BRIDGING THE DISTANCE IN OPEN AND DISTANCE LEARNING: DEVELOPING STUDENT-STUDENT AND STUDENT-LECTURER COLLABORATIVE FORUM

By

[1]Osang, Francis Bukie and [2]Nwaocha, Vivian

[1, 2] Department of Computer Science, National Open University of Nigeria, Abuja, Nigeria
Corresponding Author: fosang@noun.edu.ng, bukie3osang@yahoo.com

ABSTRACT

The internet has been a platform for individuals, groups of people and companies to interact with one another through the social media. The social media has truly aided interaction in academic settings and services through social networks, forums, blogs, among others. Forums are now been used as tools/platforms to create discussions, connect to people (mostly of similar interests) and as sources of relevant information. This work intends to make use of forums as tools in helping NOUN students to simplify their studies considering the peculiarity of the program. Based on an in-depth review of some relevant literatures, some key requirements have been considered in the development of the application. The app has been developed and tested against the objective. The system was implemented using MYSQL database, hypertext pre-processor (PHP), JavaScript and apache server. The methodology employed was Object-oriented analysis and design (OOAD). The developed system is user friendly and was designed with student, lecturers, and admin interfaces to assist users interact using friendly interfaces. The implication for students is the provision of a platform for student – student, student – lecturers and student to management interactions. Other implications for the ODL institution, the government are discussed.

Keyword: Online forum, open and distance learning, lecturers,

1.0 INTRODUCTION

The emergence of online forums has become hugely popular in recent times with interactions based on similar discussions, posts and threads (Xiaolin, et al., 2009; Sumit & Prasenjit, 2010). Online forums have become powerful tools for sharing information (Bedmar, 2010). Online discussion forums have also become one of the most popular places to ask and answer questions (Falls, 2012).

Online Forums, compared to the other social media sites, have various unique features like threads; where discussions and posts are made, RSS feeds, polls, etc. Online Forums, provide a unique type of social environment that enables people to share and access information freely. Users can either start new topics or leave comments in the threads of existing topics (Xiaolin, et al., 2009).

1.1 Statement of the Problem

In recent times, the quest for knowledge has risen drastically; surfing or browsing the web without direction for information is becoming stressful especially using search engines. Also getting information in a campus-based or academic community, especially when carrying out research, it can be stressful and expensive. There is a need to provide a collaborative mechanism for NOUN students on the go via a mobile device for online collaborative study and knowledge sharing. The mobile application will be customized with many more features that address the needs of the students specifically as compared to the conventional social forums in existence. Unlike the existing social platforms, the new system will have features that match students at their levels and also match students studying the same courses. In that way, communication and learning is seamless, an improvement over the existing system that will be healthy for an academic environment especially a distance learning

The objectives of the study are as follows:

a. To investigate the current system in existence
b. To design a mobile based platform where students can share different questions or views on various topics and majorly make information accessible.
c. To implement the designed system in (b) above.
d. To evaluate the performance of the proposed system with a view to comparing results with old system.

1.2 Significance of the Study

Mobile based discussion forum application will bring people together with shared interest and mind-set. The use of online discussion forum has emerged as a common tool and an effective way of engaging students outside the classroom. It is an e-learning aided platform that will provides students with privilege to post messages to the discussion threads, interact and receive feedback from other students and instructor on the go via a mobile device, and hence

create a deeper understanding of the subject matter being discussed.

The benefits of this web application include: easy access to information, streamlined interaction between students, fostering social interactions, no loss of relevant information, security & access from anywhere. It is flexible and requires nothing more than a computer system with access to internet. Students (users) have the opportunity to participate in discussions. News section creates an opportunity for users to have a feel and knowledge about events, seminars, conferences. Lecturers have the opportunity to make their own suggestions/opinions, answers to questions and messages to any.

2.0 THE CONCEPT OF ONLINE FORUM

Online forums provides a unique type of social environment that enables people to share and access information freely. Users can either start new topics or leave comments in the threads of existing topics. Usually, an online forum has tens or hundreds of distinct boards or communities. These boards or communities group hundreds to thousands of threads of similar related topics together. Because of the huge numbers of users and the high dynamics of online forums, this type of environment has a rich complexity (Vicenç, et al., 2008).

2.1 Structure of an Online Forum

An Online forum as a whole contains various categories (broad subject areas), which themselves contain forums (more specific subject areas) which contain topics (threads or discussions) which are made up of individual posts (where a user writes something) (vBulletin, 2014). It is arranged in a very unique way/form i.e. From Categories to sub-forums, from sub-forums to more sub-forums and from these subfolders to threads, where members can start their discussions or posts.

1. User groups and Levels: User groups are groups of users that divide the community into manageable sections board administrators can work with. Each user can belong to several groups and each group can be assigned individual permissions. This provides an easy way for administrators to change permissions for many users at once, such as changing moderator permissions or granting users access to a private forum (phpBB, 2007). There are three major user groups in a forum: a. Moderators: They are individuals (or groups of individuals) who look after the forums from day to day. They have the authority to edit or delete posts and lock, unlock, move, delete and split topics in the forum they moderate. Generally, moderators are present to prevent users from going off-topic or posting abusive or offensive material (phpBB, 2007). Common privileges of moderators include: deleting, merging, moving, and splitting of posts and threads, locking, renaming, stickying of threads, banning, suspending, unsuspending, unbanning, warning the members, or adding, editing, removing the polls of threads (vBulletin, 2014). b. Administrators: They are members assigned with the highest level of control over the entire board. These members can control all facets of board operation, including setting permissions, banning users, creating usergroups or moderators, etc., dependent upon the board founder and what permissions he or she has given the other administrators. They may also have full moderator capabilities in all forums, depending on the settings put forth by the board founder (phpBB, 2007). These are individuals who have been assigned to manage a forum. They can also be referred to as forum owners. There are also forums where administrators relate to each other to share their knowledge. c. Users: are individuals or members who have been given access to a forum or who have publicly registered to access the forum. These members do not have any special privileges unless otherwise given by the Forum Owner. Users can become Moderators or Administrators, if designated by the Administrator (IMS Global Learning Consortium, 2014).

Post: A post is a user-submitted message enclosed into a block containing the user's details and the date and time it was submitted. Members are usually allowed to edit or delete their own posts. Posts are contained in threads, where they appear as boxes one after another. The first post starts the thread; this may be called the TS (thread starter) or OP (original post). Posts that follow in the thread are meant to continue discussion about that post, or respond to other replies; it is not uncommon for discussions to be derailed (Beard, 2011). 3. Threads: A thread is started on some subject by an initiator. If they are interested in the subject of the thread, people post their opinions in reply posts. Because reply posts can reply to any preceding post, many branches (sub-threads) of discussion appear in a thread, and a thread ends up with a tree-shaped structure. We refer to this as a thread structure (Jangwon, et al., 2009). A thread starts with the publication of a post, which in turn triggers an amount of activity in the form of comments (Vicenç, et al., 2008). Threads are very important concepts in conversations on online forums.

2.2 Features of an Online Forum

The ability of online forums to be able to submit threads and posts brought the invention of new web technologies/features. In this project, some of these under-listed features will be used like private messages and emoticons. These are some standard features of an online forum:

i. Tripcodes and Capcodes: In a tripcode system, a secret password is added to the user's name following a separator character (often an octothorpe). This password, or tripcode, is hashed into a special key, or trip, distinguishable from the name by HTML styles. Tripcodes cannot be faked but on some types of forum software they are insecure and can be guessed (cave76, 2009).
ii. Private Messages: There are three reasons for this; you are not registered and/or not logged on, the board administrator has disabled private messaging for the entire board, or the board administrator has prevented you from sending messages. Contact a board administrator for more information (phpBB, 2007).
iii. Attachment: An attachment is a file or image uploaded to go with a post. It can be a convenient way for members to share documents and photos. The administrator sets who can attach files, how many per post, how large, and what types and size they can be in the Attachments and Avatars center (SMF Online Manual, 2013).
iv. BBCode and HTML: It is not possible to post HTML on this board and have it rendered as HTML. Most formatting which can be carried out using HTML can be applied using BBCode instead (phpBB, 2007).
v. Emoticon: Emoticons are essentially textual representations of oral discourse markers, generally utilized to convey a writer's sense of emotion and involvement. It is also a mode of representing a writer's feelings in communication. (Halvorsen, 2012)
vi. Poll: As with posts, polls can only be edited by the original poster, a moderator or an administrator. To edit a poll, click to edit the first post in the topic; this always has the poll associated with it. If no one has cast a vote, users can delete the poll or edit any poll option. However, if members have already placed votes, only moderators or administrators can edit or delete it. This prevents the poll's options from being changed mid-way through a poll (phpBB, 2007).
vii. RSS and ATOM feeds: The RSS (Rich Site Summary and Really Simple Syndication) feed is not human readable. It is an XML format which is designed to be read by machines rather than humans. There are different versions of RSS in use. RSS 2.0 is the most common. It is used for news/blog feeds as well as for Podcasting. A newer format, called Atom, is a more standardized way of providing XML content updates. However, it has not gotten wide acceptance yet outside of the blog communities (Web Reference, 2007). Other Features include avatars; ignore lists, subscriptions and cookies.

2.3 Applications of Online Forums

The world has given way to some great advancement on the internet, which has brought about the solution to different problems. In this context, online forums have served as "Q&A" web application; where individuals with any question about any topic can be answered, and a social network; where groups are formed and interactions are made.
Online Forums have been applied in different spheres of the internet. These are the following applications of online forums today:
i. Learning in schools through student interactions: Online forums have served as platforms for students to communicate with their fellow classmates, lecturers and other distance learning students. It has created e-learning opportunities for schools, which are having issues with student interactions within the class (Ikhu-Omoregbe, et al., 2012; Halvorsen, 2012; Kadir, et al., 2012).
2. Discussions: Online forums have also facilitated different forms of discussions in schools, organizations and on other larger environments. For example, students given assignments over the holidays can ask for assistance and still receive their feedbacks. They also provide a means to interactively participate in discussions or obtain/provide answers to questions; the vast volumes of data contained in forums make them a valuable resource for "support sharing" (Xue, et al., 2007; Mark, 2002; Li, et al., 2011).
3. Business Marketing: Organizations have started to make use of online forums for finding new customers or gaining insights from those they already have. Online forums can benefit business in several ways like crowd sourcing service and support, consumer research, social CRM (customer relationship management), etc. Online forums have created the opportunity where companies and customers can talk and it may even escalate to the manager of that company (Inc, 2010; Belicove, 2012).
4. Decision-Making support: It has been noticed that most online forum users have one decision or more to make at that point in time. This has led to scientists coming up with decision trees to understand the behavior of online forums. It can really be of use in schools, businesses, etc. (Xiaolin, et al., 2009; Ikhu-Omoregbe, et al., 2012).

2.4 Review of Existing Systems

Several Platforms/Systems have already been established as online discussion forums. This section will carefully review each of these existing systems in line with this project.

2.4.1 The Student Room

The world's largest student community, The Student Room have attracted students to the site for help with

their studies, advice from their peers and, quite often, just to have a good conversation. It is ranked as one of the first 500 visited websites in the United Kingdom (Alexa, 2014).

It is mainly for universities in the UK like University of East London, London School of Economics, University of West London, etc. It has also been noticed that every year after high school graduation, students start looking for the right university, often referred to as the Clearing Phase, where the traffic to The Student Room increases significantly. They have also been able to withstand the surge in traffic anytime the site is fully active (Gossamer Threads, 2013).

A large part of The Student Room consists of the forum, of which the major sections are:

a) University Applications

b) University Courses: most subjects have their own sub forum 3. Universities: most universities or university towns have their own sub forums

c) Exams

d) Academic Help: at any educational level though mostly focused on secondary school and college level; each subject with its own sub forum

e) Gap Years

f) Debate and Discussion: with politics, society, religion, Model Parliament, Model United Nations and philosophy sub forums

g) Careers: with teaching, armed forces and finance sub forums

h) Life and Style: with relationships, health, fashion and beauty sub-forums

i) Hobbies and Interests: with sport, entertainment, technology, gaming sub-forums, etc. (Student Room, 2014).

2.4.2 Google Groups

Google Groups is a service from Google Inc. that provides discussion groups for people sharing common interests. It became operational in February 2001, following Google's acquisition of Deja's Usenet archive. A new and redesigned Google Groups was released in February 2012 with an updated user interface. A Help Center has also been created to cater for users with this new interface (Maluniu, et al., 2013).

Google Groups have also served as a platform to create online and email-based groups. You can either register/sign-up as a regular participant or an administrator. Users can either signup/register as a regular participant or an administrator. The membership of Google Groups is at no cost at all, although as of 2013, a Google account is required. A new and redesigned Google Groups was released in February 2012 with an updated user interface. A Help Center has also been created to cater for users with this new Google Groups interface. A user can also decide the type of access he/she wants by selecting public, announcement only, or restricted (Google Groups, 2014; Lombardi, 2007).

3.0 MATERIALS AND METHODS

3A. **Architecture and Requirements**

The research methodology employed in this work is 'Dynamic Systems Development Method' (DSDM). It is a software development methodology originally based upon the Rapid Application Development methodology. DSDM is an iterative and incremental approach that emphasizes continuous user involvement. Its goal is to deliver software systems on time and on budget while adjusting for changing requirements along the development process.

3.1 Software Architecture

The software architecture of this application which represents its software (logical) implementation and deployment processes. This software architecture comprises of three (3) main layers under the server-side logic and one separate Layer: Presentation, Business and Data Layers and the cross-cutting concerns. Figure1 gives a well descriptive representation of the system:

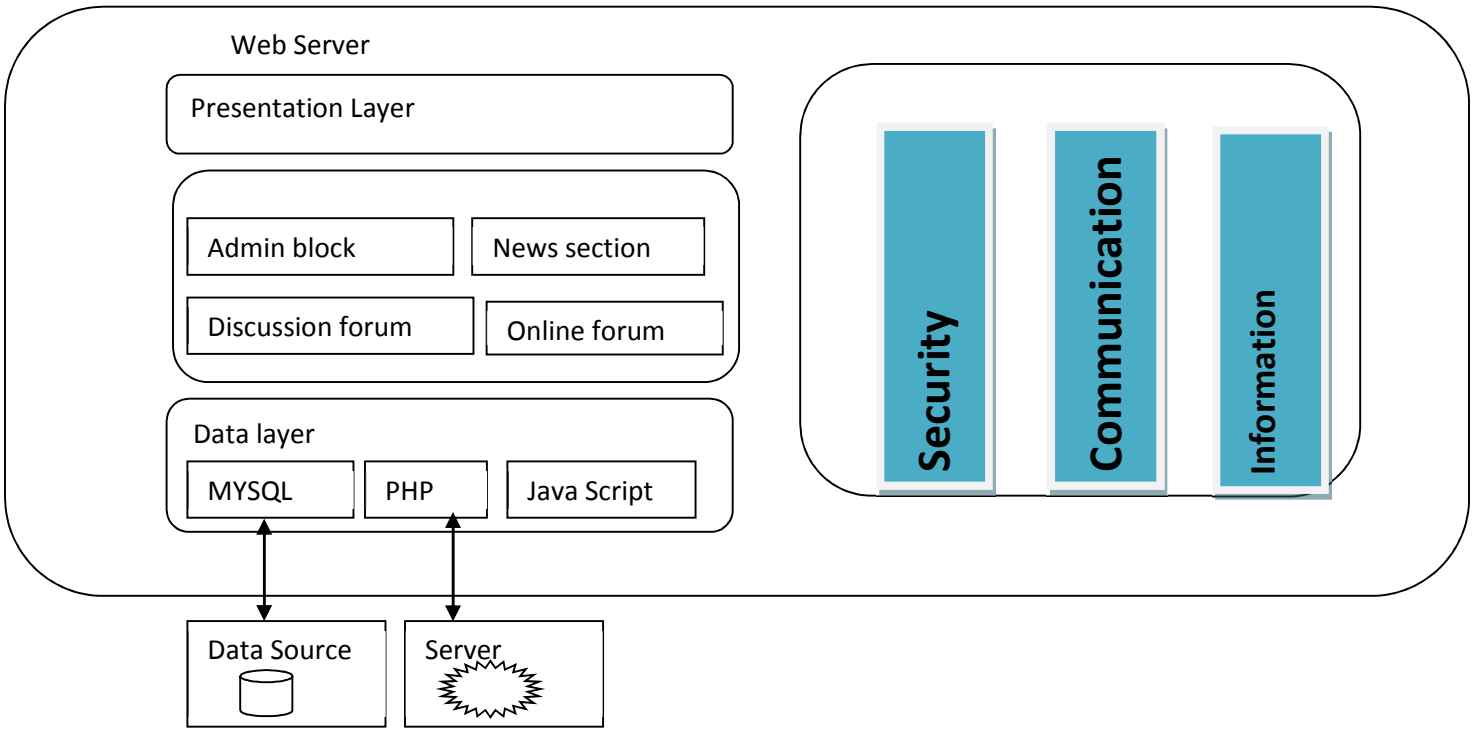


Figure 1: Software Architecture

The Presentation Layer represents components that will aid user's interaction with the system. Here, different components like desktop computers, smart phones, tablet computers and laptops will be used as a bridge into the core business logic. The Business Layer represents the core functionality of this application working with some development tools and environments to build applications. In this Layer, languages like PHP, Java, Python, etc. are supported. The Data Layer represents access to data hosted within the boundaries of the application using a relational database management system (RDBMS). This work will be implemented on the MySQL database. The Cross-cutting concerns contain common functionalities that span layers and tiers of the majority of the application. This functionality typically supports operations such authentication, authorization, caching, communication, exception management, logging and instrumentation, and validation.

3.2 System Requirements

System Requirements are processes that specify what the information system must do or what property or quality the system must have. The requirements that specify what the system must do are frequently referred to as functional requirements and the requirements that specify what attribute the system must have are called non-functional requirements (Whitten, et al., 2004).

3.2.1. Functional Requirements

The app is conceived in different interfaces for the different users; Students, Lecturers and the Administrators. Each interface has been designed to meet different requirements.

For the Students, these are the requirements that have to be met:

- Respond to posts
- Manage their account.

For the Lecturers:

- Manage their account.
- Respond to posts

For the Administrators:

- Tracking the number of users at each time.
- Add lecturer's and students.
- Manage students and lecturer's personal accounts.

3.2.2. Non-Functional Requirements

i. Look and Feel Requirements

- The app should be presentable on low resolution devices (mobiles & tablets).
- The toggle navigation will fit an Android device.

ii. Usability Requirements

- Ergonomic and clear usage.
- Users will have no problem learning how to use this application.

- Convenience of usage.

iii. Performance Requirements

- Reliable storage of information.
- Students will be able to respond to their questions as a means of follow-up.
- Posts will be placed in the right category for quick response by Students.
- Quick response to user activities by either moderators or administrators.

iv. Operational Requirements

- The app should be able to work with relevant hardware devices.
- Not prone to crashing.
- The app should be able to handle multiple users.

v. Security Requirements

- Only a admin has access to any posts.
- Sensitive information is hidden from non-users.
- Password sensitive
- Only registered users can use the system except for the administrator.

vi. Legal Requirements

- Personal information of users should be protected.
- App should comply with quality assurance standards.
- The Administrator is fully responsible for most operations in the forum.

3B. SYSTEM DESIGN

The system design illustrates how the system will fulfil the objectives or requirements identified during the analysis of the system. It also illustrates the overall architecture of the system and the setting of standards, for example, for the design of an artificially intelligent system (Simon, et al., 2006).

3.1 Object Oriented Analysis and Design

Object-oriented analysis and design (OOAD) is a software engineering approach that models a system as a group of interacting objects. Each object represents some entity of interest in the system being modelled, and is characterized by its class, its state (data elements), and its behavior. Various models can be created to show the static structure, dynamic behavior, and run-time deployment of these collaborating objects.

3.2 Unified Modelling Language (UML)

Unified Modelling Language is a diagrammatic object-oriented modelling language. It uses diagrams to document an object-based decomposition of systems showing the interaction between these objects and the dynamics of these objects. UML aims to provide a common vocabulary of object-based terms and diagramming techniques that is rich enough to model any system development project from analysis to design. This system is modelled with: (a). Use case diagram (b). Sequence diagram (c). Activity diagram

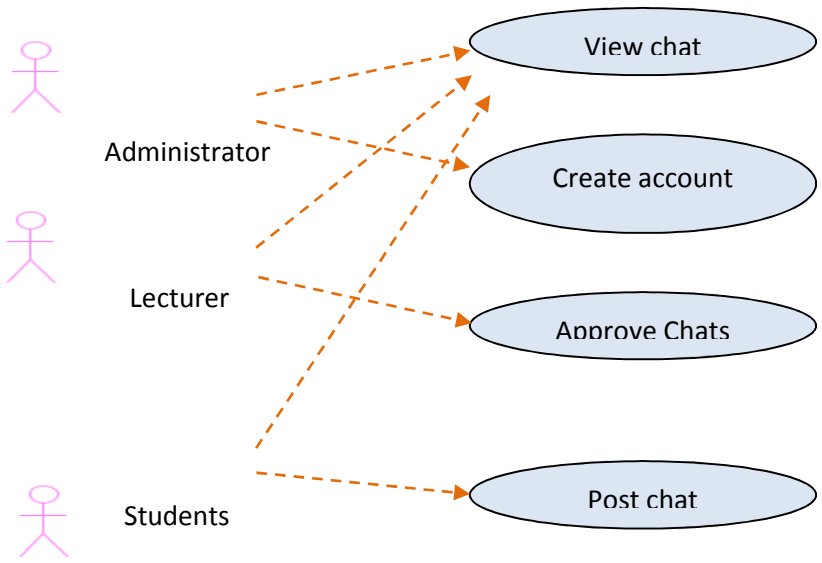
3.3 Use Case Diagram

Use case diagrams were used to perform requirements analysis in order to understand the core functionalities and usage scenarios associated with the identified requirements. A Use case diagram simply shows a look at the system from an outsider (e.g. user) point of view. The system is treated as a black box and one solely identifies what the system is used for.

The components of a use case diagram include, Actors, Use cases, Associations and the system boundary.

a. Actors: represents the external entities of the system i.e. people or things that interact with the system that is being
b. Use Cases: are functional parts of the system. It is what an actor does e.g. a customer "browses the catalog", "chooses items to buy", and "pays for the items".
c. Associations: are shown between actors and use cases, by drawing a solid line between them. It links an actor with the use case it interacts with.
d. System Boundary: represents the scope of the system the actor is interacting with.

The use case has three (3) actors. The Administrator is the manager of the system. the Lecturer, Student are the main users of the system. The following use case diagram illustrates the relevant subsystems of the system. The Use-case diagram is shown in Figure 2.



Figur2: Use case diagram

3.4 Sequence Diagram

A Sequence diagram provides a graphical representation of interactions between objects over time. It shows the messages that pass between classes over time for a use case. The objects involved in the operation are listed from left to right according to when they take part in the message sequence. A sequence diagram typically shows a user or an actor, and the objects and components they interact with in the execution of a use case.

There are four primary elements of a sequence diagram:

a. Objects: are arranged on the horizontal axis. Time increases downwards. Below each object there is a vertical dashed line. That is the life-line of the object spanning the period (the vertical axis represents time) over which the object lives.

b. Lifelines: The life-line of the object spanning the period (the vertical axis represents time) over which the object lives

c. Messages: Between the life lines (or activity bars) we show arrows representing the messages which are exchanged between objects. The message itself is shown as a label on the message arrow.

d. Focus of control: These are vertical rectangular boxes used to connect and send messages between two objects in a sequence diagram. It is also used to bridge the communication of different lifelines.

Figure 3 carefully describes this interaction that is the most functional on the online forum.

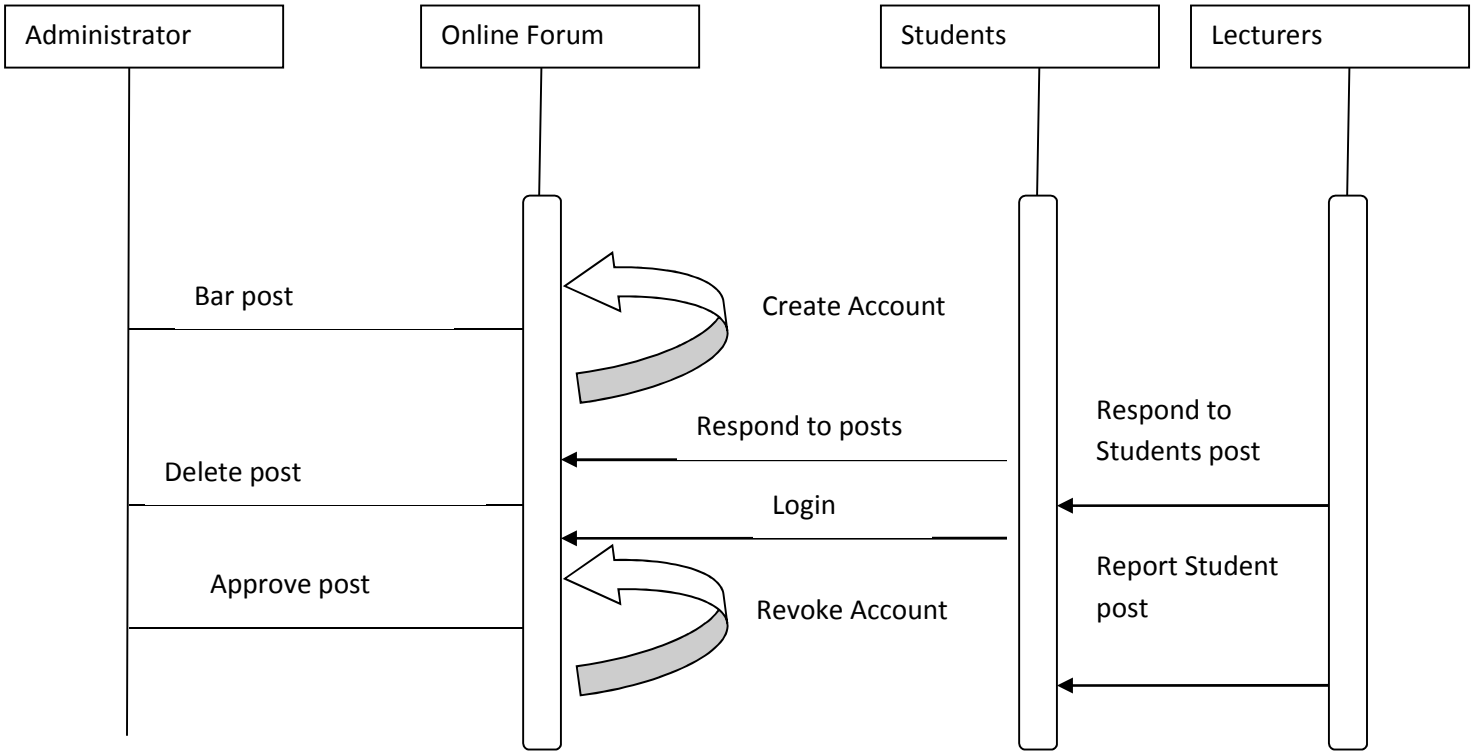


Figure 3: The Sequence diagram for the System

3.5 Flowchart

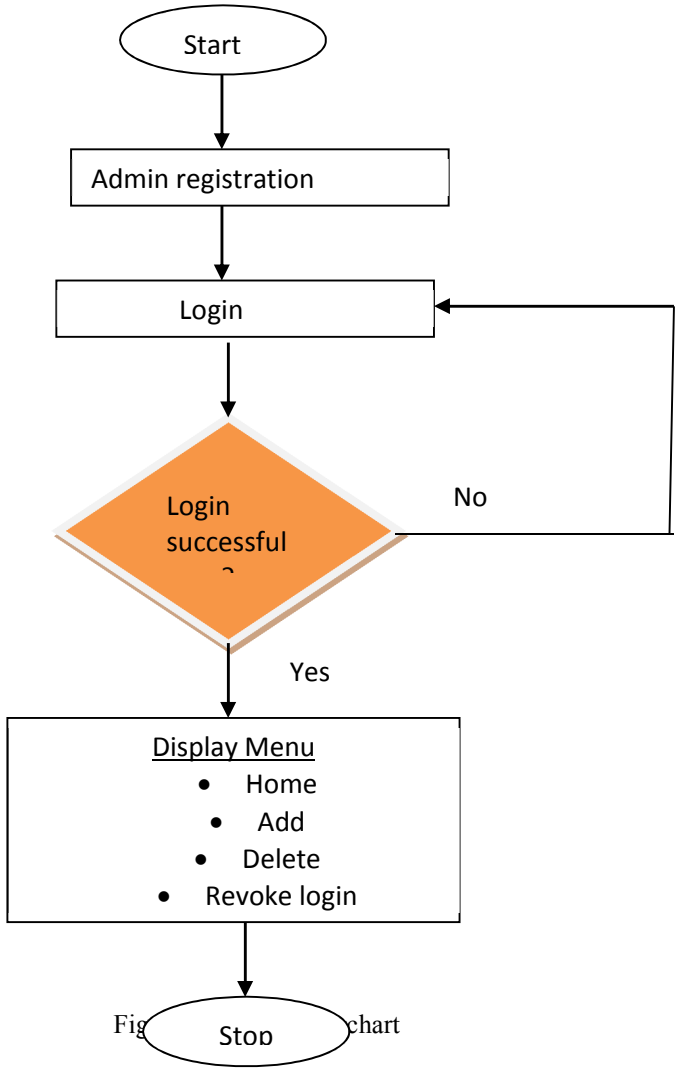
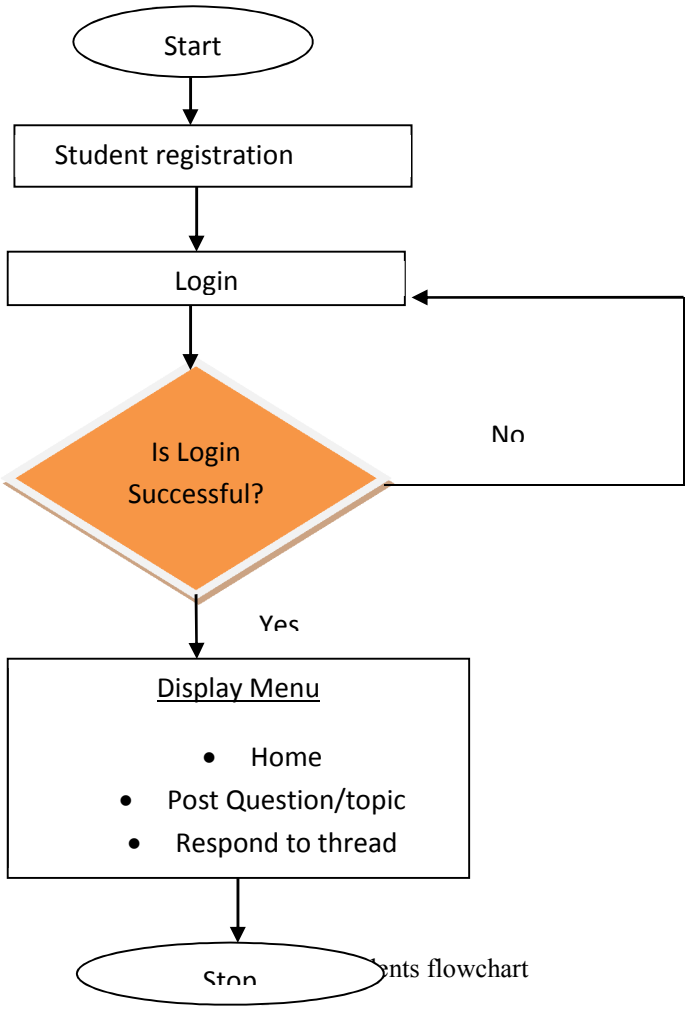


Fig chart



nts flowchart

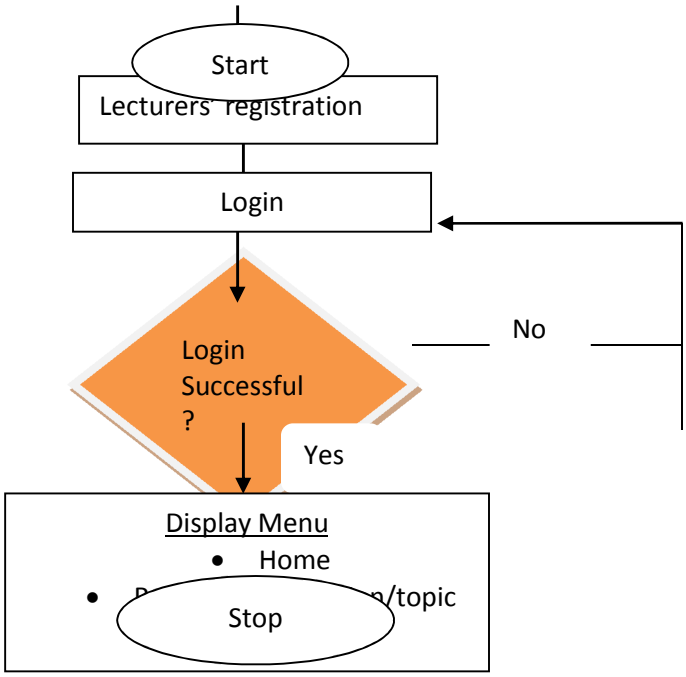


Figure 6: Lecturers flowchart

3.6 DATABASE DESIGN

The Database Design was conducted to show a modelled view of the system. The database program for the app is the MySQL; a relational database design was implemented and tested using a local MySQL (open-source relational database management system).

Description of Tables

A description of tables and their different columns are stated below:

Note: PK means the primary key in the tables on database

Table 1: Hardware and Software Requirements

Table Name	Column	Description
Admin	id(PK), username, password	Stores the admin login details
Students	regno(PK), fullname, username, email, course, gender, level, password	Stores student's profile details
Lecturer	id(PK), fullname, username, email, password, postheld	Stores lecturer's profile details
News	id(PK), title, news, date_time	Stores and maintains all news posted by the student

Table 2: Database Schema

Hardware Requirements	Software requirements
i. Windows 7 or 8. ii. PHP iii. MYSQL iv. Query browser v. Apache Server vi. PhoneGap vii. Apache Cordova viii. Mobile Emulator	i. Pentium IV and above, 32bits. ii. 512 MB RAM and above, 40GB HDD and above iii. VDU/Monitor or Screen. iv. Connectivity: Network Interface Card or Wireless Network Interface v. Link: Strong Internet Connection (Cable or DSL) vi. Router, Switch, Modem.

4.0 RESULTS AND DISCUSSIONS

In the implementation phase all the programs are written, database is created, user operational document is written, users are trained, and the system tested with operational data. The implementation is carried out with the results that have been obtained from the feasibility study and analysis. The system is implemented by finishing the project with the help of appropriate tools that have been suggested and are loaded into the server. The system is then tested with appropriate data inputs to check the success of the system. This is being carried out by inputting data that are rare to be inputted. Then the administrator will be trained of the operational functionalities to control and maintain system at a later stage. The third party user's role is being carried out by the implementation team itself. There by it is made sure that the system meets the required standards. The objectives of the new system will be used to develop some program modules to communicate; they will need a way to interact with each other. These developments were all generally achieved using the development tool Dreamweaver to code the layout in HTML and CSS, while the function that is performed by different users were generally achieved using PHP scripting language and JavaScript whenever it is necessary. Finally the session tracking of the system users' were also implemented to track users' accessibility and authorization to various functions for example a regular user can't perform the functions of the admin of the system.

There are several activities involved while implementing a new project they are

- End user training
- Training on the application software
- System Design
- Parallel Run And To New System
- Post implementation Review

4.1 Implementation Procedure

For the purpose of demonstration and presentation of this project, the researcher's laptop was used as both the server and the client system during development. The application was eventually hosted in a remote server. Mozilla Firefox or Internet Explorer or Google Chrome are some of the Web browsers that users would use for visualization.

The following are the sample shots of the deployed application

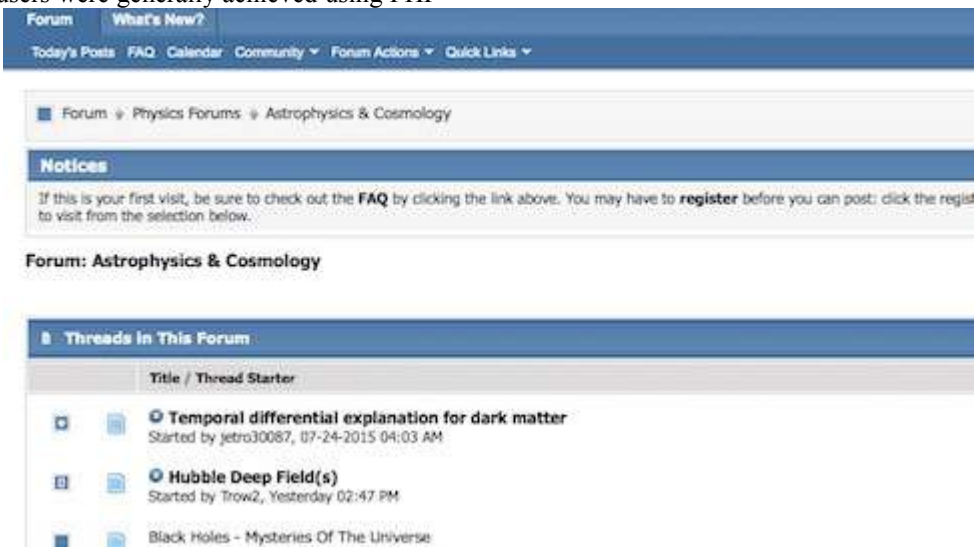


Figure 7: Forum Thread

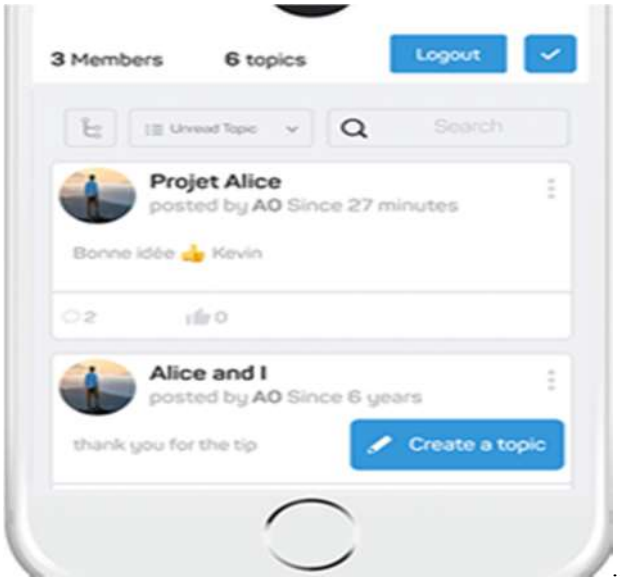


Figure 8: Students interaction

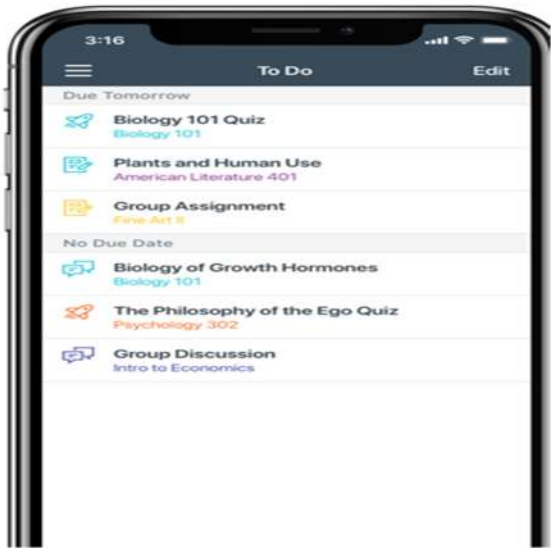


Figure 9: student's interactions

This activity interface enable all registered students and lecturers to interact. Threads posted are diplayed

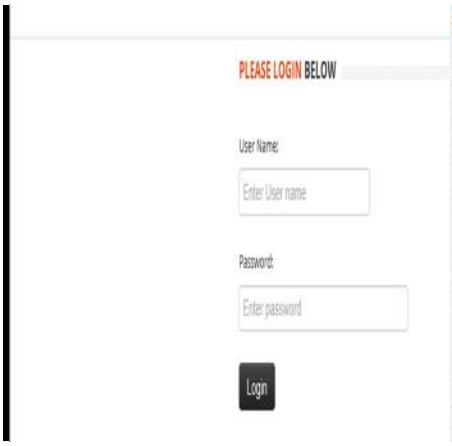


Figure 10: login

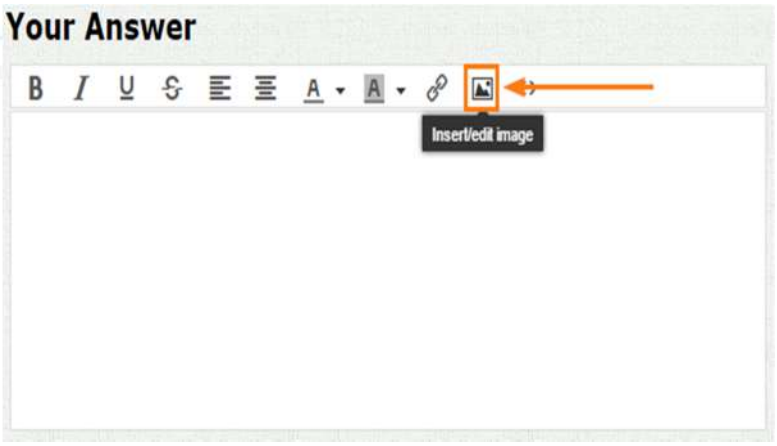


Figure 11: posting interface

This data entry platform provides an editable and formattable interface functions. It also allows for multimedia data insertion

The interface allows users to login to their respective platforms

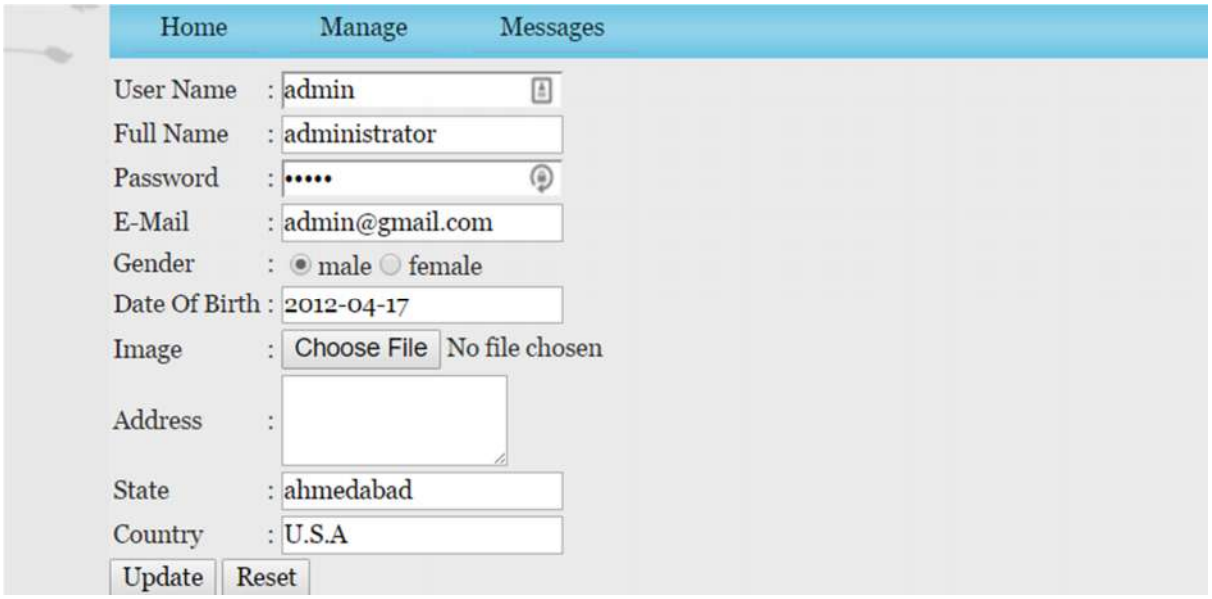


Figure 12: Administrator account

This is the control interface of the admin. Students can check reported posts/messages among other operations designated to him to manage

This is the interface for only student's interaction

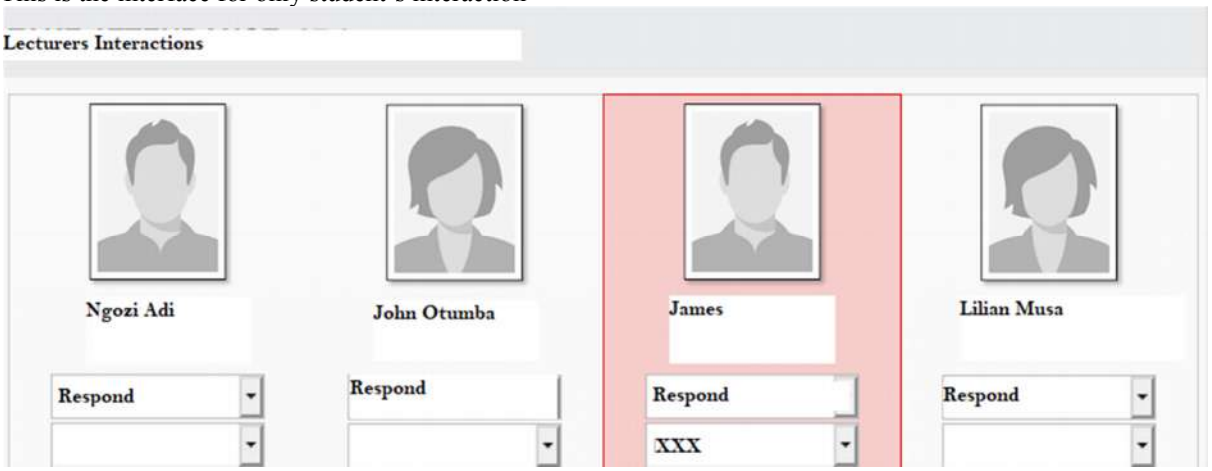


Figure 13: Lecturer's Response

Lecturers react to students' questions tagging their response

4.2 Evaluation

Following a thorough implementation and testing of the current system the program was very effective, considering the main objectives of the newly developed system. While implementing this system the following were observed;

i. This system was approved for meeting its requirements in the analysis phase and it may need some slight adjustments to suit new or larger data.
ii. Security and privacy of user data were perfect using passwords and usernames.
iii. The system was found to be reliable.
iv. It involved the use of the latest technology in terms of software and hardware.

5.0 CONCLUSION

As the social media grows, online forums like this will be relevant to students and youths around the world. Even as other versions will be later developed, the activities and features on the app will increase because they will be built to meet the end-user's requirements.

Online forums have presented students with systems designed for the discussion of topics, with each topic separated into its own area, called a thread. A thread is begun by a user writing a short document, called a post, which introduces the topic or asks a question about the topic (Liu, et al., 2010).

Although online forums are significant tools for interaction, the integration of other popular social networks to make it accessible to everyone can be a big plus to this work. Also, most students are able to relate with Q&A's more, so they can get any information they want easily. The participation of the institution involved will also be an advantage because they will be able to relate with these issues and problems raised by the students to improve some of their operations.

This will be deployed to complement traditional learning techniques such as course materials. It will harmonize with the educational philosophy that makes communication a necessary tool and fundamental mechanism for effective learning. Consequently, the proposed customized Mobile based online discussion forum for NOUN students can be successful in enhancing collaborative learning by attracting students to participate and interact freely. The system will improve the performance of students due to collaborative learning and raise the academic strength and rating bar of NOUN. With the sorting capacity of the platform, students with the same or similar interest can be sorted there by simplifying research and discovery sharing.

5.1 Recommendations for future Research

Future research should consider integrating forum with other learning management systems and providing comparative analysis of the different collaborative platforms and their effect on teaching and learning outcomes in both ODL and non-ODL institutions of learning.

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