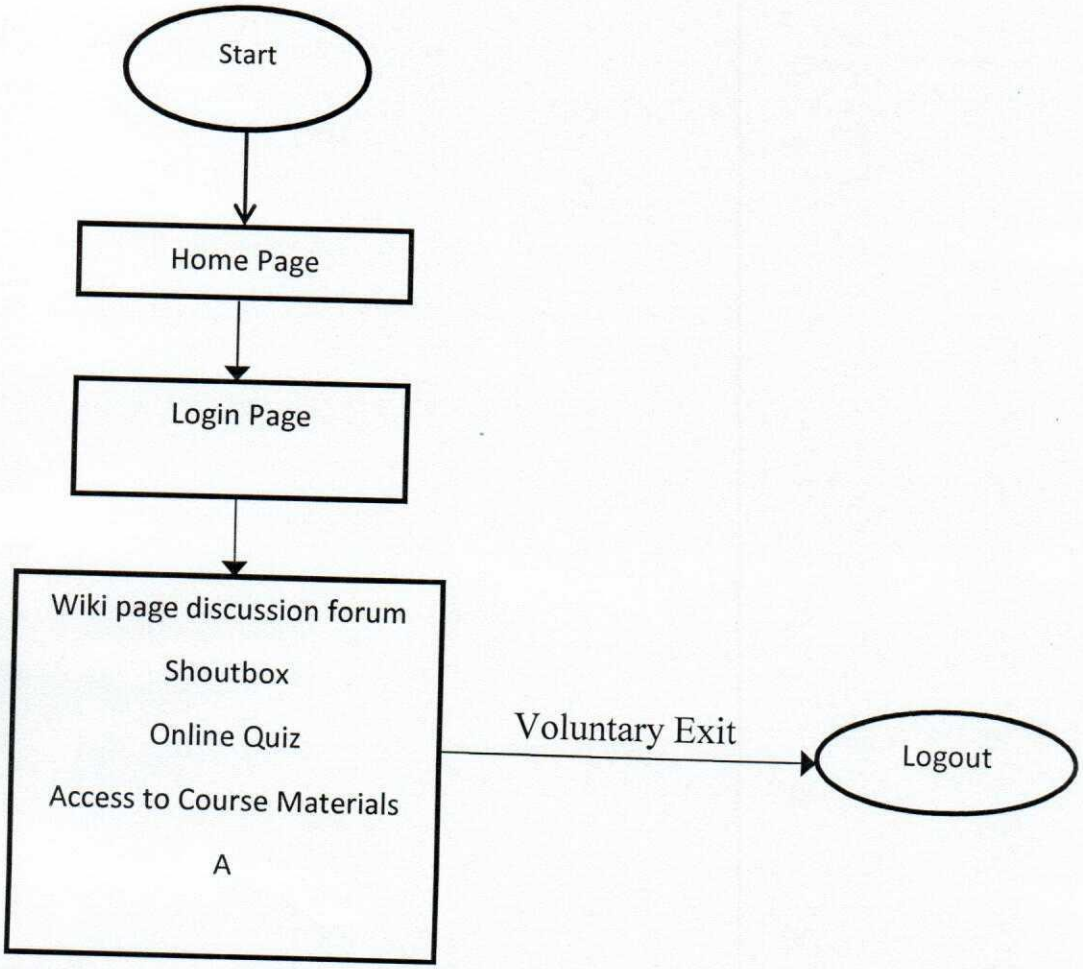

Figure 3.2 Design Structure of the System

3.6 Object Oriented Design of the Proposed System

A software system can be said to have two distinct characteristics: a structural, "static" part and a behavioral, "dynamic" part. In addition to these two characteristics, an additional characteristic that a software system possesses is related to implementation. The static characteristic of a system is essentially the structural aspect of the system that defines what parts the system is made up of and it includes the u*se case* diagram.

3.6.1. Use Case Diagram

The proposed system includes three actors; Administrator(s), Tutors, and Students. Each actor interacts and participates in a set of use cases.

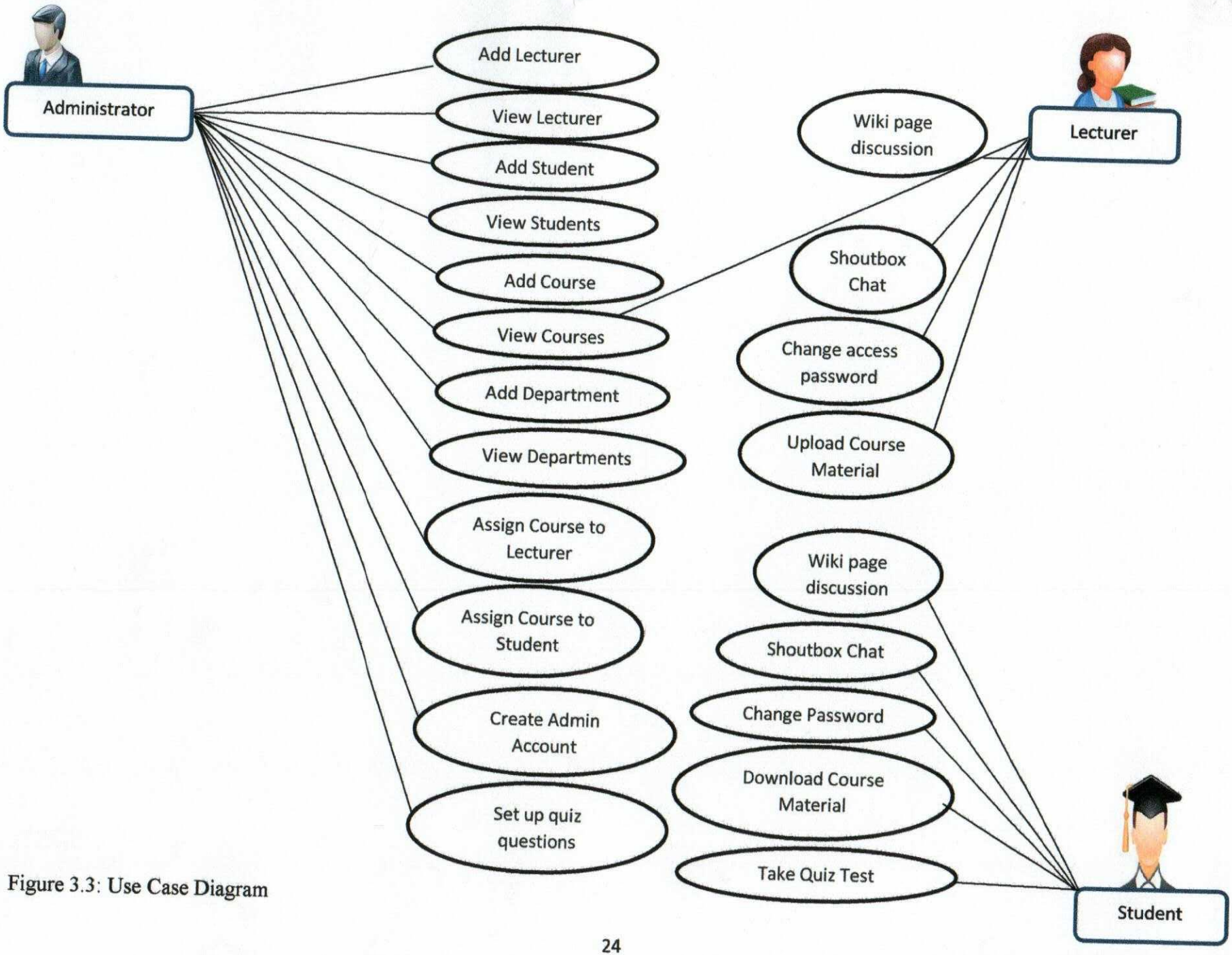

Figure 3.3: Use Case Diagram

3.6 Interfaces

3.6.1 Administrator interface

The administrator manages the system by content updating and managing users and ensuring that the system is functioning properly.

3.6.2 The Lecturer's Interface

The interface of the teacher contains the main functionalities of the system, which provides the teacher with a set of features that allow him to carry out his tasks in an effective way. Several tasks can be done by the teachers.

3.6.3 Student's Interface

The main role of this interface is to offer to the learner access to training courses as well as communication and interaction spaces.

3.6.4 Functional Requirements for a Collaborative Learning System

The following are the functional requirement for the collaboration learning system

Table 3.1: Functional Requirements

S/NO	USERS	FUNCTIONAL REQUIREMENTS
1	Administrator	• To manage Courses • To manage course creator • To manage course information • To view Assignment calendar • To view collaboration tools such as:-chats, forums ,groups , classes, Editors • View departments and courses. • Manage lecturers • Manage all users and their privileges • Manage evaluation
2	Students	• To view courses • To view lecturers • To view notes • To post and view comments • To create personal profile and edit profile • To collaborate using chat, group, class, forums and support tools for learning process. • To view group and classes • To download notes posted by lecturers.
3	Lecturers	• To create notes through text editor or upload

		• Post a forum topic. • Set quiz inform of multiple choice or discussion questions. • Create class or group • Post and view comments. • View and send messages • View evaluation • Use collaboration tools: -chats, groups, classes, forums, comments and blogs. • Edits notes through text editor • View notes posted by co-lecturers View assignment calendars

3.7 Output Design

This is the service rendered by the system. The output from the system is in form of a web page. The result of the quiz carried out by the users is displayed on the screen and the class forum which is interactive and open to everybody on the network. The output of this program can be printed out if necessary.

3.8 Database Specification

Data is essential for processing to take place. Input data needs to be captured, validated, processed, stored or retrieved for the system to function effectively. Thus, the

design of the database goes a long way to determine how data will be stored, organized and retrieved when needed. The needed inputs are stored in a database for record keeping and table objects were used. The field names, field size and data types are specified in the tablesas shown as follows:

Table 3.2: Table design for Student's information

FIELD NAME	DATA TYPE	FIELD SIZE
StudentID	Integer	4
Matric	VarChar	12
Surname	VarChar	20
Firstname	VarChar	20
Lastname	VarChar	20
Fullname	VarChar	65
Pic	VarChar	70
Email	VarChar	40
Password	VarChar	10

Table 3.3: Table design for Lecturer's information

FIELD NAME	DATA TYPE	FIELD SIZE
StaffID	Integer	4
Username	VarChar	12
Surname	VarChar	20
Firstname	VarChar	20
Lastname	VarChar	20
Fullname	VarChar	65
Pic	VarChar	70
Email	VarChar	40
Password	VarChar	10
Department	VarChar	60

Table 3.4: Table design for courses allocated to lecturers

FIELD NAME	DATA TYPE	FIELD SIZE
Id	Integer	4
CourseId	VarChar	10
LecturerinchargeId	VarChar	3
CourseCode	VarChar	10
CourseTitle	VarChar	80

Table 3.5: Table design for courses allocated to students

FIELD NAME	DATA TYPE	FIELD SIZE
Id	Integer	4
StudentId	Integer	4
CourseId	VarChar	10
CourseTitle	VarChar	80
CourseCode	VarChar	8
StudentFullDetails	VarChar	100

Table 3.6: Table design for courses

FIELD NAME	DATA TYPE	FIELD SIZE
CourseId	Integer	4
CourseTitle	VarChar	80
CourseCode	VarChar	8

Table 3.7: Table design for departments

FIELD NAME	DATA TYPE	FIELD SIZE
Id	Integer	4
Name	VarChar	50

Table 3.8: Table design for course material upload

FIELD NAME	DATA TYPE	FIELD SIZE
FileId	Integer	4
Floc	VarChar	500
Fdatein	VarChar	200
Fdesc	VarChar	100
Teacher_id	Integer	4
CourseId	Integer	4
Fname	VarChar	100

Table 3.9: Table design for forum post

FIELD NAME	DATA TYPE	FIELD SIZE
TopicId	Integer	3
PosterId	Integer	4
CourseId	Integer	4
CourseCode	VarChar	8
Postername	VarChar	80
Topictitle	VarChar	100
Topicbody	VarChar	100
DayTime	VarChar	70

Table 3.10: Table design for storing quizzes

FIELD NAME	DATA TYPE	FIELD SIZE
Id	Integer	11
Cat_id	Integer	11
Quiz_name	VarChar	500
Quiz_desc	VarChar	500
Added_date	DateTime	
Parent_id	Integer	11
Show_into	Integer	11
Intro_text	VarChar	4000

Table 3.11: Table design for storing answer to questions

FIELD NAME	DATA TYPE	FIELD SIZE
Id	Integer	11
group_id	Integer	11
Answer_text	VarChar	800
Answer_image	VarChar	450
Correct_answer	Integer	11
Priority	Integer	11
Corret_answer_text	VarChar	800
Answer_pos	Integer	11
Parent_id	Integer	11
Answer_text_eng	VarChar	800
Control_type	Integer	11
Answer_parent_id	Integer	11
Text_unit	Char	10

CHAPTER FOUR

IMPLEMENTATION AND RESULTS

This chapter introduces the full documentation of the web-based collaborative learning environment, the implementation scheme employed including software and hardware requirements of the system for high functionality and also system testing for verification and validation before hosting the website for full-fledge access.

4.1 User Documentation

This section describes the user's method employed in the design of the web-based system. The web pages are composed of HTML files, PHP scripts, Cascading Style Sheets (CSS) files and Images. The first page designed was the index.php page which serves as the landing page for both students and lecturers. On this page, the user can have snap information about the system, what it entails and its objectives. Also on the page, there is a link created to serve as entry point for both lecturers and students. The link pops up a login dialog where users can enter their login details (username and password). After verification of the login details, the user is redirected to a personalized home page where he/she can have full access to what the web site has got to offer. In the case of a user who happens to be a student, the home page consists of links to wiki pages for all courses he/she is offering, a link to the general shoutbox forum, a link to the quiz portal, a link to the settings page where a user can change the access password.

On the wiki page, both the user, his/her fellow colleagues, and lecturer(s) of a particular course can rub minds about a particular course. There are two text fields for capturing user input. The first captures the title of the post while the second captures the main body of the post. The general shoutbox is a platform where students and lecturers can engage

in real time chat. The quiz portal presents the students the opportunity to participate in quiz sections just to widen their understanding about the course(s) they are offering.

4.2 Requirements

This section simply discusses both the software and requirements need for this web application to function effectively both on the server as well as on the client's machine.

4.2.1 Software Requirements

a. Supported Operating Systems

i. Linux x86

ii. Mac OS X

iii. Windows XP, Windows Vista, Windows 7, Windows 8, Windows 8.1, Windows 10

b. Supported Web Servers

i. Apache

ii. Zeus

iii. AppServ

c. PHP Compatibility

i. 4.3.1 and above

ii. Safe mode off

iii. Register_global off

iv. Memory_limit 32MB or more

d. MySQL Database Requirements

i. 4.1.20 or newer

ii. InnoDB storage engine

iii. MyISAM storage engine

e. Supported Browsers

i. Microsoft Internet Explorer 7 and above

ii. Mozilla Firefox 3.0 and above

iii. Opera mini 3.1.2 and above

4.2.2 Hardware Requirements

For a system running on Windows OS (Operating System), the following hardware specification will be required to access the web-based collaborative learning environment.

i. Intel Pentium 4 or AMD Athlon (32-bit or 64-bit) processor

ii. Windows XP or later

iii. 1GB of RAM

iv. 1024x768 display (1280x800 recommended) with 16-bit video card

v. DVD-ROM drive

vi. Broadband Internet connection; required for online services

For a system running on Mac OS X or Linux OS, the following hardware specification will be required.

i. Multicore Intel processor

ii. Mac OS X v10.5.7 or later

iii. 1GB of RAM

iv. 1024x768 display (1280x800 recommended) with 16-bit video card

v. DVD-ROM drive

vi. Broadband Internet connection; required for online services

4.3 Implementation

The purpose of implementation is to make the new system available to a prepared set of users and positioning on-going support and maintenance of the system for the organization. At a finer level of detail, deploying the system consists of executing all steps necessary to educate the users (students, lecturers) on the use of the new system, placing the newly developed system into production, and ensuring that all sub-components required for the system to function properly are in place. For full implementation of this system, the website must be hosted or published as earlier stated above.

4.4 Testing

As said earlier, the architecture employed in developing the system is a client/server model. Here, the HTML pages is what is displayed on the user's browser, then the Apache web server communicates with the MySQL to fetch information from database based on user's requests/actions. Though, browsers will be configured as clients to access the server when the website is eventually hosted. In testing the web pages. WAMP (Version 2.1) which houses the Apache web server, MySQL, PHP and web browsers (Mozilla Firefox 3.0, Internet Explorer 7) were used to test the functionality of the developed web pages. The PHP scripts and MySQL database allows for dynamism and high level of interaction among the pages.

4.4.1 Testing Results

Sample data was used to test the functionality of the website developed. The results are in form of screen shots and are discussed below.

4.5 The Home Page

The home page acts as the landing page whenever the site is loaded. It shows brief information of what the website is all about, it also contain links that bring up pop-up login dialogs for users (students and lecturers). It also contains links that redirects to the University's mission and vision statement pages. When a user who happens to be a student clicks on the login link, a pop-up is shown where the user can enter his/her email address and password so as to gain access.

4.5.1 Lecturer's Home Page

Upon successful login, the lecturer is redirected to his personal home page where he can find links to various sections of the website. The links are:

i. **Home:** This links redirects back to the lecturer's home page.

ii. **Shoutbox:** This links redirects the lecturer to a general forum where students and lecturers can engage in real time chat.

iii. **Settings:** This link redirects the lecturer to page where he/she can change his access password.

iv. **My Courses:** This section displays a list of courses that a lecturer is in charge of. There is a link for every course in this section and the link redirects to the wiki page for that particular course. The wiki page in this case is only exclusive to the lecturer(s) in charge of a particular course and students offering that course.

v. **Logout:** This link ends the current session, logs out the lecturer and redirects backs to the home page.

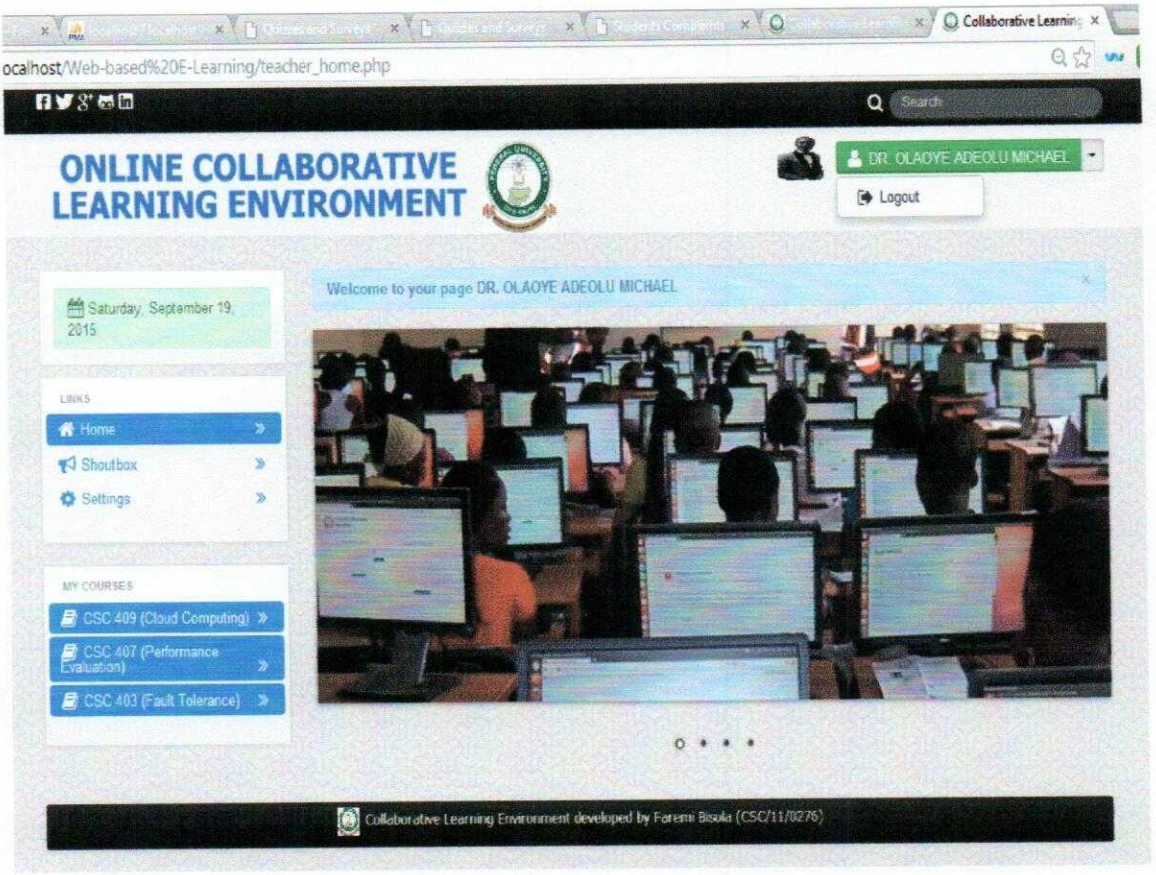

Figure 4.1 Lecturer's home page

4.5.2 Student's Home Page

Upon successful login access, the student is redirected to his personal home page where he/she can find links to various sections of the website. The links are:

i. **Home:** This links redirects back to the student's home page.

ii. **Shoutbox:** This links redirects the student to a general forum where students and lecturers can engage in real time chat.

iii. **Settings:** This link redirects the student to page where he/she can change his access password.

iv. **My Courses:** This section displays a list of courses that a student is offering. There is a link for every course in this section and the link redirects to the wiki page for that

particular course. The wiki page is this case is only exclusive to the lecturer(s) in charge of a particular course and students offering that course.

v. **Logout:** This link ends the current session, logs out the student and redirects backs to the home page.

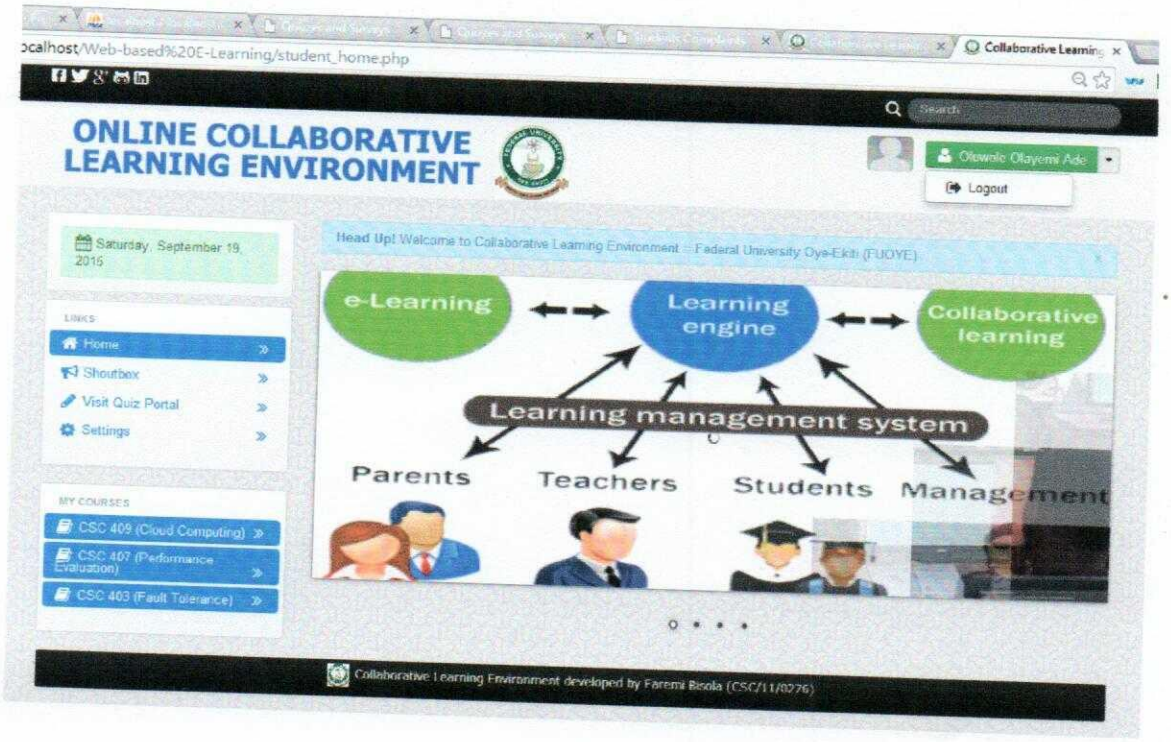

Figure 4.2Students home page

4.6 Shoutbox

Shoutbox is a platform that gives room for real time chat. When the Shoutbox link is clicked, the Shoutbox chat page is loaded, the user can see engage in discussion with other online users. The screenshot of the general Shoutbox is shown as follow:

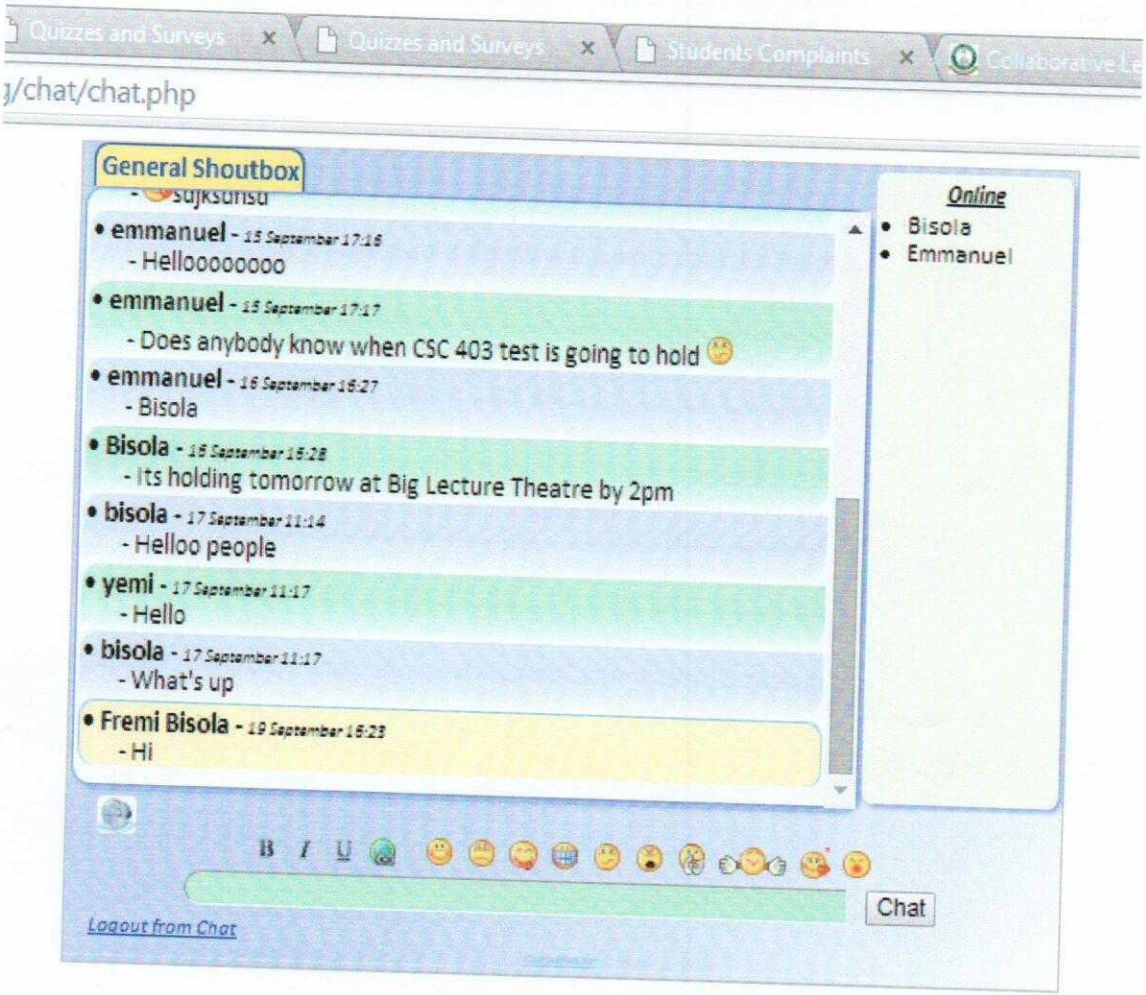

Figure 4.3Shoutbox General Discussion Forum

4.7 Wiki Page

As discussed earlier the Wiki page access for a particular course is only exclusive to the lecturer(s) in charge of a particular course and students offering that course. Here, students and lecturers can interact by making posts. The screenshot of the wiki page is shown as follow:

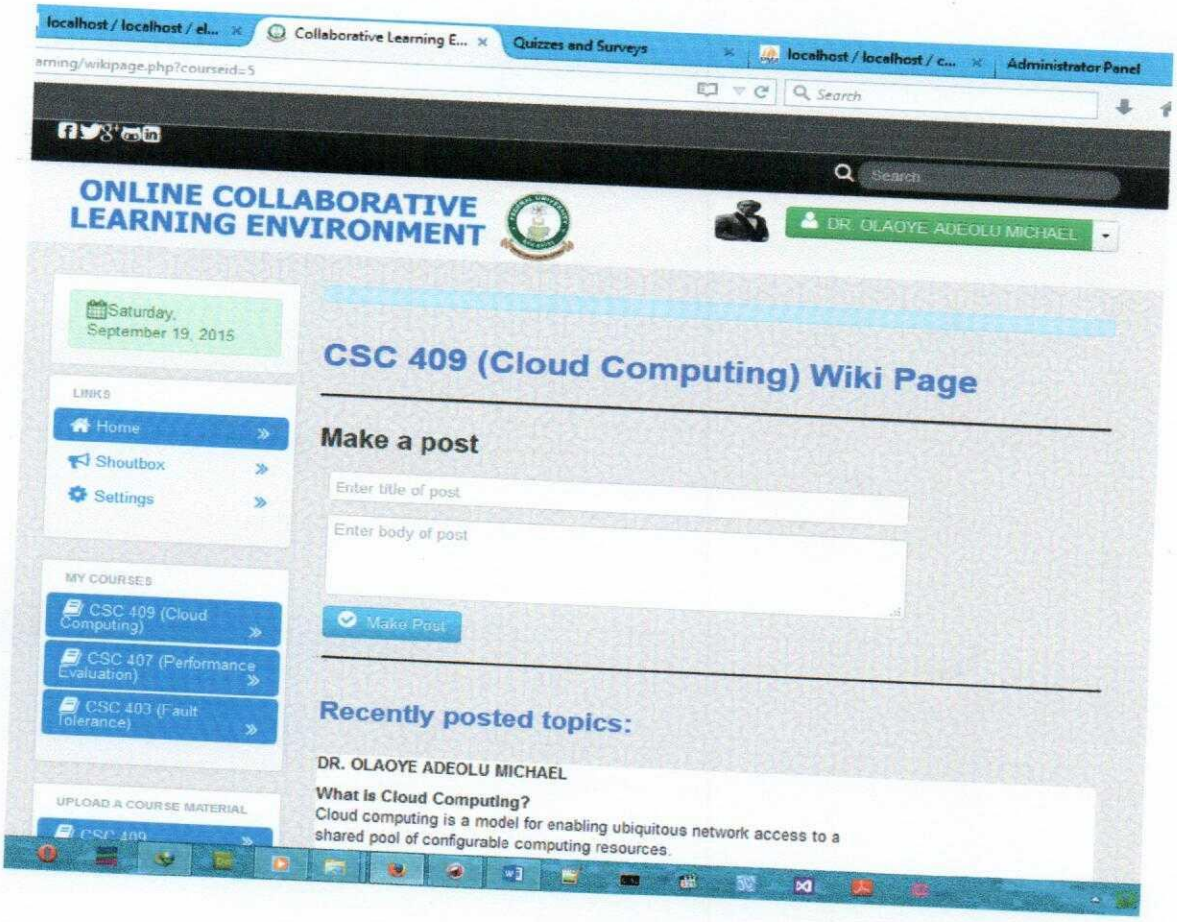

Figure 4.4 Wiki page screenshot

4.8 Course Material Upload

The course material upload link is only available to lecturers, there is a link for each of the courses that a lecturer is in charge of, clicking on any of these links redirects to the upload page for that course. That's where the lecturer gets to upload a new course material and see the list of uploaded course materials. The screenshot of the course material upload is shown as follow

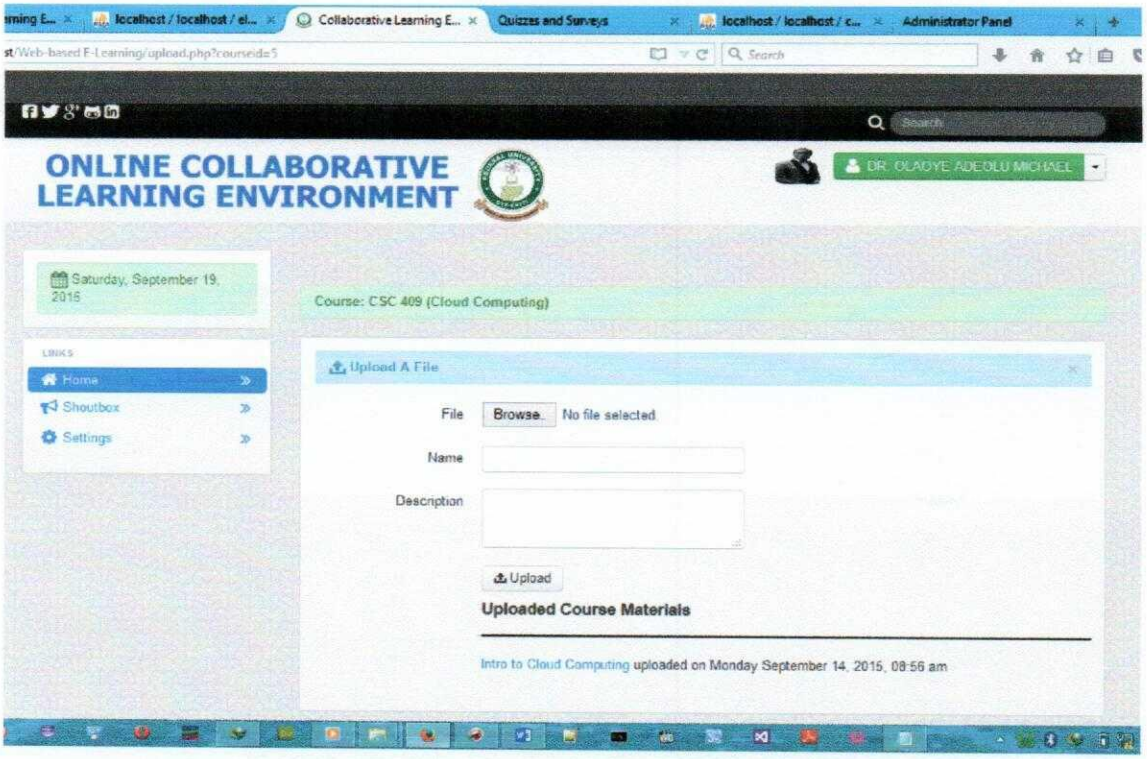

Figure 4.5 Course Material upload page

4.9 Administrator Section

The administrator of this website is capable of performing tasks like account setup for both lecturers and students, addition or removal of a course, addition of departments, assigning a course to a lecturer, enrolling students for courses, creation of multiple admin accountsas shown in Figure 4.6

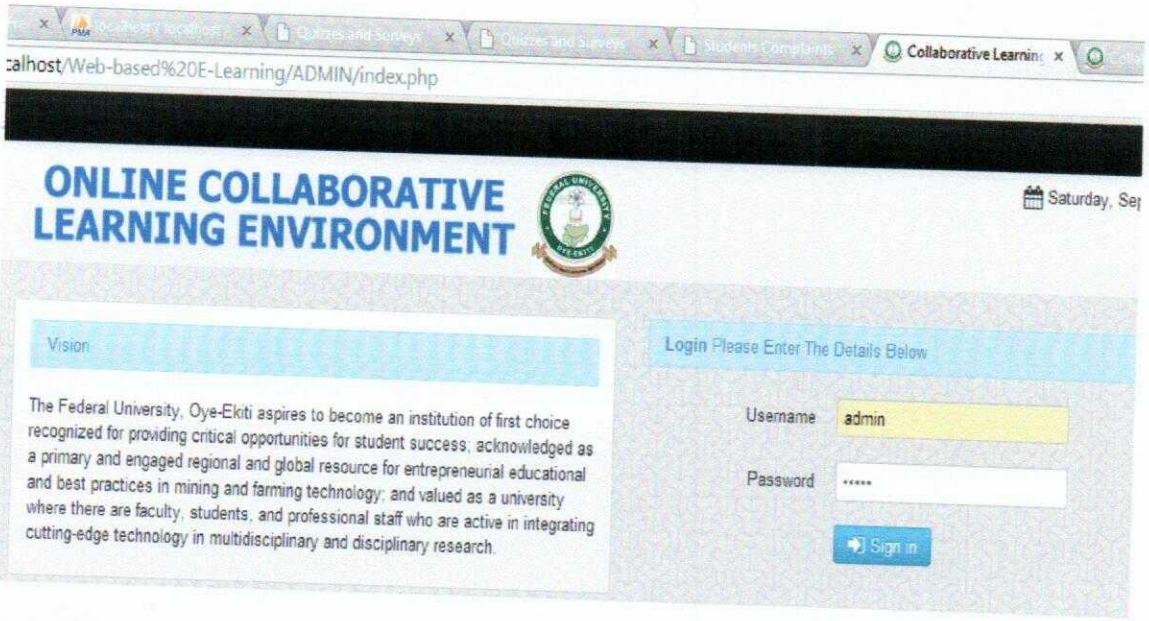

Figure 4.6 Admin login page

Upon successful login, the admin is redirected to his home page where he can perform all the tasks stated above. The screenshot of the admin's home page is shown in Figure 4.7

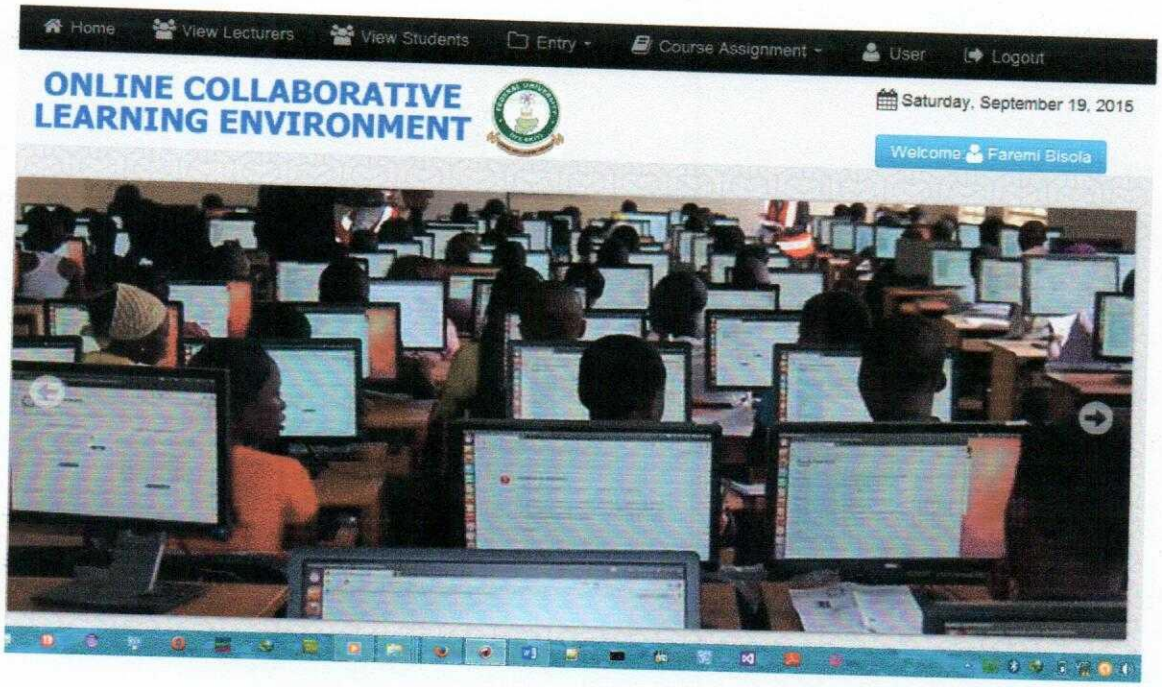

Figure 4.7 Administrator's home page

4.9.1 Course Assignment

i. Assign Course to Lecturer page

On this page, lecturers are assigned to courses. There is a drop down list of all registered lecturers and there is also another list for all registered courses. A lecturer can only be assigned to a course once; subsequent attempts will flag an error as shown in Figure 4.8

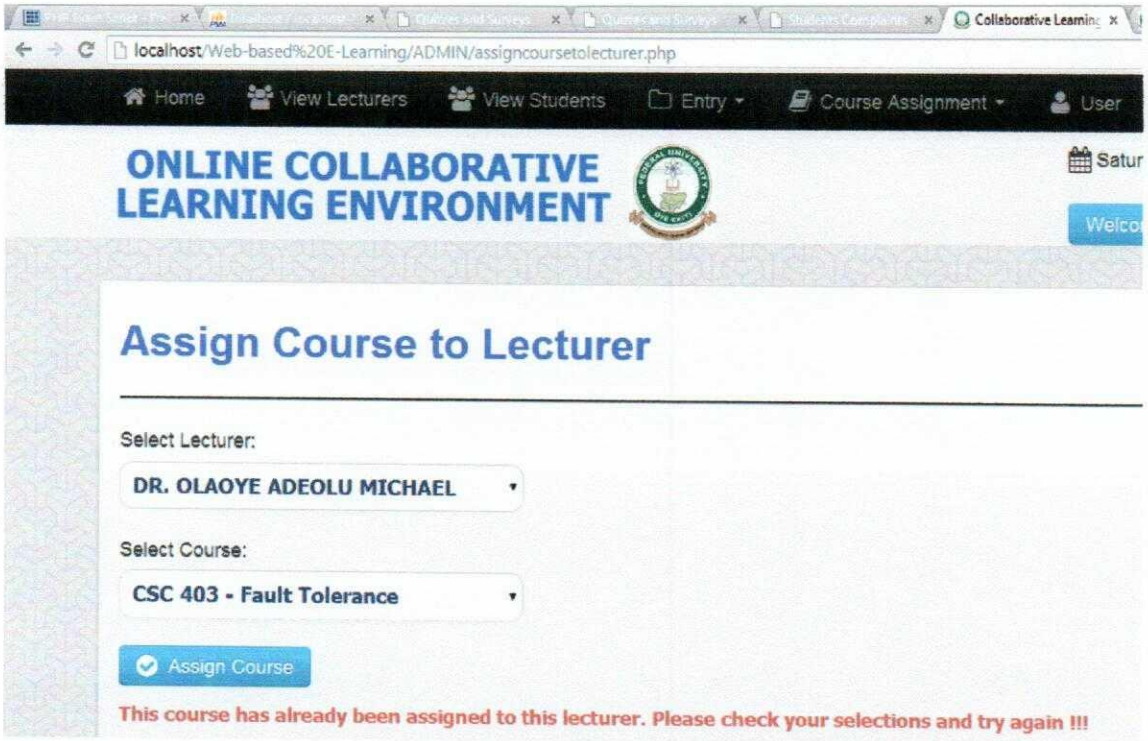

Figure 4.8 Course assignment page for lecturers

ii. Enroll Student for a Course

On this page, students are enrolled for courses. There is a drop-down list of all registered students and there is also another drop-down list for all registered courses. A student can only be assigned to a course once, subsequent attempts will flag an error as shown in Figure 4.9

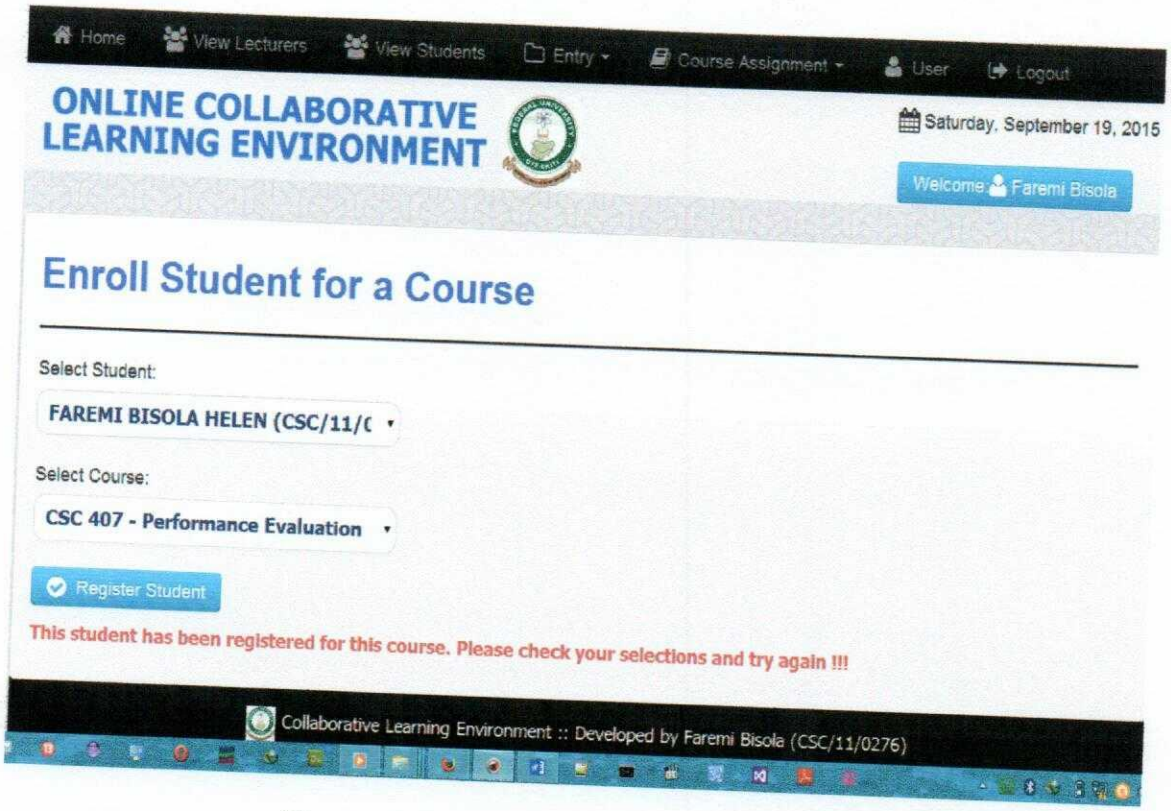

Figure 4.9 Course assignment page for students

4.10 Quiz Portal (Administrator)

This system gives room for students to take some practice test in form of online quiz. The website administrator is the one responsible for keying in the questions just to preserve the integrity of the database. When he logins in into the quiz portal, he can perform some set of operations and they are:

i. **Categories:** This option allows the administrator to create a new quiz category, edit/delete an existing quiz categoryas shown in Figure 4.10

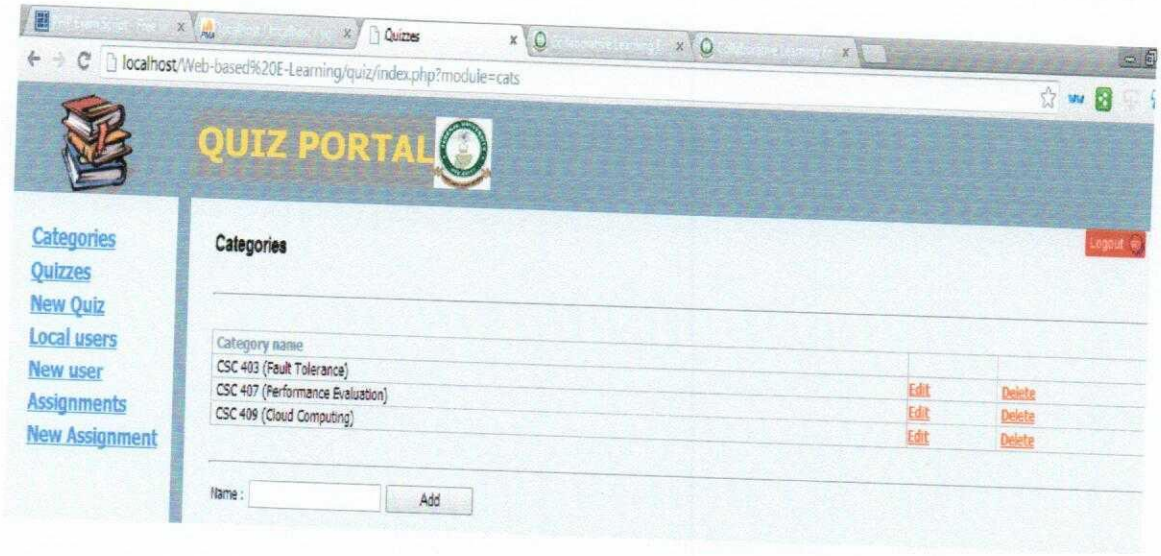

Figure 4.10 Quiz category page

ii. **Quizzes:** Here, the administrator can create a new quiz (a set of questions) which must belong or fall under an existing quiz category, the administrator can also edit/delete existing quizzesas shown as follow:

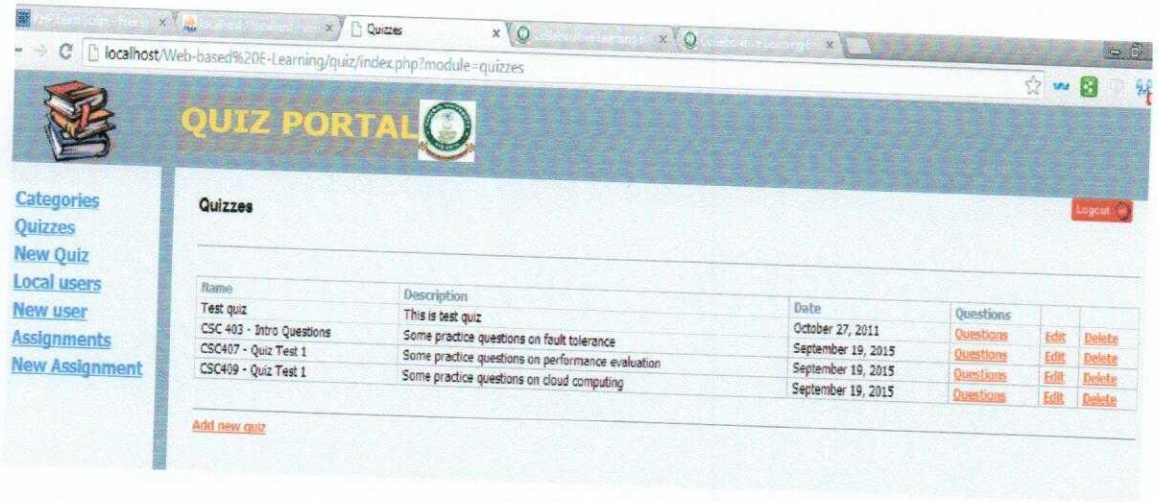

Figure 4.11 Quizzes page

iii. **Local Users:** This option gives the administrator the opportunity to set up login details (username, password) for students. The administrator can also edit or delete existing user accounts.

iv. **New User:** This option gives the administrator ability to create multiple administrator accounts as the need arises.

4.11 Evaluation and Result

The collaborative learning system was evaluated by the use of evaluation methods. These methods are used to measure the effectiveness of a computer system by looking at how learnable, efficient, memorable, safe, and satisfying it is for a given set of users. There are two major types of usability testing; inspection and user testing. Inspection testing is done by the specialists and the development team. While user testing method, is carried out by the target users of the system. The second method was used in this case to carry out evaluation. The following sections discuss the evaluation exercise as done by the target users of the system

4.11.1 Students Evaluation

Evaluation of the system was carried with the target learners of the collaborative learning system. The students were issued with student evaluation to sign and the questionnaire was used in the evaluation exercise of the system. The outcome of the students is shown below.

Table 4.1: Usability Evaluation Outcome by Students

NO	Evaluation Factor	No Of Students	Strongly Agree %	Agree %	Neutral %	Disagree %	Strongly Disagree %
A	Help Facility	10	20	60	20	0	0
B	Understandability	12	60	60	0	0	0
C	Learnability	9	30	50	10	0	0
D	Error Recoverability	10	30	60	10	0	0
E	Error Recognition	10	40	40	20	0	0
F	Simplicity	10	60	20	20	0	0
G	Effectiveness	10	70	20	10	0	0
H	Efficiency	10	30	40	20	10	0
I	Satisfaction	8	40	20	20	0	0
	Mean Average %		31	38	19	1.0	**0**

4.11.2 Observation

Observation is very useful method especially for obtaining an insight into usability of software as you watch users use the software. During observation, the facilitator also played a role of the observer. This was because it was costly to hire tools such as video to record usability testing sessions. The students were asked to perform tasks such as chatting, downloading notes, answering questions and posting forums. The following are the findings: Students could comfortably use the system and perform all the tasks presented in the system. , Students navigated well from one task to the other and Students performed tasks easily and effectively.

4.12 Hosting

Hosting means providing space on internet servers for storage of World Wide Websites which can be accessed by others through the network. This service is usually offered by ISPs (Internet Service Providers) or web hosting specialists. To make a website accessible, it is hosted to make it visible to the world and to get this done, it must be stored on a web server. In a web-hosting environment, an amount of space is provided to place out files, data, documents, and bulletins for people to access with their web browsers. The web host will also provide means to get a domain name so that visitors can easily locate the web site on the internet.

4.13 Limitations

Due to financial constraints, the application is yet to be deployed on the public domain (www). Power supply is another major setback that could limit the full functionality of this application.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The field of Web-based learning has evolved over the past decade, nevertheless, the development of Web based learning environment (WBLE) focused on the use of emerging Internet technologies without fully considering the previous research on the learning as a social process .The social process of learning involve participation in a community where learners make inferences of Phenomenon through group discussions. With the vast spread of the web, it was not until recently that collaborative learning became increasingly popular.

This study was based on developing a collaborative learning system for Federal University Oye-Ekiti students and the lecturers, the system presented some common collaboration tools and features that can be used by both lecturers and students in the learning environment. The students can form online groups and classes and carry group tasks and communicate with their colleagues through forums, group chat and posting of comments and messages to their lecturers. The web-based collaborative learning environment can help foster unity and also create a general sense of belonging among lecturers and students more than what the four walls of a classroom can offer as ideas can be shared among concerned parties with just a few click of the mouse

5.2 Recommendations

Further work should be carried on the following. First, how to assess the quality of interactions and the quality of the co-learning experience in Web-based learning is one research question that remains unsatisfactorily answered. Thus many analysis models are focused on measuring the quantity of messages or interactions, type of content, units of meaning, or patterns of connection and Second, measuring student and learning progress

Itself will always be a challenge to educators in any kind of learning environments including Web -based learning. And therefore further research should be carried out in order to answer the following questions.

i. How can we effectively evaluate/assess the individual learning outcomes or performance in web -based collaborative learning environment?

ii. What variables are associated with outcomes of this web-based collaborative learning?

iii what other issues can be raised related to the peer-evaluation in the web-based Collaborative learning?

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APPENDIX A

SAMPLE OF STUDENT CONSENT FORM

USER REQUIREMENT COLLECTION OF COLLABORATIVE LEARNING SYSTEM FOR HIGHER INSTITUTION LEARNERS

Student Consent Form

1.....(Surname and First Name) with Matriculation Number.....,a student at high school. I have willingly participating in this data collection exercise by filling this questionnaire without any pressure. I understand that any data or answers to questions will remain confidential in respect to my identity. I'm aware that I am free to withdraw from the exercise and terminate my participation at any time.

Signed.....date .....

APPENDIX B

SAMPLE OF SYSTEM EVALUATION

QUESTIONNAIRE B: STUDENT EVALUATION

Please read the statements below and tick the box that you feel is most appropriate about the system you have used. For (Students)

Name..... (First Name and Surname)

Section One	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The user interface;					
1) Is easy to use	☐	☐	☐	☐	☐
2) Is easy to understand	☐	☐	☐	☐	☐
3) Is easy to learn how to use it	☐	☐	☐	☐	☐
4) Is easy to recover from errors	☐	☐	☐	☐	☐
5) Has help Facility	☐	☐	☐	☐	☐
6) Has unnecessary information	☐	☐	☐	☐	☐

APPENDIX C

SAMPLE SOURCE CODE

Home Page

```
<?php
include('header.php');
//Start session
session_start();
//Unset the variables stored in session
unset($_SESSION['id']);
?>
<body>


 <?php include('navhead.php'); ?>


 <div class="container">
   <div class="row-fluid">
     <div class="span10">
       <ul class="breadcrumb">
         <li class="active">Login<span class="divider">/</span></li>
         <li><a href="login_student.php"><i class="icon-group icon-
    large"></i> Teacher</a><span class="divider">/</span></li>
         <li  class="active"><i class="icon-group icon-large"></i> Student</li>


        <div class="pull-right">
          <li>
```

```
            <i class="icon-calendar icon-large"></i>
            <?php
            $Today = date('y:m:d');
            $new = date('l, F d, Y', strtotime($Today));
            echo $new;
            ?>
          </li>
        </div>
      </ul>

      <div class="alert alert-info">
        <button type="button" class="close" data-dismiss="alert">&times;</button>
        <strong>Login Student!</strong> Please Enter the Details Below.
      </div>

      <form class="form-horizontal" method="post">
        <div class="control-group">
          <label class="control-label" for="inputEmail">Username</label>
          <div class="controls">
            <input type="text" name="username" id="inputEmail"
placeholder="Username">
          </div>
        </div>
        <div class="control-group">
          <label class="control-label" for="inputPassword">Password</label>
```

```
            <div class="controls">
              <input type="password" name="password" id="inputPassword"
placeholder="Password">
            </div>
          </div>


          <div class="control-group">
            <div class="controls">
              <button type="submit" name="login" class="btn btn-info"><i class="icon-
signin"></i> Sign in</button>
            </div>


          </div>


          <?php
          if (isset($_POST['login'])) {


            function clean($str) {
              $str = @trim($str);
              if (get_magic_quotes_gpc()) {
                $str = stripslashes($str);
              }
              return mysql_real_escape_string($str);
```

```
}

$username = clean($_POST['username']);
$password = clean($_POST['password']);

$query = mysql_query("select * from user where username='$username' and password='$password'") or die(mysql_error());
$count = mysql_num_rows($query);
$row = mysql_fetch_array($query);

if ($count > 0) {
  session_start();
  session_regenerate_id();
  $_SESSION['id'] = $row['user_id'];
  header('location:home.php');
  session_write_close();
  exit();
} else {
  session_write_close();
  ?>
  <div class="pull-right">
    <button type="button" class="close" data-dismiss="alert">&times;</button>
```

```
                <div class="alert alert-danger"><i class="icon-remove-
sign"></i> Access Denied</div>
            </div>
            <?php
            exit();
        }
    }
    ?>

</form>
```