

**WEB ENABLED COLLABORATIVE AND CO-OPERATIVE
LEARNING SYSTEM**

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ABSTRACT

Research works in the field of electronic learning are represented by a broad spectrum of applications, ranging from virtual classrooms to remote courses or distance learning. In this project work I used a simple web-based training and quizzes system, in which, teachers and trainers can conduct any type of courses and set different types of quizzes and exams. The system allows potential users to store, update, and delete questions from the database using the web, in a very easy and simplified manner. In addition, teachers can track the activities of their students and can guide them to reach the pre-determined objectives of the courses. This system is used successfully in distance learning as well as in self-training. This system has been tested, ranged from basic to advanced namely: introduction to computer science, programming concepts using C++, digital logic design and fundamentals of database systems. The feedbacks of both teachers and students were highly promising

INTRODUCTION

1.1 Background to the Study

The methods that are used to share ideas and for collaboration are constantly changing and evolving. This has also had an impact on the way we learn. The methods are now ubiquitous in nature. In some cases, it has provided for building communities. The communities formed can be geared towards learning which can be both cooperative and collaborative in nature.

Collaborative learning is an instructional system of education in which students group together on a task and students can create the individual parts of an allotted task exclusively and after that set up the last cooperate, as an issue (Educause, 2010). Agreeable adapting, some of the time confused for collective learning, portrays a technique where students cooperate in little gatherings on an organized movement. Students are independently responsible for their work but also for the work of the group as a whole, and both outcome are assessed.

Interactivity and collaboration have become the keywords of the new web content and this has necessitated for the topic, design and implementation of web enabled cooperative and collaborative learning for Computer Science Department.

The need for education is increasing constantly and the development and improvement of the eLearning platform solutions is necessary (Paul Pocatilu, Felician Alecu & Marius Vetrici, 2012). Collaborative learning need to keep pace with technology, so the new direction is to leverage eLearning components system architecture in which this study intend to work upon. This will allow the students to cooperate and collaborate with each other in an unprecedented way so as to bring about learning.

1.2 Statement of the Problem

Lecturers find it difficult to know whether a given task assigned to students (usually in groups) which supposed to be cooperative and collaborative in nature fulfil its very purpose. Cooperative and collaborative learning are used to increase self-esteem and self-concept. Students who also live in different location find it difficult to cooperate and collaborate on a task face-to-face and it is most difficult if the task given span across holidays or festive period in which students have to live the vicinity of the campus and even the town which the campus is situated. How the students then successfully cooperate and collaborate virtually to bring about learning which is relative permanent change in behavior which is acquired through skills, experiences and knowledge in order to achieved some goals of cooperative and collaborative learning (which include celebration of diversity, valuing contributions, increased higher level of reasoning, greater transfer of learning between situations, and increased generation of new ideas and solutions)?

This system will provide a reliable and efficient platform for collaborative learning that will solve the problem of identifying inactive student(s), assign task to students while on break, track student progress, test for all the 3-levels of domains(cognitive, affective and psychomotor), catalyzed innovation and creation of learning community.

1.3 Aim and Objectives

The aim of this project is to design and implement a web enabled cooperative and collaborative learning system for tertiary students.

This is to be achieved by the following objectives:

- To study and review the existing methods of collaborative and cooperative learning in a bid to identifying their strengths and weaknesses.

- To design a web enabled collaborative and cooperative learning platform.
- Implement the designed system

1.4 Methodology

The methodology used in this project is object-oriented analysis and design. In object-oriented analysis and design, both data and action are of equal importance. Object-oriented Analysis and Design has been chosen because of its popularity and sophisticated design methodologies.

1.5 Scope of Study

This study looks into the processes of collaborative learning which aim to solve group investigation task, developed by Shlomo and Yael Sharan. It is a general classroom-organization plan in which students work in small groups using cooperative inquiry, group discussion, cooperative planning and projects-based task (Sharan and Sharan, 1992). The researcher focus on instructional and assessment in tertiary Institutions that involves collaboration and it can be modelled into web-based platform using the internet.

The key elements of collaborative learning, which the most outstanding experiments to date clearly show that to a large extent, group learning is based on making individuals feel responsible towards the group, whether because the task involves explaining something to other group members or because group communication has the purpose of producing a common item or solving a common problem (Trentin, G., 1999). The idea that collaborative learning is the development of shared meaning among group members reflects the larger CSCL (computer supported collaborative learning) perspective on learning, a perspective that emphasizes the social creation of knowledge as the basis of learning. Meaning is not pre-

packaged and delivered to the student for memorization; rather, it is negotiated among group members (Pea, 1994; Roschelle, 1992).

According to the description above, the main important components of collaborative learning in Web-based environment is how to realize social context, group learning process, communication each other (collaboration), and performance evaluation. Web-based collaborative learning is not only one computer programming, but also one system integrated collaborative learning essential spirit, process, social context, and more flexible and suitable, which as Brandon stated (1999) for on-line group learning that the collaborative development of shared meaning requires a substantial amount of communication, perhaps even more so in on-line than in face-to-face groups.

1.6 Significance of Study

The Implications of this project are:

- Reduce the cost overhead accrued by Universities for Deploying educational collaborative Solutions like Google Apps for education, Microsoft Apps for education and etc.
- It will equally reduce the cost of purchasing significant number of hardware and software by institutions.
- It is relatively inexpensive, less stressful, it does not consume time, and it is modern, reliable, dependable, and easily usable.
- It will bring about effective knowledge management which is much more important than document management.
- It will also provide opportunities and platform for the optimal utilization of the available devices that are owned by most students.

- Most Importantly, the students and lecturers of department of computer science and the University will benefit from the project because students can now remotely work and collaborate on task that involves group investigation, group discussion and cooperative work without physically interacting with each other. Festive period in which student and staff travelled to their home town or base can no longer hinder collaborative task once the user can have access to the internet.

1.7 Limitations of Study

This project only focused on the use of internet to support cooperative and collaborative learning within computer science domain. It is difficult for the researcher to know all types and various examples of collaborative task that is applicable in all the departments in the school due to the time the researcher have to carry out the project. This makes it impractical to modelled different types of group investigation and collaborative task into the system which could have make the system more versatile and a compelling platform for collaboration to suit all the department in the school.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

It is important to know that there is no single entry point of which we can say that eLearning originated from (Terry, 2010). Learning that is facilitated by electronic technologies, otherwise known as e-Learning, can be either fully online, mixed mode (also known as hybrid), or web assisted (Nicole, 2008). The history of e-learning is short and it is characterised by rapid changes in technological advancement (Paivi , 2002).

2.1 HISTORY OF E-LEARNING

Sidney Pressey invented the automatic teacher in 1924, the first in electronic learning. Automatic teacher help the students to be drill. Due to the failure of automatic teacher, Harvard professor B.F Skinner created Teaching machine which was a mechanical device that administer a curriculum of programmed instruction.

PLATO (programmed Logic for automated teaching operations) was introduced in 1960 and it was the first computer-based training (CBT) program. PLATO was built by the University of Illinois and has been functioning for the past decades. It is use to offer coursework to students, local schools and other universities.

Gilbert Ahamer (2010) suggested 3 generation of web based learning according to the usage of web based functionalities while presenting practical cases. It comprises of first generation which are content and quiz, second generation which are communication and construction and the third generation which are collaboration and assessment.

Before the 1970s, distance learning has been seen to be a correspondence courses that provided materials to read and tests to submit by mail. Between 1970s and 1980s the scope has been increased to include viewing programs on public television or, more recently, on cable access channels, with or without a senior lecturer available for discussions (Evastina, Ottoson & Sigrum , 2008).

Prior to 1980s Computer Assisted Instruction (CAI) also known as Computer-based training (CBT) – took hold. The idea back then was to make training programs which then would be used by students on a computer (Jan- Peter, 2005).

The Current and present e-learning based distance education efforts are making use of strategies that will deliver effective content that will be more of student oriented learning. (Evastina, Stig & Sigrum , 2008).

2.2 COOPERATIVE LEARNING

Cooperative learning is a process meant to facilitate the accomplishment of a specific end product or goal through people working together in groups (Melinda, 2008). Collaborative structures are content-free, and thus can be used in a variety of contexts.

Zhao Jianhua & Kanji Akahori (2004) in their Studies show, that in well-structured cooperative groups, students constantly learn many subjects better than students in traditionally structured classroom setting. Gilbert Ahamer (2010) suggested 3 generation of web based learning according to the usage of web based functionalities while presenting practical cases. It comprises of first generation which are content and quiz, second generation which are communication and construction and the third generation which are collaboration and assessment.

Social networking, knowledge management and groupware are the technology used in the cooperative eLearning platform (Wan & Tsai, 2014). One of the most popular programs for eLearning is an open source online 'just in time' instruction platform called the Moodle. It has a user base of 8,000 registered sites (Jan-Peter, 2008).

2.3 COLLABORATIVE LEARNING

In excess of two-hundred years prior, George Jardine, educator of rationale and rationality at the University of Glasgow from 1774 to 1826, outlined a system for associate survey to help set up his understudies for full investment in British society. Jardine made a far reaching viable arrangement for utilizing present day ideas, for example, free written work, sequenced paper assignments, composition as revelation, written work over the educational program, and companion survey (in spite of the fact that he did 94 Journal of Advanced Composition not utilize our wording), and customary addresses, to instruct theory to underprepared understudies and to prepare them for vocations in business and science (Lynee, 2004) .Collaborative learning requires that all learners are working together toward a particular aim. More importantly, it means that students are responsible for one another's learning as well as their own and that reaching the goal implies that students have helped each other to understand and study together (Melinda, 2008).

All collaborative learning theory contends that human interaction is a vital ingredient to education (Kevin, 2004). Collaborative learning via eLearning is perceived to be out-of-classroom experiences.

Cooperative learning has been proven to be one of the useful strategies for indigenous education (Wan & Tsai, 2014). Web based collaborative system can be divided into two categories as suggested by (Zhao , Likedong & Kanji , 2004), one is asynchronous system and another is synchronous in which many practical systems are developed.

2.4 TYPES OF E-LEARNING

E-Learning can be categorized into four groups based on the purpose they serve while its types can be classified into 3 types.

The four classifications of E-Learning are:

- i. New information – this is by and large aloof learning. The Learner will basically get and read the data, which may be up-date occasionally.
- ii. New Learning Transfer – this obliges some support by the Learner, who will read, tune in (if there is a sound part), and answer questions.
- iii. New Skills – this will include more interest. The Learner will read, listen and go for the new aptitudes, and will then be surveyed for advancement made.
- iv. New Certification – this is the largest amount of e-learning, in light of the fact that there is an examination toward the end of the course, and a declaration

2.4.1 The three ‘types’ of e-learning are:

- i. Traditional: these courses have profundity of substance and readiness, and are normally delivered by specialists, and to give the Learner a genuine understanding of the subject.
- ii. Rapid Self-directed (asynchronous): This is generally identified with one particular part of the subject, and the courses are created quickly and obligated to change. The Learner lives up to expectations at his or her pace. It could be focused around Cds, Dvds, Networks, Intranet or Internet and may incorporate access to teachers through notice sheets or examination discussions.
- iii. Rapid controlled (Synchronous,): on the grounds that it is led at situated times, for instance in telephone or web classrooms. It is directed continuously, with a live teacher. All

Learners log in at the recommended time and can identify with the gathering under the control of the teacher, by raising a digital hand. The course may a weeks ago or even any longer.

2.5 SOME PLATFORM FOR WEB-BASED COLLABORATIVE AND COOPERATIVE LEARNING

Web 2.0 technologies has seen the emergence of wide range of educational tools and platform that students can use outside the classroom. Collaborative web tools is one example. Currently, web applications can be a valuable tool to reach information management goals and objectives. The application of new learning technologies that has emerged as a main stream in education is known to simplify document management, communication, student evaluation, collaboration and grading. However, these tools focus mainly on maximizing efficiency of administrative teaching and have little in consideration the learning tasks directed at students (Djamal , 2006).

2.5.1 Moodle: Moodle software has hosted hundreds of organization from over 86 countries to create and administer courses and collaborative over the internet. It is free open source learning management content system for creating internet-based courses.

2.5.2 Claroline: is a platform that allows hundreds of organizations from 86 countries to create and administer courses and collaboration online. Claroline as a company has continue to grow as notable software company in educational software.

This decade has now witness web-start-ups and software companies that are developing specialized and unique collaborative learning platforms that are compelling for learning and attractive to users. The platform being embraced by this start-ups are web, targeting mobile users due to the influx of smartphones.

2.5.3 Hackpad: is a tool to develop collaborative note-taking and co-writing online. Hackpad will make classroom projects and group works a lot easier (Annenberg , 2012). Hackpad is a simple, easy to use wiki with real time updating and requires no special text editor. It can be used a better option for collaborating that the traditional wiki or Google Docs. Hackpad allows you to share your docs real-time and it uses colour coding to show which authors have contributed to which content. It allows in line photos, checklists and can also be used for coding as it offers syntax highlighting also (Annenberg, 2012). Hackpad is a simple tool which is easy to use, a real-time wiki that makes collaboration fast and easy. It Keeps track of who wrote what as author names are automatically highlighted and listed in the margin. It is free, with an optional paid plan of \$2 per member (WikiMatrix, 2014).

2.5.4 CoSketch: it leverage on the power of web 2.0. it is a virtual web 2.0 tool that enables the use to create online white board and share it with other users. It is a multi-user online whiteboard designed to give its users the ability to visualize and share ideas as images. It is a free online service.

2.5.5 TodaysMeet: Todaysmeet allow instructors to create virtual room for students to speak up instantly. Todaysmeet can be use for discussions , brainstorming, reflecting and formative assessment. The response in Todaysmeet is microblogging due to the size of the post which is limited to 140 characters. Teachers can make a chat room for students and groups of students to discuss and ask and answer questions, and engage in the lesson during the presentation. It is a great resource for in class or homework collaborative discussion (Med , 2013).

2.6 Merits and Demerits of E-learning

The growing interest in e-learning seems to be coming from several areas. ELearning has been seen by student as a technology that enhance their study and which has also improve their results (Richard, 2010).

The merits of eLearning and its demerits has it affects the trainer and the learner shall be discussed.

2.6.1 Merits of e-Learning to the Trainer or Organization

Some of the most outstanding advantages to the trainer or organization are:

- i. **Decreased overhead cost:** Reduced general expense is the absolute most powerful component in receiving e-learning. The disposal of expenses connected with educator's compensations, gathering room rentals, and understudy travel, cabin, and dinners are specifically quantifiable. The decrease of time used far from the occupation by representatives may be the best branch.
- ii. **Compact learning times:** Time to learn in eLearning are reduced and reduced.
- iii. **Consistent delivery:** delivery in eLearning are consistent through asynchronous communication.
- iv. **Protection of expert knowledge:** Expert knowledge is communicated, but more importantly captured, with good e-learning and knowledge management systems. This has also encourage sharing culture amongst practitioners and users of eLearning system.
- v. **Computerization:** Proof of completion and certification, essential elements of training initiatives are computerized.

2.6.2 MERITS TO THE LEARNER

- i. **Paced Learning:** Self-paced learning has also contributed to the increased of informal learning (Richard, 2004).

ii. **Interactive:** Interactivity engages users, pushing them rather than pulling them through training.

iii. **Increased confidence and reduced shyness:** personal studying online increase the confidence of the learner as there will be no shyness that may occur in case of the traditional learning method (Salem et al, 2011).

2.6.3 Demerits to the Trainer or Organization

E-learning is not, however, the be all and end all to every training need. It does have limitations, among them are:

i. **Considerable budget is required:** Deploying effective eLearning technology will require some considerable cost.

ii. **Technology Know-how:** there is need for technical know-how in order to fully leverage the benefits of eLearning.

iii. **Traditional acceptability:** ICT penetration is now key issue due to cultural value.

iii, **Cost factor:** Cost factor is also related to considerable budget. Purchase of software and hardware can be a great disadvantage.

2.6.4 Demerits to the Learner

E-Learning can also be a disadvantage to the learner. Here are some of its demerits as it affects the learner:

i. **Availability of required technologies:** learners may developed phobia for new technology and even the necessary technology may not be in place.

ii. **Reduced social and cultural interaction:** eLearning can reduce the level of face to face interaction thus affecting the social and cultural interaction of the people.

2.7 REVIEW OF OTHER RELATED STUDIES

The learning technology standardization process is taking the lead role in the research efforts into Web-based education (Andrey, 2004). Research has been carried out on the role of collaboration in learning has tried to find deeper theoretical frameworks that could better guide the developing of technology-aided learning environments (Erno et al, 2004).

There has been some trends that have necessitate for web-based learning. ELearning platforms have the features of abundant resources, sharing, convenience, and so on, and all of these characteristics make it into one of the more powerful learning tools. ELearning provides good functionality for supporting students' learning and prompts positive attitudes in students and teachers, so it also can be defined as a second classroom (Guangran et al ,2012). The on-line collaborative learning depends on the Internet and uses collaborative learning methods. This model takes full advantage of Internet resources, and cultivates the learners' abilities to self-learn, communicate and coordinate their activities with others and to solve practical problems.

From what has been discussed above, one may reasonably arrive at the conclusion that collaborative learning in an online classroom can take the form of discussion among the whole class or within smaller groups (Jane and Christine,2004). Collaborative and cooperative learning can help in demonstrating new knowledge (Maureen Ed., 2005) Various names has been giving to this type of learning, they are cooperative learning, collaborative learning, collective learning communities, peer teaching, peer learning or team learning. What they have in common is that they all incorporate group work (Melinda, 2008). Moreover, research demonstrates that network-based collaboration may provide opportunities for more equality in group work than actual face-to-face group work since in the latter approach group “decision-making” is often contingent upon which student has the loudest voice or who has the most confidence in the target language.

Guangran et al (2004) works on design of collaborative learning platform to support flipped classroom gives full play to the teachers guidance function, motivates learners enthusiasm and improves instructional effectiveness. Object oriented approach was used in its methodology for designing the system. Inability to handle many courses and support for mobile clients limit this system.

Kohei & Anik (2012) proposed a question and answering system with knowledge based system. A prototype was developed which enable interaction between teacher and students that becomes question and answering system for collaboration purpose. The limitation of this system is that it uses a third party system to do its major task which is online Wikipedia.

Paul Kirschner (2010) in his work displayed a structure for planning and creating electronic community learning situations focused around two different standards. The standards are systemic and emanate properties of instructive, social, and innovative affordances and the execution of communication outline to guarantee both its helpfulness and quality.

Azeta, (2008), created an architectural structure and web-based application that will advance learning processes using multi-channel technologies that connect students, faculty and the researcher community in a growing network of education settings, irrespective of the communication device owned by a subscriber. This will allow devices to interoperate freely and provide same user experience across all devices. Modular approach programming was employed using Microsoft visual studio.Net.

Maria Ester Lagos et al (2004) proposed interaction model represents the interaction that occurs in a collaborative learning scenario where people work through a specific type of mobile devices, PDAs. Nevertheless, it is possible to extend this model to include other devices such as tablet PCs, laptops or desktop PCs, as long as learners and teachers are collocated, otherwise the face-to-face interaction cannot occur (e.g. e-Learning platforms).

Ming-Shang et al (2012) work on collaborative learning systems for students in a department of digital content design in a college. Designing web graphics and layout is choosing as the instructional content. Structured design and analysis was use as the design methodology. At the end of the semester, it was verified that the system has improved the academic performance of the students.

Tiago & et al (2014), in their work “a novel collaborative e-learning platform for medical students” consider learning object, instructional design principles and principles of cognitive learning theories in building a collaborative learning platform for medical students. The system was built based on java technology which is a web-based application and oracle database system. The simpler version of the system was built for iPhone platform which form part of its limitation.

According to Xia Chen and Jea Choi(2010) in the work on “designing online collaborative Location-aware platform for History learning” which provides a location aware for students to learn history of places leveraging on google chrome to show maps on their devices. This work has also introduced another concept of coloration which is location-aware based. Xia Chen and Jea Choi work has the limitation of being a single module application and for the 3D virtual environments to be presented, google earth has to be installed on clients’ devices.

2.8 SUMMARY OF REVIEW

In the literature on collaborative and cooperative learning with the support of internet technologies, it has been well discussed that web-based collaborative and cooperative learning will increase learning performance using appropriate technologies.

This project presents a new architecture of collaborative and cooperative Learning System over the internet, by using technologies enriched with mobile and wireless devices, addressing the challenges of group investigation in which students work in small groups using cooperative inquiry, group discussion, cooperative planning and projects which will be supported by internet technologies. In this method, students form their own two-to-six-member groups. The groups can be assigned a task, break these tasks into individual tasks, and carry out the activities necessary to prepare group reports.

However, outcomes of both collaborative and cooperative learning are focused on group performance. Thus, individual learning effectiveness is often affected by team performance.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.0 INTRODUCTION

This chapter appraise and analyse the data collected with a view to expounding on the advantages and improving on the shortcoming of the existing system. System analysis and design makes emphasis on how a system should work with business benefits in mind. In a nutshell, systems analysis is to determine what to be done and the design is to determine how to do it.

3.1 ANALYSIS OF THE EXISTING SYSTEM

The traditional collaborative method of facilitating teaching and learning process is no longer effective due to the fact that it is not engaging, not self-pacing and different location in which student reside within the campus community has been a major deterrent. In this traditional method of collaborative and cooperative learning method, students collectively contributed to a task. The student can also be grouped by the lecturer or the lecturer can allow the student to group themselves and the task to collaborate on which main aim is to bring about learning is pasted on the notice board or written on the whiteboard for the student to copy.

Another operation carried out on the existing system is submission of the group task. Some of the task can be submitted individually or submitted by the group leader in which each member of the group must have contributed to the final draft for submission.

3.2 DRAWBACKS OF THE EXISTING SYSTEM

Inflexible operational hours, inability to track students involvement in a collaborative task, keeping of participation logs which cannot be manipulated and reporting mechanism based

on the contribution of each student in a group task are some of the limitations of the existing system.

3.3 THE PROPOSED SYSTEM

The user interface is interactive, cluttered-free, and the navigations are clear and well-organised using some interactive elements of HTML 5 which provides same user experience and responsiveness across all device. It support both instruction, learning and study. The role of teachers' assisted instructions remains unchanged in the learning system and the collaborative learning platform provide related functions to assist teachers' instruction.

The architecture is easy to extend. The platform reserved the external system access interface to make it convenient to extend. When the platform is extended with new features, it does not affect the original functions and try to reuse the existing functional modules as far as possible.

The system is divided into three module and they are;

- i. Administrator Module
- ii. Lecturer Module
- iii. Learners Module

3.3.1 ADMINISTARTOR MODULE

This section managed the lecturers, set up the department, set up the course and have the ability to create/edit/delete users. The administrator has direct access to the database.

3.3.2 LECTURER MODULE

This section is handled by the lecturer. The lecturer has the privilege and rights to manage the group/groupings of the students, manage various task to be assigned to them, set deadline for task, track and monitor the progress of each students and generate report for assessment based on their participation on the collaborative platform of the system. The report can be converted to portable document format (pdf), Microsoft excel file (xls) or word document file (doc

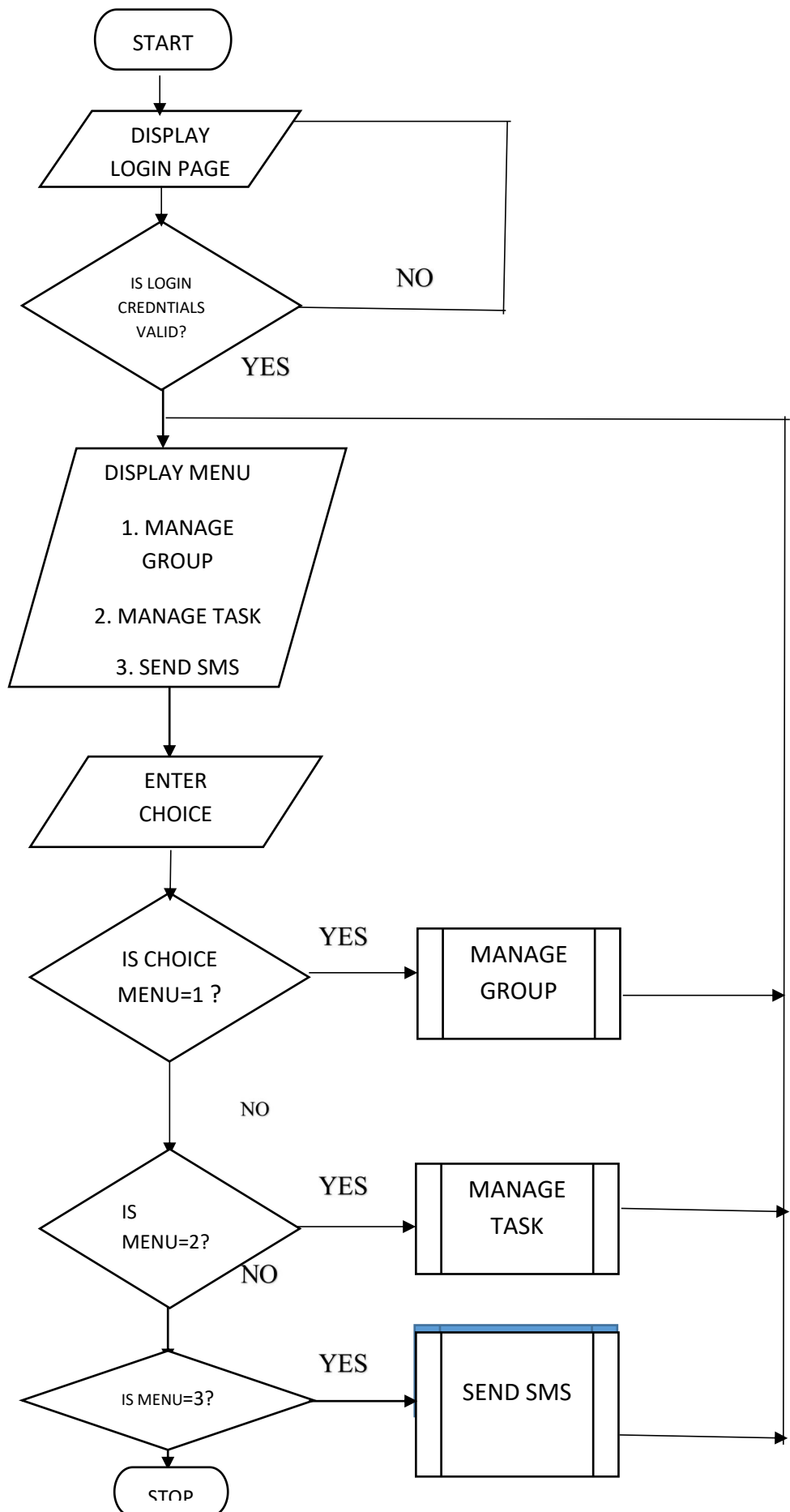


Figure 3.1 Program Algorithm represented in Flowchart for Lecturer Section

3.3.3 LEARNER MODULE

The learner will have to complete their profile on the system on first login. The learner upon login check for notification of any task. They can also receive a text message on their phone via web service notifying them of any task. The user can also see his or her group members whenever a group task is given. The user can also respond to any task as appropriate by uploading files, posting answers on the joint collaborators widget and posting links for references in other for group member to read further.

3.3.4 NEED FOR THE NEW SYSTEM

- i. **ON-DEMAND AVAILABILITY:** with internet connectivity available to the user, the system can be access by registered users.
- ii. **FLEXIBLE OPERATIONAL HOURS:** the system runs 24/7 of the day this makes it useful at off-hours or from home.
- iii. **TRACKING OF STUDENT PERFORMANCE:** student's level of interaction and collaboration can be tracked through the dashboard and reporting mechanisms in the system.
- iv. **PERVASIVE USER INTERFACE & RESPONSIVE DESIGN:** users are no longer tethered to their desktops because they are always on the move. This application is being designed foe pervasive access which implies that the user interface layer needs to scale seamlessly across device.
- v. **SELF-PACING & INTERACTIVE:** learners can move at their own pace and it engages the learner by pulling rather by pushing them.

3.5 METHODOLOGY

The methodology used in this project is object-oriented analysis and design. In object-oriented analysis and design, both data and action are of equal importance. Object-oriented Analysis and Design has been chosen because of its popularity and sophisticated design methodologies.

3.5.1 SYSTEM DESIGN

Related literatures on the design of a cooperative and collaborative learning system were reviewed and interviews with some lecturers and students in the department of computer science were conducted. Then data model and functional model was formulated for systems design purposes. These formed part of requirements specification stage of the system. This is the aspect of object-oriented analysis and design which determine what has to be done and determining the objects involved which are the learner, lecturers and the administrators.

Technology familiarization is key in developing a system. Understanding of the technology needed to implement the project was also thoughtfully analyzed. PHP was used at the front end, with JavaScript as the scripting language at the client side, MySQL as the database and hosted on a Unix-based platform . The backend will be an Apache webserver running HTTP web service and the front end will be the web application written in PHP. Every of the choices was governed by the system specific requirements and infrastructure limitations.

At the database creation stage, a database of at least 20 entries of student groups was created. All this data is sample data which was created to begin with the design of tables etc. the database design of this project is also detailed in this chapter.

Implementation of the front-end of the system to integrate with the database so that all possible scenarios (like a student entering his details, viewing task, responding to task) and then coming up with flow-charts or pseudo code to handle the scenario was also handled. The

fronts-end developed in the earlier milestone will now be able to update the student details. Other features like mail notification and Short Message Service (SMS) etc are now functional at this stage. The system is now ready for integration testing.

For the high-level and detailed design of the system, a top-down approach was adopted for the project design, this model shows the hierarchical flow of the actions performed by the system and actions performed by the administrator, lecturers(who are less privileged administrator) and users.

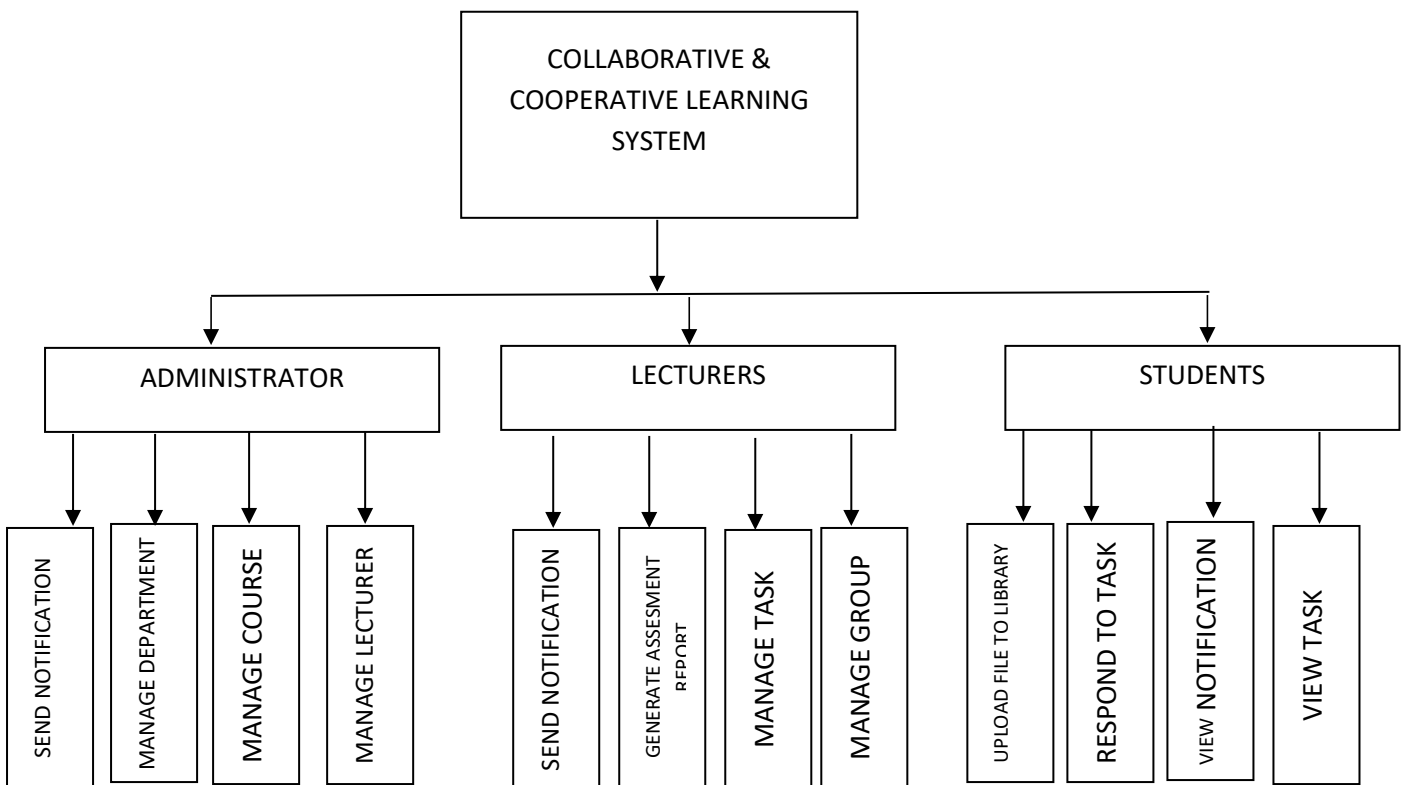


Figure 3.2 Top down Model Approach

3.6 DATABASE DESIGN

The program uses MySQL as its database engine.

Table 3.1 is the Users information table which is also known as users table. It contains information of all the users (students and lecturers).

Table 3.1 Users Information Table

S/NO	FIELD NAME	DATA TYPE	SIZE
1	Student Id	Integer	20
2	First Name	Variable character	200
3	Last name	Variable character	200
4	Unique Id	Variable character	30
5	Password	Variable character	30
6	Hash_log	Variable character	30
7	Register As	Enum	('A', 'L', 'S')
8	IP Address	Variable character	30
9	Last_login	Date Time	
10	Change Password	Enum	('0','1')
11	Status	Enum	('0','1','2')
12	Avatar	Variable character	Picture
13	Date Register	Date Time	

Table 3.2 is the course table. It contains information about the course taken by the student such as the course code, the lecturer taken the course and the date the course was set-up.

Table 3.2 Students course table

S/NO	FIELD NAME	DATA TYPE	SIZE
1	Course Id	Integer	11

2	Student Course	Variable character	30
3	Moderator	Variable character	14
4	Date	Date Time	

Table 3.3 is the student task group table. It contains information about group task to be taken by the students. Information such as the group name, the date which the group was created, the members in the group and the lecturer that created the group.

Table 3.3 Students Group Table

S/NO	FIELD NAME	DATA TYPE	DATA SIZE
1	Group Id	Integer	11
2	Group Name	Variable character	30
3	Members	Variable character	255
4	Moderator	Variable character	14
5	Date	Date Time	

Table 3.4 is the Student Library table. It contains information about the media library which the student will upload their files.

Table 3.4 Student Library Table

S/NO	FIELD NAME	DATA TYPE	DATA SIZE
1	Library Id	Integer	11

2	Library Name	Variable character	80
3	File Extension	Variable character	4
4	Author Link	Variable character	14
5	Author	Variable Character	14
6	Date	Date	

Table 3.5 is the Task details setup table. It contains information about the task which the students carried out either by posting their answer on the collaborator widget or uploading file. It has relationship with the task details table.

Table 3.5 Task details Table

S/NO	FIELD NAME	DATA TYPE	DATA SIZE
1	Task Details Id	Integer	20
2	Task Id	Integer	11
3	Post	Text	
4	Author	Variable character	14
5	Remarks	Variable character	14
6	Start Date	Date Time	
7	End Date	Date Time	

Table 3.6 is the Task table. It contains information of the entire task assigned to students. Information such as the name of the task, its description, the date the task was created and the date it will elapse for the student to submit the task for assessment.

Table 3.6 Task Table

S/NO	FIELD NAME	DATA TYPE	DATA SIZE
------	------------	-----------	-----------

1	Task Id	Integer	11
2	Group Id	Integer	11
3	Task Name	Variable character	300
4	Description	Variable character	255
5	Moderator	Variable character	14
6	Start Date	Date Time	
7	End Date	Date Time	

Table 3.7 is the Notification table. It contains information about the notification which the system will be alerting all the user of the system.

Table 3.7 Notification Table

S/NO	FIELD NAME	DATA TYPE	DATA SIZE
1	Notification Id	Integer	10
2	Link	Variable character	25
3	Source	Variable character	14
4	Unique Id	Variable character	14
5	Title	Variable character	100
6	Remarks	Variable character	255
7	Category	Variable character	30
8	Status	Enum	('0','1')
9	Date	Date Time	

3.7 DESIGN APPROACH

On the whole, this study used the method of object-oriented development to program each module, extracted each entity class - Object from the platform, used Object Service as the class of action object, used the instance of Object to transfer data, and applied the relevant methods of Object Service to implement business logic. The system was thoroughly tested by running all the test cases written for the system. Issues found during the previous milestone are fixed and the system is ready for the final review. Both the unit testing and integration testing of the system is carried out.

3.7.1 DESIGN CONSIDERATIONS

The application is divided into layers and some key considerations for designing component, modules and functions are considered. Consideration was given to how the user will interact with the system, how the application will be deployed into production and managed. The non-functional requirement for the application such as security, performance, concurrency, internationalization and configuration was not traded for anything.

The system also consider security and performance but priority was not given to interoperability and scalability. Mechanism for authentication and authorization that passes identities across multiple layers to permit granting access to resources. Email address and password will be used to authenticate users and also to pass authenticated identity across the layers.

In the aspect of exception management, exception are caught at functional, logical and physical boundaries especially to avoid revealing sensitive information to end users. The HTTP protocols is choosing for the communication and calls are minimized across the network to protect sensitive data passing over the network.

Finally, the system combines the latest internet and database technologies incorporating a user-friendly and intuitive interface, flexible and mobile. Architecture of the system permits to effortlessly render contents on the mobile device. The application is also designed to be flexible and maintainable over time.

3.7.2 DESIGN ARCHITECTURE

The platform adopts the browsers-Server model, and is hierarchical; therefore, the coupling degree between the server-side and client-side is small, and the platform is easy to extend. It contains five core components. These are a presentation layer, a business logic layer, a data access layer, a service layer and common components, etc. The presentation layer is responsible for system interaction with users. The presentation layer consist of 3 views which are administrator view, the lecturer view and the student view. The business logic layer is responsible for the business processing system which PHP programming language was used. The data access layer is responsible for data's CRUD operations: that is creating, updating, reading and deleting. MySQL database server is used as the data access layer. The service layer is responsible for data exchanging with other systems and business integration. The sending of SMS is within the service layer which uses web service to send SMS thorough the application.

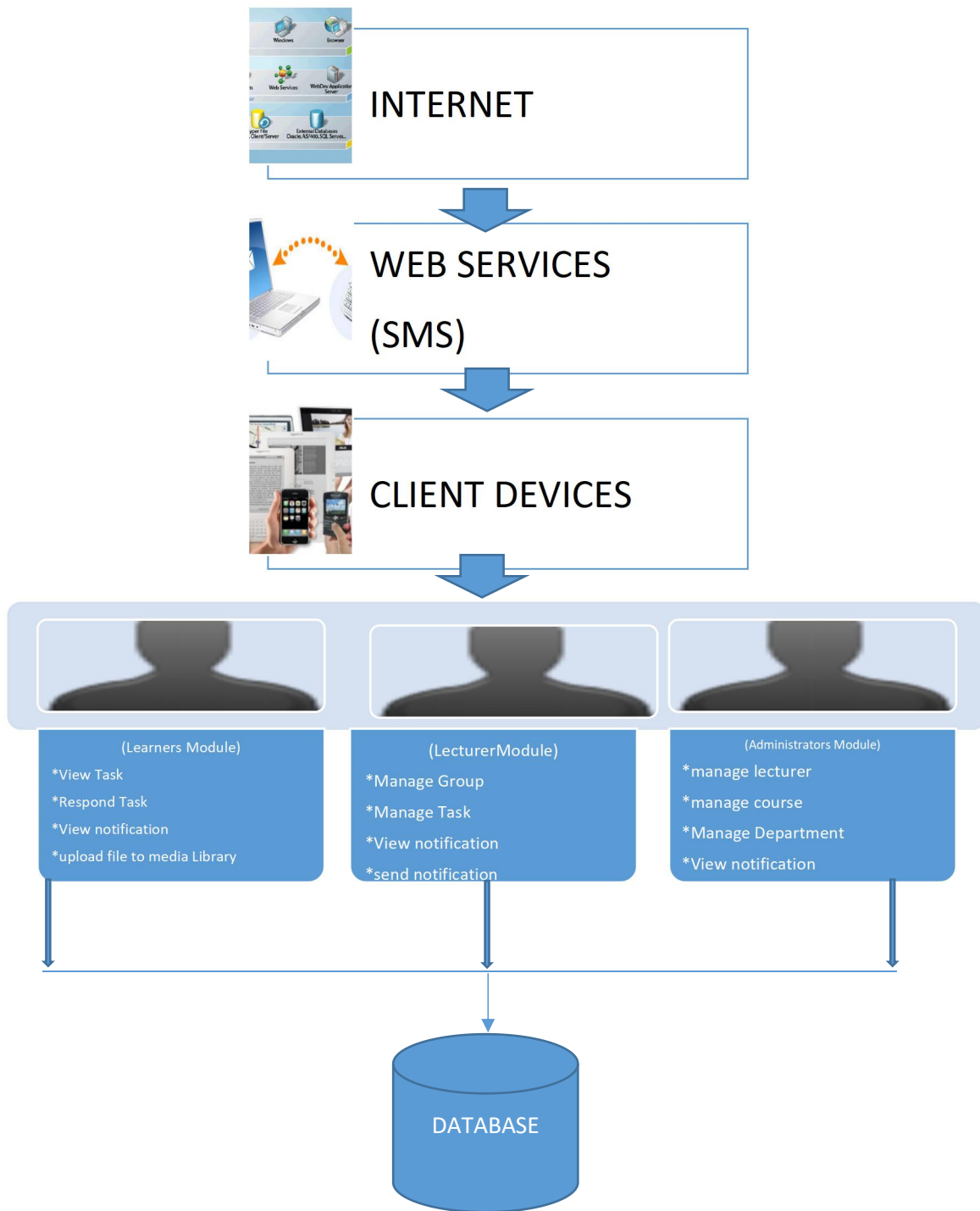


Figure 3.3 System Architectural Design

3.8 DATA COLLECTION

Computer science department of federal university of technology was use as my case study which has streamlined the study and as such I had to make use of Interview Method as my data collection method.

3.8.1 INTERVIEW METHOD

In the cause of this project work, investigations were carried out which involved sourcing information from students of computer science department. The following questions were asked so as to gain more understanding in building a typical web-based collaborative and cooperative learning system.

- i. How often did your lecturer give you group investigation task?
- ii. How is your grouping done for a join task work?
- iii. How many days does your lecturer normally give you for a group work?
- iv. Do you always have assignment that span through the festive period break?

3.9 ARCHITECTURAL PRESENTATION

This system was designed using a three tiered architecture (Presentation Tier, Application Tier and Data tier). The Presentation Tier contains all of the visible web pages and handles all input from and output to the user. All front end components used HTML 5, PHP, JavaScript and jQuery as the primary interface. The Application Tier handles all of the Business logic and provides an abstraction to the database, the Data tier which is the data access layer consists of the Database and stored procedures contained within, and this provides the persistence required for the system. This system is deployed on a Unix-based platform with a single database server and a single application server.

CHAPTER FOUR

SYSTEM IMPLEMENTATION, TESTING AND INTEGRATION

4.0 INTRODUCTION

System implementation phase is a critical phase in every system development life cycle. This is the point that everything that has been written, coded or developed is put to work.

4.1 CHOICE OF PROGRAMMING LANGUAGE

PHP, Hypertext Pre-processor, an open source scripting language is used for the business logic of this application, both at the client and the server side. PHP code can be simply mixed with HTML code, or combination with various template engines and web frameworks. PHP code is usually treated by a PHP interpreter, which is usually applied as a web server's native module or a Common Gateway Interface (CGI) executable.

Other supporting languages and tools are:

- i. HTML 5: this is the latest evolution of the standards that defines, structures and present content for World Wide Web. HTML is the only language the browser understands in presenting information to the user based on the formatting of tags which HTML use as commands. HTML 5 is used for the presentation view of this project because it allows light and responsive contents that automatically adjust to the size of the device being used; it allows the design of an application that will render efficiently on a computer with modern browser that support HTML 5 additional tags and widgets as well as mobile phones.
- ii. CSS 3 (Cascading Style Sheet): CSS 3 is used in this design for describing the look and formatting the information written in a HTML. It is an open source

formatting language that works well with HTML 5. It is used strictly for the layout, fonts and colours to add look and feel to application.

iii. Other languages include JavaScript's and jQuery.

4.2 SYSTEM REQUIREMENT

This embodies the hardware and software that must be set up for the smooth operation of the system.

4.2.1 HARDWARE REQUIREMENTS

The system facility utilized for the development of the system is Laptop computer with its configuration recorded beneath:

i. Processor: Intel Pentium (R) processor 2.40 GHz and Above

ii. Memory: 2.00GB and above

iii. Hard Disk: 500 GB and above

4.2.2 SOFTWARE REQUIREMENTS

The software utilized within actualizing this project comprises of the accompanying:

i. Database: MySQL

ii. Web Application: PHP (As the Server Side Scripting language.)

iii. Web browser (Mozilla Firefox 15.0, Microsoft Internet Explorer 9, Opera and Google Chrome)

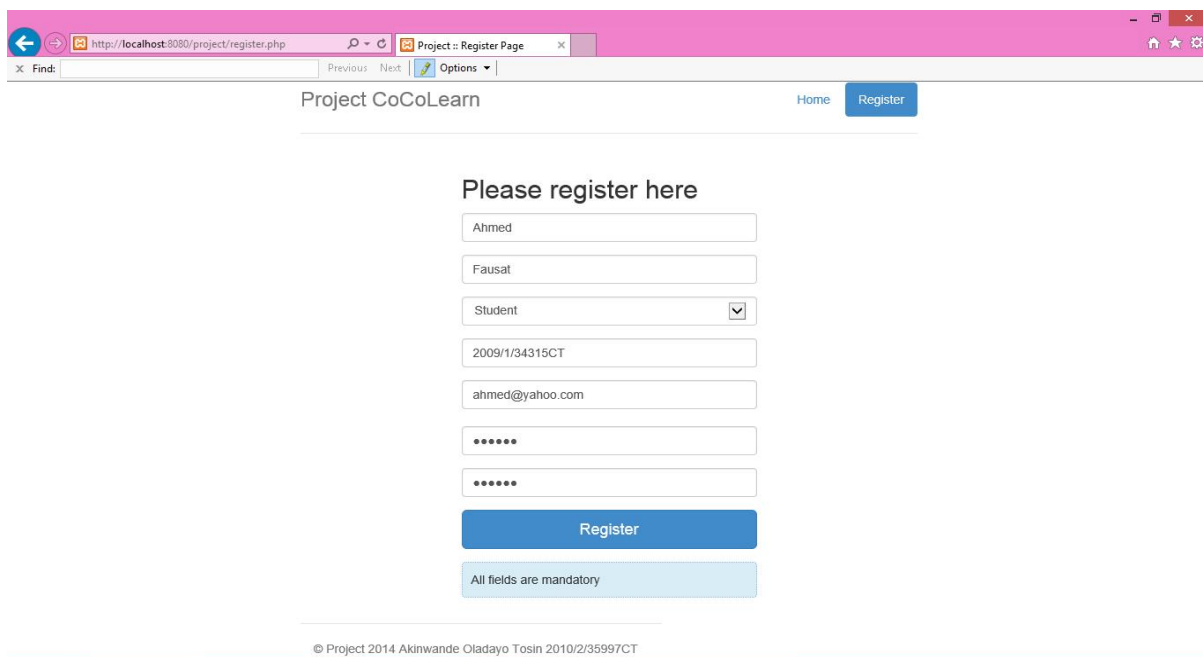
iv. XAMPP server Version 3.1.0.

4.3 THE SYSTEM MAIN MENU IMPLEMENTATION

User Service was used to implement the log-in and log-out actions of the system login. The business logic of log-in action can be described as following: get the input parameters of user id and passwords, and call the log-in method of User Service to authenticate user's log-in. After successfully log-in, it save the user information to cookies and record the information

about the user's current log-in, such as log-in time, hostname, etc. If the log-in fails, it give a friendly message to the user.

The business logic of log-out action can be described as following: get input parameters of user id and, then, apply the log-out method in the User Service to set user cookie information to expire.



The screenshot shows a web browser window with the URL `http://localhost:8080/project/register.php`. The page title is "Project CoCoLearn" and it features a "Home" link and a "Register" button. The main content area is titled "Please register here" and contains a registration form with the following fields:

- First Name:
- Last Name:
- Role: (dropdown menu)
- Phone Number:
- Email:
- Password:
- Confirm Password:

Below the form is a blue "Register" button and a light blue message box that says "All fields are mandatory". At the bottom of the page, there is a copyright notice: "© Project 2014 Akinwande Oladayo Tosin 2010/2/35997CT".

Figure 4.1 User Registration Page

This is the Registration page. User can register as a Lecturer or as Student

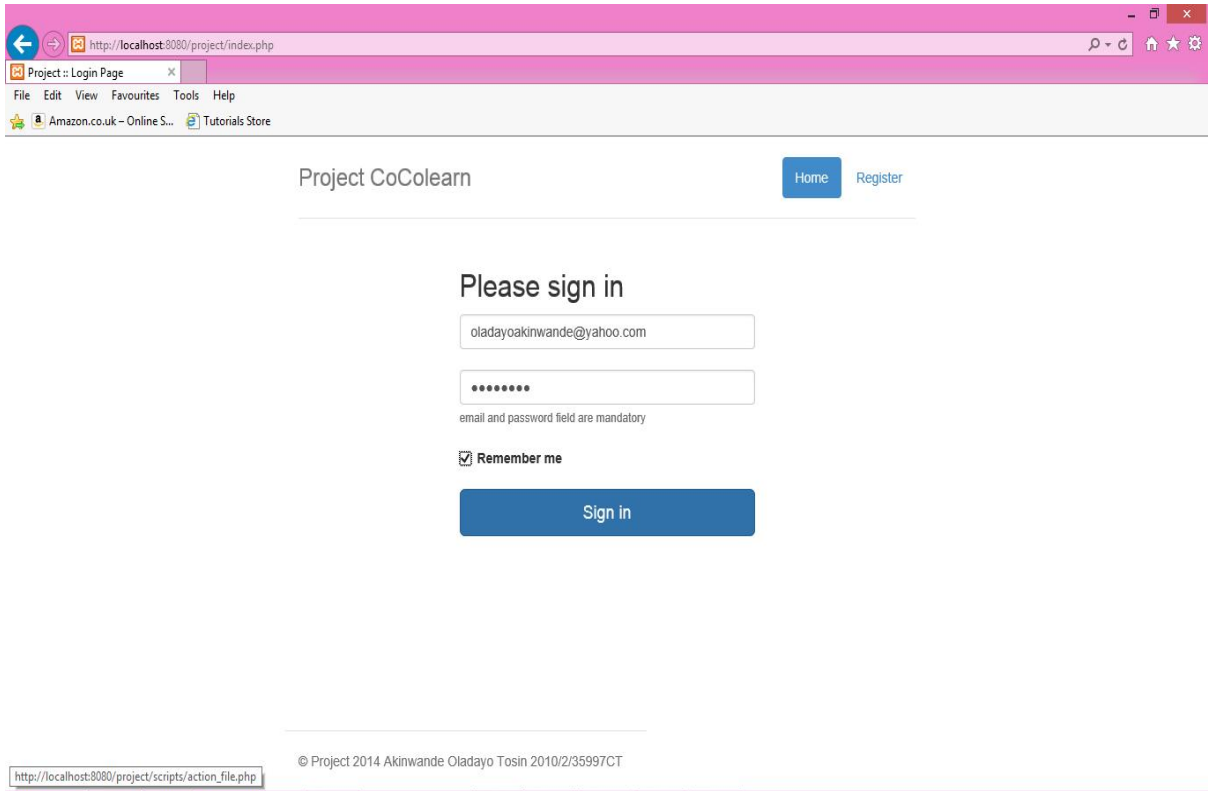


Figure 4.1 User Login Page

The system signing-in menu. All the users of the system sign in through this page. The credentials supplied determine where they will be directed to. They all log in with their credentials and it takes each of them to their respective granted pages.

4.4 IMPLEMENTATION OF THE SUBSYSTEM

This shows all actions performed by the administrator.

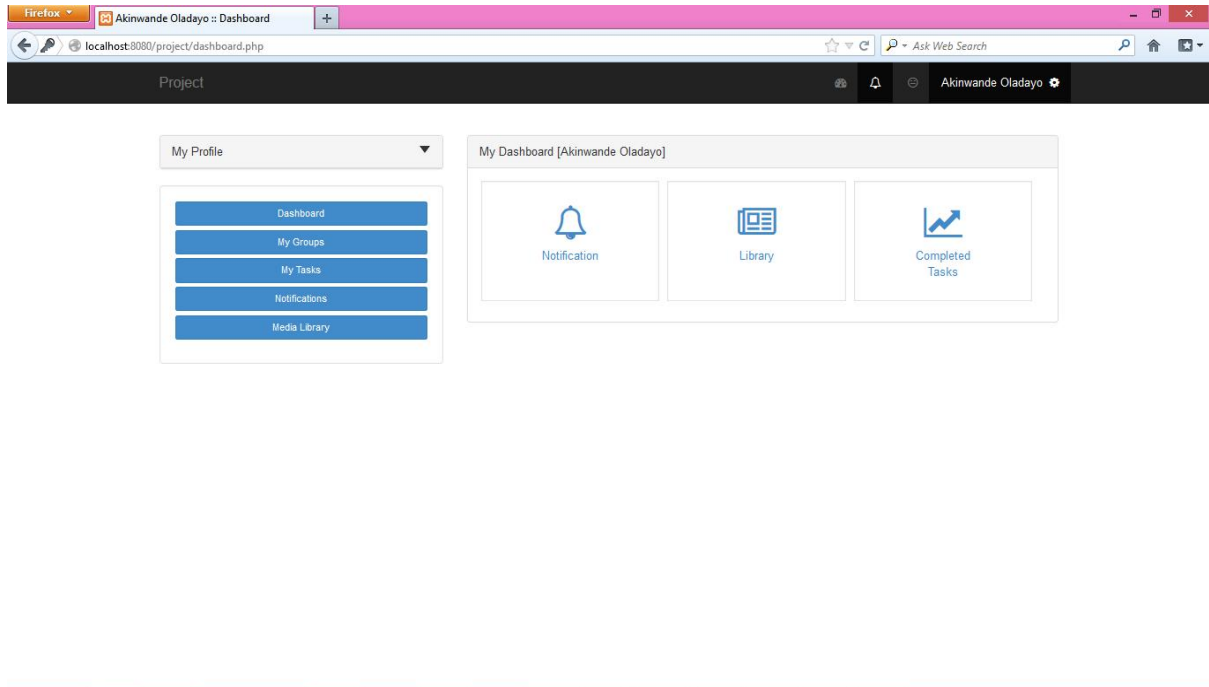


Figure 4.3 A typical landing page for student showing his/her dashboard.

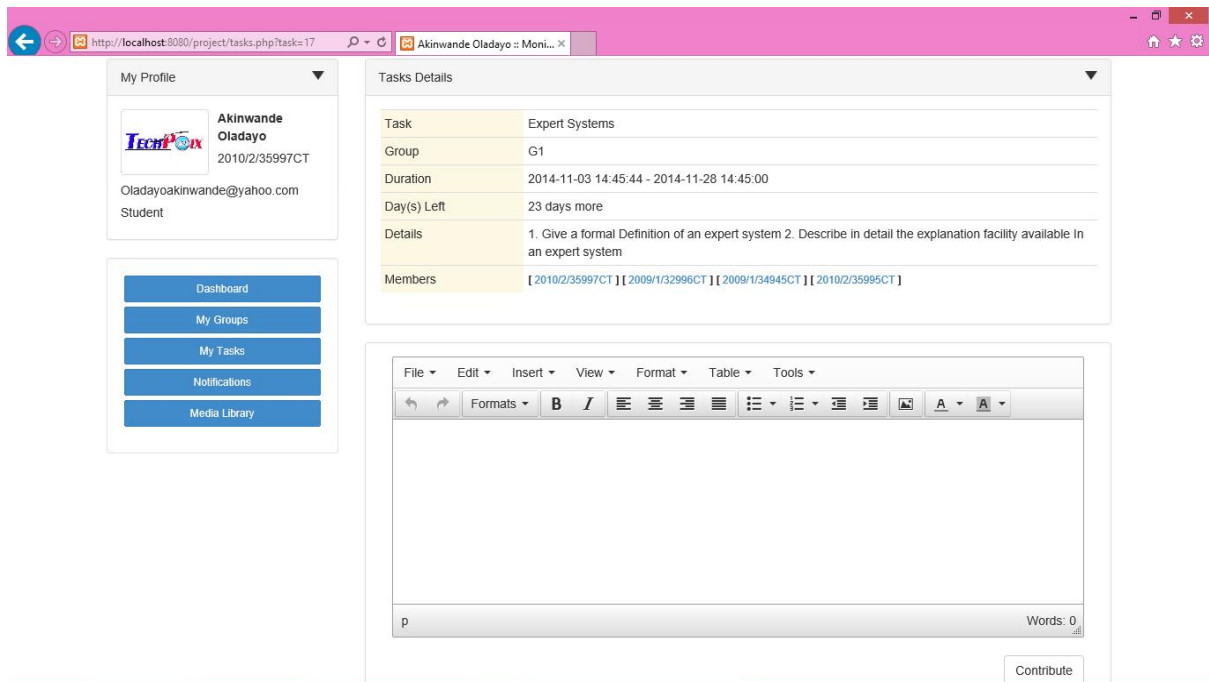


Figure 4.4 Widget Showing Student task view Page

This is Collaborator widgets page. Student respond appropriately to the task by submitting his/her contribution to the task/assignment given.

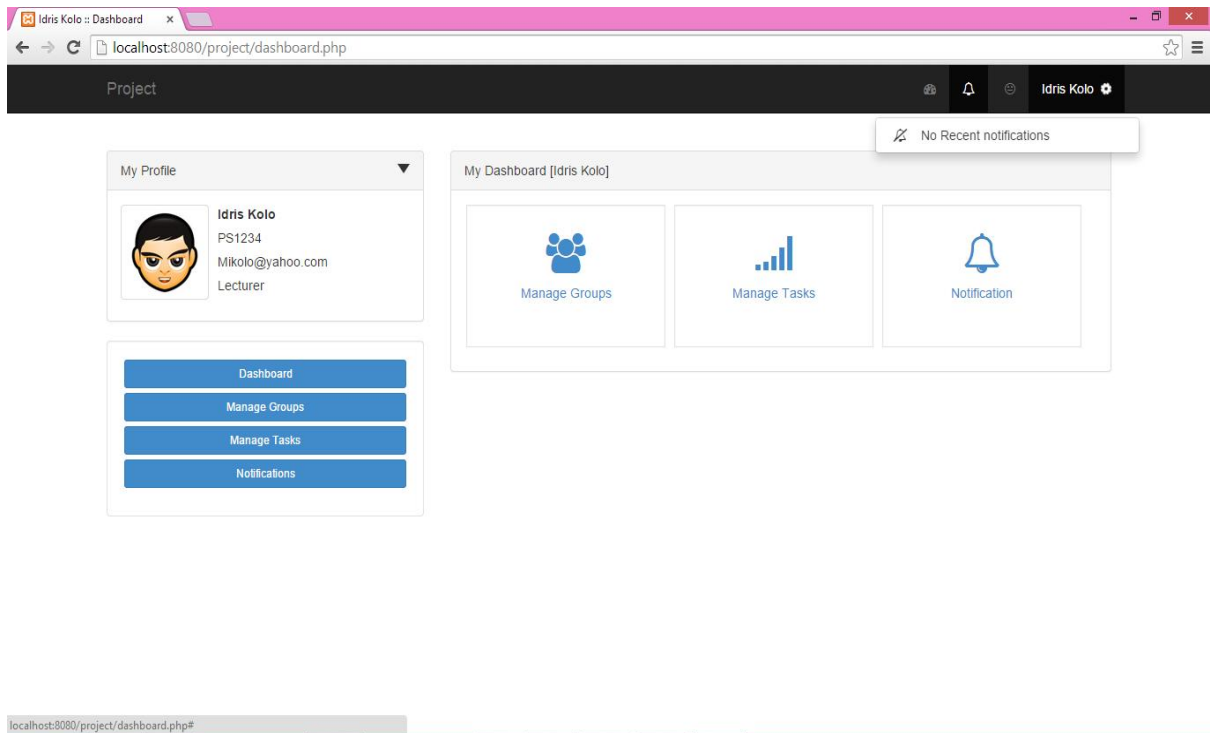


Figure 4.5 Typical landing page for the lecturer.

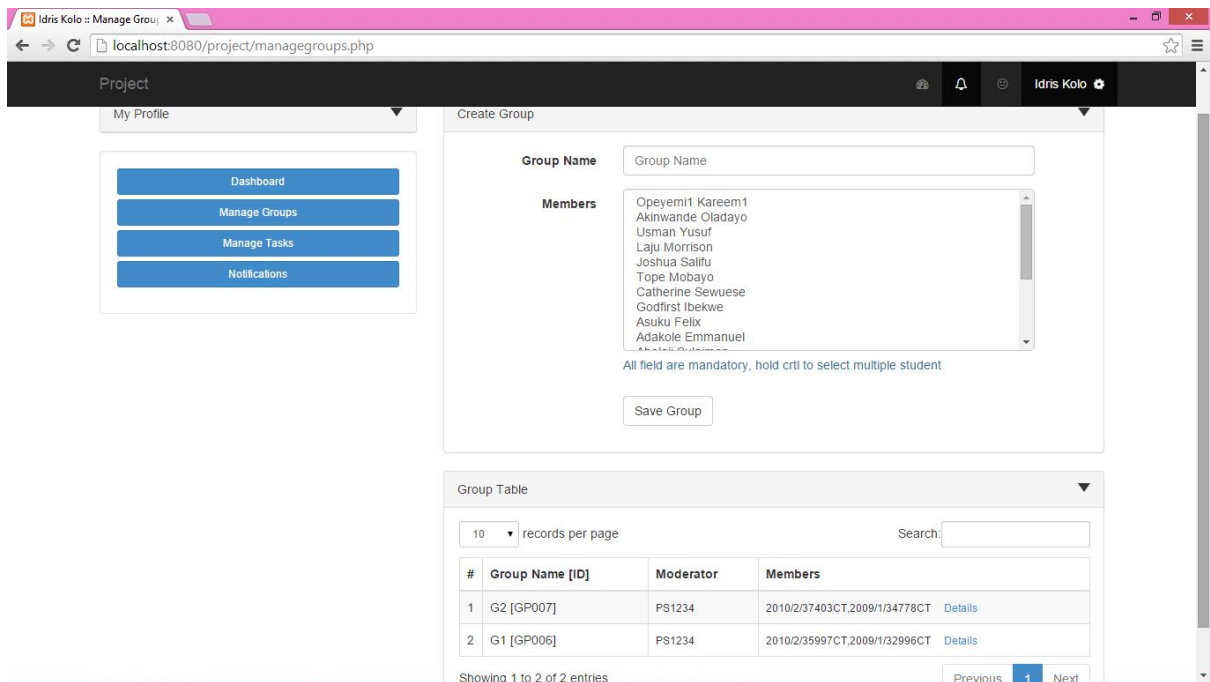


Figure 4.6 Manage Group Page

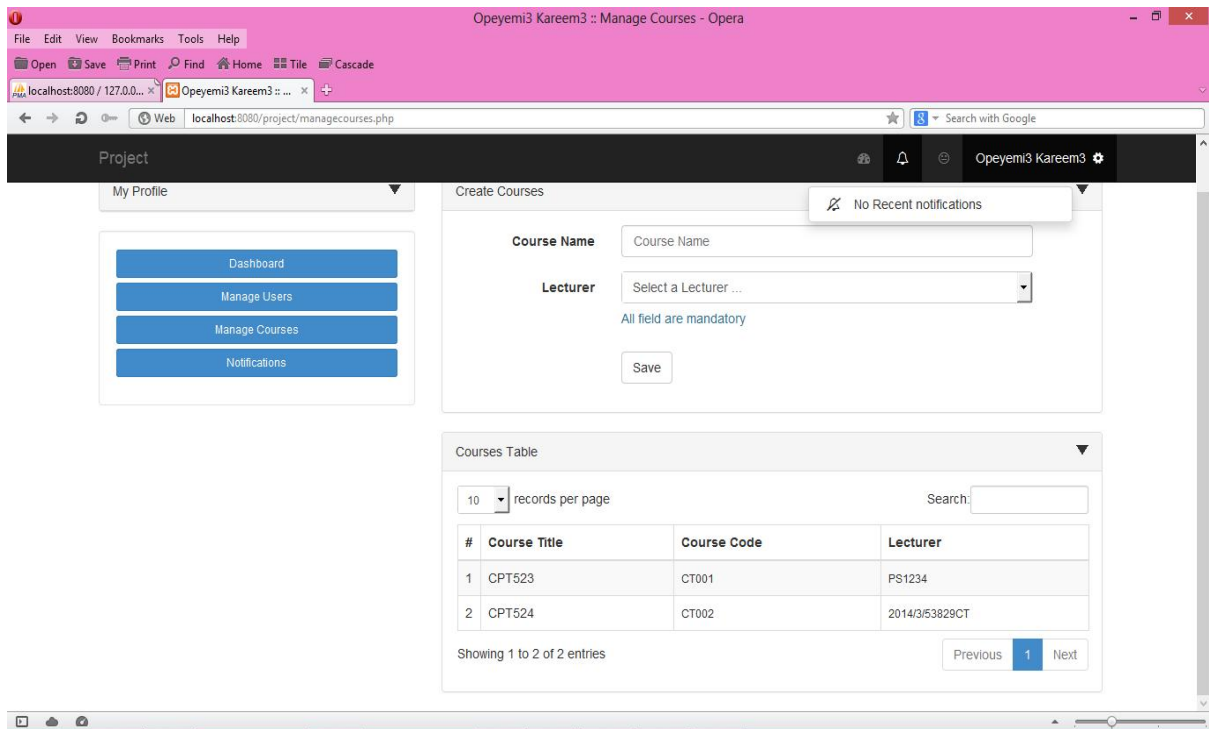


Figure 4.7 Administrator view page.

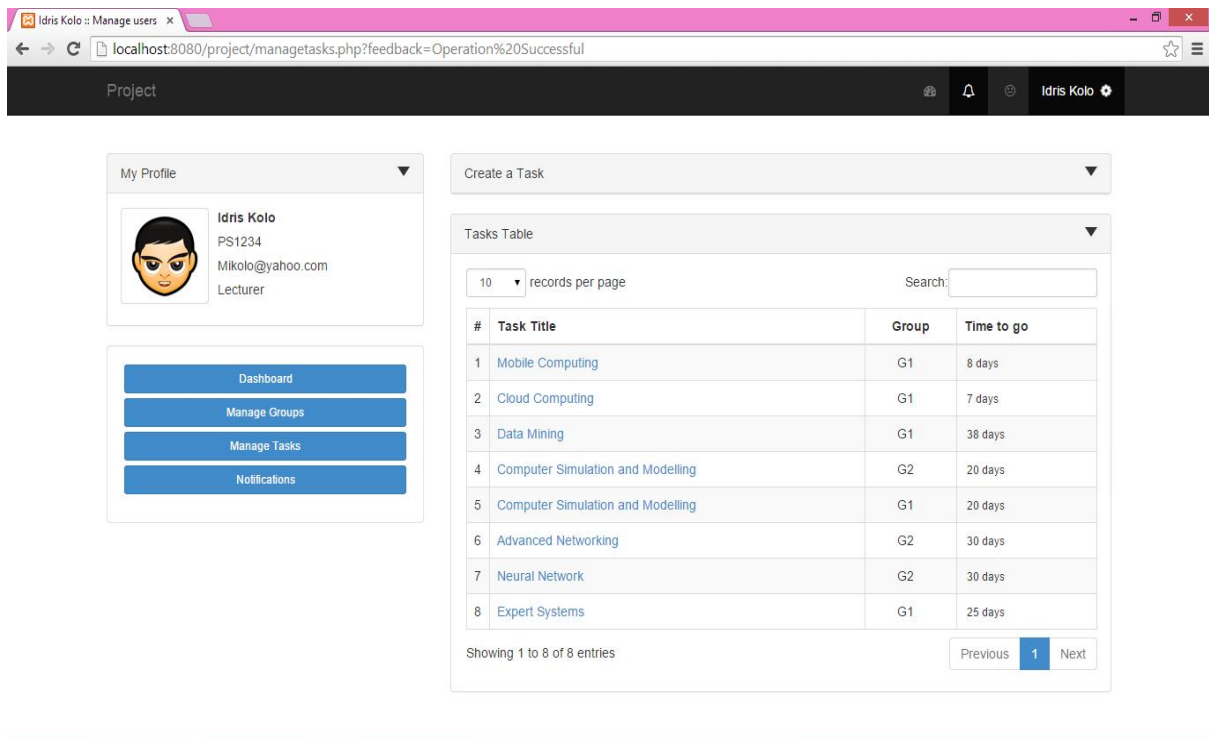


Figure 4.8 Lecturer view page showing task grid page

It shows the Grid table where task created by the lecturer are stored. The task title are clickable and this direct you to where the task can be monitored.

4.5 QUERY SUBSYSTEM IMPLEMENTATION

The query subsystem shows the interaction between the user and the system through queries and reporting.

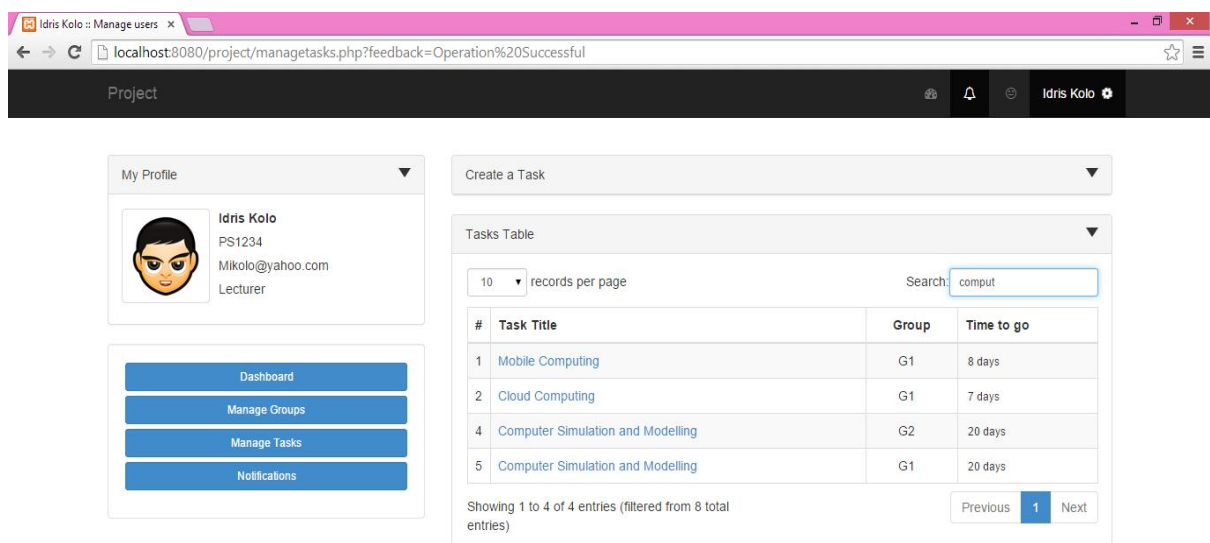


Figure 4.9 lecturer view page showing task search query

The lecturer searches through his table of task with the search word “**comput**” and it filters through the record for Task title that has “**comput**” and this record were shown.

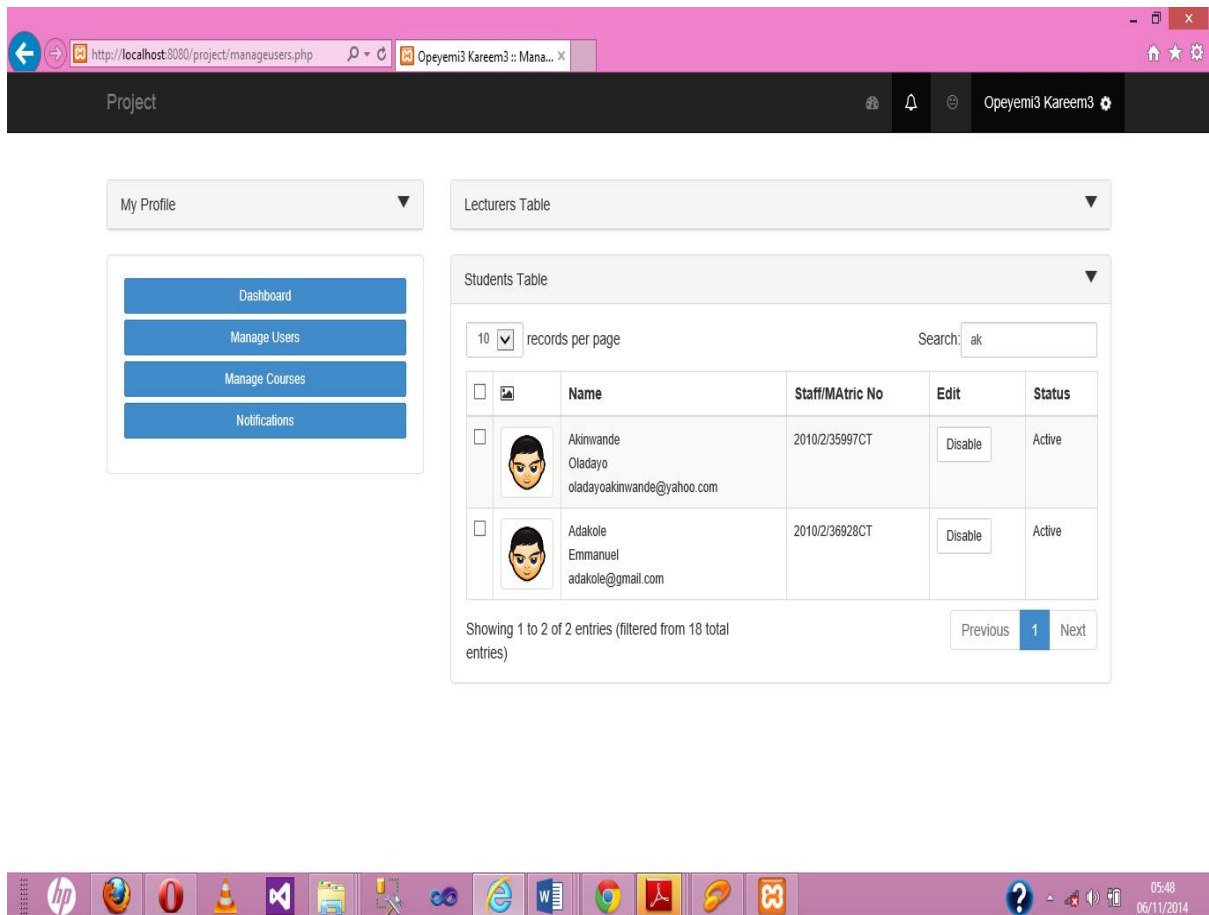


Figure 4.10 Administrator view Page showing Student search

The administrator is searching through the Students record using the searching string of “ak” which filters through the record the names that start with “ak”

4.7 SYSTEM TESTING AND INTEGRATION

Testing involved putting to work all that has been studied, design, and developed. Testing is very important in any system development life cycle. This is the stage where un-noticed errors or bugs can be discovered and corrected before the full deployment of the program.

4.8 THE TEST PLAN

The test-plan are a list of test cases that need to be run on the system. Some of the test cases can be run independently for some modules (Unit test cases) and some of the test cases

require the whole system to be ready for their execution (integration test cases). It is important to note that the test cases cover all the aspects of the system.

No.	Test case Title	Description	Expected Outcome	Result
1	Authentication/ User Verification	The login to the system should be tried with the login assigned by the admin and the correct password	Login should be successful and the user should access the system.	Passed
2	Role based screens	The users(students and lecturers) and administrator should have different screens	Users are redirected to their respective profile page based on their role in the system	Passed
3	Report Generation	Lecturer and the administrator should be able to generate	Role based functionality	Passed
4	Efficient search	Search option should be efficient by optimizing the system resources for both small and large data	Search performance should be tested	Passed

5	Simultaneous data access	The System should allow small and large number of users logged in different roles concurrently	Load and stress test should be done	Passed
6	UI test	For consistent look and feel and enabled controls	The system is responsive across all device and browsers	Passed

4.9 TEST DATA

The system uses Student's name/ lecturer name, email, picture (jpeg or png) ,matriculation number/Staff ID as part of the data for testing.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 INTRODUCTION

Learning or any other process that can bring about learning by higher institution over the internet has been seen as a way of rationalizing the costs of in-house student learning activities. The aim of this project is to guarantee that learning can be ubiquitous that is anywhere and at any time. The system developed in this research essentially utilize eLearning strategies to allow student collaborate and cooperate successfully on a task.

5.1 SUMMARY

The main aim of this project was to determine the possibility of transferring the traditional collaborative learning into a reliable, secured and faster electronic system with internet technologies. The system architecture proposed in this project will provide valuable guide for developers in developing a web enabled collaborative and cooperative learning systems. The system will pave way for a world wide deployment of collaborative and cooperative learning platform.

5.2 FINDINGS AND DISCUSSION

In this project, we developed a collaborative and cooperative learning system for students in a department of computer science. Students demonstrate high levels of academic achievement and learning satisfaction, which verified the system's utility. This study concludes that establishing a comprehensive collaborative and cooperative learning system with better interaction mechanisms will ensure higher levels of learning performance in a web-based collaborative/cooperative learning process.

5.3 SUGGESTIONS FOR FURTHER WORK

The system has potential to grow, so there is need to make some enhancement in the future which are based on the findings of this study. The suggestions for further study are:

- i. Developing a mobile application version: a hybrid mobile application and a cross-platform mobile application (Android, iOS, Blackberry & windows phone) can be developed which will eliminate the use of browser on any device. The mobile app can also include a push notification for details of notification for assignment/task and other notifications.
- ii. Integration of learning analytics tools to analyse the trends and pattern of learning task that the student shows interest most.

5.4 CONCLUSION

The project work presented a collaborative and cooperative learning system, which enables students/users to work on a group task by submitting their contribution for assessment. This project has sought to contribute to improving the procedures adopted by university in using a system-based collaborative and cooperative task among the students.

The project achieved its aims and its objectives stated earlier in Chapter one by studying the activities of the existing system before the designing of the web enabled system, using unstructured interview with the user so as to gain proper understanding of the system. Object-oriented analysis and design was use as the design methodology. The proposed system was developed and developed on the foundation of the existing system and extra functionalities were added where necessary to improve and strengthen the existing system with the help of web and internet technologies such as PHP, HTML, JavaScript, jQuery and MySQL as the database.

5.5 RECOMMENDATIONS

There are also limitations in this study. Participants in this study are computer science students; and hence, results of this study may not be suitable for other aspect. Therefore, recommendation is suggested based on the experiment of this project that Cooperative and collaborative learning systems should contain better interaction mechanisms to support communication activities among lecturers and students in a web enabled learning platform.

The system is efficient and the method used could be integrated in any faculty in any University or academic system. The researcher is confident that this research work will not only aid teaching and research but will also promote learning at all level. Therefore, I strongly recommend that the system should be fully implemented.

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APPENDIX

Dash Board

```
<?php
include_once('dbfiles/check.inc.php');
?>
<title><?php echo ucwords (htmlentities($fullname)); ?> :: Dashboard</title>
</head>
<body>
<?php
if(isset($_SESSION['feedbacks'])){
include ('includes/dashboardfb.inc.php');
}
?>
<?php include ('includes/topMenu.inc.php'); ?>
<div id="body" style="padding-top: 90px;">
<div class="col-sm-4">
<?php include 'includes/profile.inc.php'; ?>
</div>
<div class="col-sm-8">
<?php
$dashMenu = "";
if($reg_as=='A'){
$dashMenu .= '<a href="manageusers.php"><div class="boxes"><i class="fa fa-
user fa-5x"></i><p>Manage Users </p></div></a>';
$dashMenu .= '<a href="managecourses.php"><div class="boxes"><i class="fa
fa-navicon fa-5x"></i><p>Manage Courses </p></div></a>';
$dashMenu .= '<a href="notifications.php"><div class="boxes"><i class="fa fa-
bell-o fa-5x"></i><p>Notification</p></div></a>';
} elseif($reg_as=='L') {
$dashMenu .= '<a href="managegroups.php"><div class="boxes"><i class="fa fa-
users fa-5x"></i><p>Manage Groups </p></div></a>';
$dashMenu .= '<a href="managetasks.php"><div class="boxes"><i class="fa fa-
signal fa-5x"></i><p>Manage Tasks </p></div></a>';
$dashMenu .= '<a href="notifications.php"><div class="boxes"><i class="fa fa-
bell-o fa-5x"></i><p>Notification</p></div></a>';
$dashMenu .= "";
} elseif($reg_as=='S') {
$dashMenu .= '<a href="notifications.php"><div class="boxes"><i class="fa fa-
bell-o fa-5x"></i><p>Notification</p></div></a>';
$dashMenu .= '<a href="medialibrary.php"><div class="boxes"><i class="fa fa-
newspaper-o fa-5x"></i><p>Library </p></div></a>'
$s = "SELECT tasks.tkid, groups.grpname FROM tasks INNER JOIN groups
ON tasks.grid = groups.grid WHERE groups.members LIKE
'%$uniqueid%'";
$dashMenu .= '<a href="tasks.php?task='.$result[0].'"><div
class="boxes"><i class="fa fa-user fa-5x"></i><p>'. $result[1]. ' </p></div></a>';
}
}
$dashMenu .= '<a href="finishedtasks.php"><div class="boxes"><i class="fa fa-
line-chart fa-5x"></i><p>Completed <br>Tasks </p></div></a>';
}
$dashMenu .= "";
?>
```

```

        <div class="panel panel-default">
            <div class="panel-heading">
                My Dashboard [<?php echo "$fullname"; ?>]
            </div>
            <div class="panel-body center-block" style="padding-left:17px">
                <div class="center-block" id="allbox">
                    <?php echo $dashMenu; ?>
                </div>
            </div>
        </div>
        EDIT POST
    <?php
    include_once('dbfiles/check.inc.php');
    if($reg_as=='L'){
        $_SESSION['feedbacks'] = 'You are not allowed to use the Edit Post Page';
        header("location: dashboard.php");
        exit();
    }

    if(isset($_GET['task']) && isset($_GET['des'])){
        $tkid=$_GET['task'];
        $des=$_GET['des'];
    } else {
        header('location:managetasks.php');
        exit();
    }

    $sql = "SELECT tasks.tkid, tasks.tkname, tasks.dscriptn, tasks.startdate, tasks.enddate,
            groups.grid, groups.grpname, groups.members,
            DATEDIFF(enddate, NOW()) as date_diff
            FROM tasks INNER JOIN groups
            ON tasks.grid = groups.grid
            WHERE tasks.tkid = '$tkid ' ";
    $query1 = mysqli_query($db_conx, $sql);

    if( mysqli_num_rows($query1)>0){

        while ($details = mysqli_fetch_row($query1)) {
            $task = $details['0'];
            $name = $details['1'];
            $dscriptn = $details['2'];
            $startdate = $details['3'];
            $enddate = $details['4'];
            $grid = $details['5'];
            $grpname = $details['6'];
            $members = $details['7'];
            $more = $details['8'];
        }
    } else {
        header('location:managetasks.php');
        exit();
    }
    $lists = '<small>';
    $mem_arr = explode(',', $members );
    foreach ($mem_arr as $key => $value) {
        $lists .= '<b>[</b> <a href="#" . $value.'"'>'. $value.'</a> <b>]</b> ';
    }

```

