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e-Collaboration for Tertiary Education Using Mobile Systems

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ABSTRACT

Electronic collaboration has revolutionized academic activities by enabling academic collaborations through devices such as computers and other mobile devices. With this development, learning and academic collaboration can now take place across continents and different time zones. In electronic collaboration, knowledge sharing is done remotely, in real-time and not location-bound. Although several institutions in the developed countries have been using some form of eCollaboration for academic activities and for improving collaborations among students, much has not been done in this domain in the developing world. Using Java as software technology of choice, we take electronic learning a step further by making it possible for students to learn and collaborate through mobile phones thus leveraging on the existing mobile diffusion among students in Nigeria. The intention is to contribute to research and development in mobile learning relevant to the growth and quality of education by encouraging group participation among students and fostering joint academic contributions among the academia.

KEYWORDS*:* Electronic collaboration, Mobile collaboration software, mobile phone and electronic learning.

1. INTRODUCTION

Definitions of collaborative learning vary. Collaborative learning is defined by the United Nations Educational Scientific and Cultural Organization as learning that takes place **'**when learners work in groups on the same task simultaneously, thinking together over demands and tackling complexities.**'** Collaborative learning is viewed as an 'act of shared creation and/or discovery and within the context of electronic communication as taking place without members being physically in the same location' (Recabarren, 2009). Simply put, collaboration is a process by which people work together on an intellectual, academic, or practical endeavour. Historically, collaboration took place in person, by letter, or on the telephone.

Since the inception of the Internet and the World Wide Web, collaboration is viewed as an electronic phenomenon that connects individuals electronically via the Internet using tools such as email, online communities, discussion groups, wikis, blogs, podcasting, or through access to sites on the World Wide Web. Electronic collaboration allows collaborators to communicate anytime, from anywhere to any place. People from different parts of the world, different universities, and/or in different courses can exchange information, collaborate on shared documents and ideas, study together, or reflect on their own practices (Watson, 2005). This Internet-based work allows collaborators to communicate anytime, from anywhere to any place. People from different parts of a building, state, country, or continent can exchange information, collaborate on shared documents and ideas, study together, or reflect on their own practices. The advancement in information technology has revolutionized the way collaboration has been. The entrance of mobile phones to the technology market has given communication a face lift. One of the contributions of mobile phone which is mobile internet has enhanced internet connectivity and makes collaboration easier. With mobile phones, students can easily share ideas and knowledge without using personal computers.

The revolution in different mobile technologies such as GPRS (General Packet Radio System), Edge, 3G and even the 3.5 G has added to the speed of accessing information via mobile phones. This paper focused on how mobile phones can be used as tool for collaboration. This is to enable those that cannot afford personal computers to still have access to electronic collaborative systems for academic activities.

2. PROBLEM STATEMENT

Learning in higher requires extra effort outside the classroom, where students can share problem that borders on academic interest. Before now the only medium where something like that is done may be through the internet, which is possible or accessible when one have computer and a modem or service provided through a cybercafé, outside this students come together to discussed issues of academic concerns. These options have one or more problems. Like cost of buying modem, proximity to cybercafé, congestion and threats in cybercafé, lack of awareness on the path of students etc

The study intends to presents a concept on design and simulation of Electronic Collaboration using Mobile Phone for Tertiary Institution, to enable students from different institution contribute to topics of common academic interest, without necessarily living their location. In order to improve quality of learning. The outcome of this study will be relevant to the growth and quality of education by encouraging group participation in academics among students. The said technology can foster joint academic contributions among the academia**.**

3. COLLABORATION AND RELATIVE CONCEPTS

Collaboration is a recursive process where two or more people or organization work together in an intersection of common goals — for example, an intellectual endeavour (Watson,2005) that is creative in nature—by sharing knowledge, learning and building consensus. Most collaboration requires leadership, although the form of leadership can be social within a decentralized and

egalitarian group (Spence, 2006). In particular, teams that work collaboratively can obtain greater resources, recognition and reward when facing competition for finite resources. Lave et al, (1991) in their findings claimed that collaboration is also present in opposing goals exhibiting the notion of adversarial collaboration, though this is not a common case for using the term.
Structured methods of collaboration encourage introspection of behavior and communication. These methods *specifically* aim to increase the success of teams as they engage in collaborative problem solving. Forms, rubrics, charts and graphs are useful in these situations to objectively document personal traits with the goal of improving performance in current and future projects (Recabarren, 2009). Electronic collaboration (e-collaboration) is operationally defined here as collaboration using electronic technologies among different individuals to accomplish a common task (Kock et al, 2002). This is a broad definition that encompasses not only computer-mediated collaborative work, but also collaborative work supported by other types of technologies that do not fit most people's definition of a "computer," such as the telephone, which is not, strictly speaking, a computer – even though some of today's telephone devices probably have more processing power than some of the first computers back in the 1940s. Another example is the teleconferencing suite, whose main components are cameras, televisions and telecommunications devices.

A key characteristic of Computer-Supported Collaborative Learning (CSCL) research is its diversity in methodology: Computer-Supported Collaborative Learning (CSCL) researchers apply laboratory experimental methods, quasi-experimental approaches, discourse analyses, or case studies. Qualitative data shows high regard for use of Computer-Supported Collaborative Learning (CSCL) tools as aides to learning in the classroom (Jakes, 2008). If Collaborative learning is the idea of bringing together learners to work and learn in a collaborative manner, (Gokhale, 1995) then Computer Supported Collaborative Learning (CSCL) tools accomplish this task either synchronously or asynchronously. {See Asynchronous Learning} Online collaborative tools provide a central environment for these types of interactions (Hsiao, 1996).

According to Jakes, (2008) some specific benefits of the utilization of web-based applications for collaborative learning are listed below;

1) Saves time. Students can work either together or independently, either way contributing to the success of their group overall.
2) Develops oral and written communication and social interaction skills.
3) Allows for interactions with students outside their class, school, city, state and even country.
4) Prepares young students for upper grades and the technology tools they will be encountering there.
5) Allows for students who are unable to attend school to keep up with their peers.
6) Share ideas.
7) Increases student motivation.
8) Encourages different perspectives views.
9) Establishes a sense of learning community.
10) Creates a more positive attitude about learning.
11) Promotes innovation in teaching and classroom techniques.
12) Enhances self management skills.

4. RESEARCH FRAMEWORK

In recent time, Nigeria society has experience tremendous improvement in Information Technology. The boost in Information Technology in Nigeria can be attributed to the entrance of mobile network into Nigeria in 2002 (Ernest, 2003). Today, mobile phones are virtually everywhere, the penetration of mobile phones is more than computer system. Nearly all students in Nigeria have mobile phones compared to students' population with computer systems. With increase in the number of mobile phones users in Nigeria, there is need to tailor the applications to suite the million mobile phones.

Fixed internet, which is internet on computers, does not integrate the concept of mobility, while mobile internet does. In today cyberspace, mobile phones with computer capabilities are now available and affordable; this has made internet to reach all and sundry. The main purpose for this study is to take the advantage of mobile phones to offer mobile collaboration to students to enhance academic activities.

4.1 The Existing System

Ambrose Alli University, Ekpoma is an institution with a state-of-the-art web collaboration service for the use of the students without academic integration. For students' academic activities, the institution makes use of lecturing, library system, laboratories, workshops etc; while the students are left to carry out collaboration themselves. The existing mode of collaboration is the traditional method, where students gathered mainly in the evening to discuss academic works. At time the students formed themselves into different groups for tutorials which will be taken by the group leaders.

4.2 Problems Of The Existing Collaboration

The existing method for collaboration is designed to enhance the academic performance of the students in order to develop knowledge needed to pass examinations and to face job challenges in the industries. The system is nonetheless without its own problem and limitations, highlighted below are some of the problems of the existing manual method for collaboration;

1. **Limitation in collaboration scopes**: The collaboration is only limited to the same set of students. There is no cross institution collaboration; knowledge and ideas are not shared with students from other institutions. This limited the collaboration scope of the students.
2. **Time bound:** There is time bound in manual collaboration. Students only meet in specified time and they share knowledge within this time frame. Other questions have to wait till next collaboration session.

3. **Limited resources:** Manual collaboration is limited in resources available to students. In most cases they make use of handout, few available books that in most cases are limited in content.

4.3 The Proposed System Concept

The proposed collaboration system is not to replace the existing manual collaboration system but to extend the system from traditional method to mobile internet. This is to bring the collaboration system to students' mobile phones and make it collaboration "on the move".

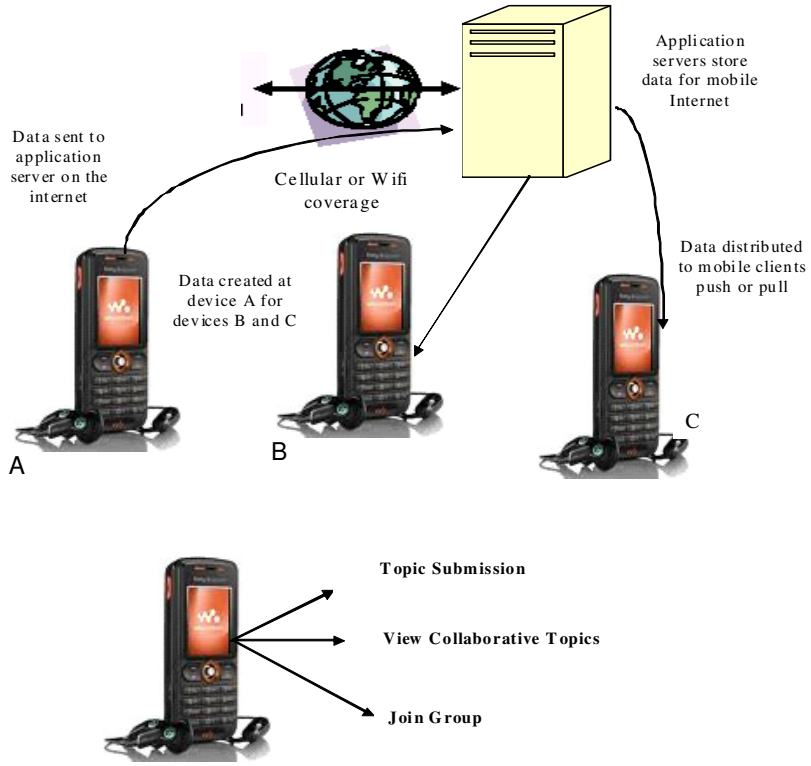

Fig 1: Architecture for Mobile collaboration Services

The proposed system will utilize the mobile internet broadband for client server transactions, due to advancement in mobile internet; most GSM operators in Nigeria now have mobile internet broadband access for their subscribers. The implication of this is that mobile broadband is within the reach of all GSM subscribers. With the proposed concept students will be able to perform most of their collaborative activities through their mobile phones. After the deployment of the system, students can now do the following through their mobile phones:

1. **Submit topics from collaboration**: This service will enable students to submit their questions or research topic for other students to respond.
2. **View collaborative topics**: apart from submitting topics/questions for collaboration, students can also view and participate in collaborative session using the software that will be available on mobile phone.
3. **Join Collaborative group**: Students can join any group they wish to join based on the course of study that will be available on the software via the internet.

4.4 Software Design Methodology

The design of the proposed mobile collaboration will be based on prototyping software development methodology using Object Oriented Programming (OOP) approach. The programming tools will be Java Micro Edition (JME) and Java Server Page (JSP) with MYSQL for database. The development will conform to client/server architecture while the client will run on mobile phones and the server on the Mobile collaboration web server.

4.5 Proposed System Architecture

The proposed mobile collaboration system will be based on client/server architecture. In this architecture, the client is the mobile phone while the server is the web server. The communication method is described below: The client (mobile phone) initiated the communication by sending request to the web server. The web server in turn processes the request and sends appropriate response back to the client. The client used WAP (Wireless Access Protocol) to send request to the mobile operator Gateway, while the Mobile operator Gateway uses HyperText Transfer Protocol (HTTP) to forward the request to the web server (internet). On the other hands, the web server sends response back to the Mobile Operator Gateway using the HTTP and the gateway forwards the response to the client using WAP. The billing for data usage for mobile collaboration system is done on the mobile operator gateway. The architecture is represented with the diagram in Figure 1.

5. DEVELOPMENT TOOLS

The development tools used for the proposed system are listed below:

1. Java Micro Edition(JME) Version 2
2. JSP(Java Server Page) and MYSQL

Java Micro Edition Version 2
J2ME (Java 2 Platform, Micro Edition) is a technology that allows programmers to use the java programming language and related tools.
To develop programs for mobile wireless information devices such as cellular phones and personal digital assistants (PDAs).
J2ME consists of programming specifications and a special virtual machine the K Virtual Machine that allows a J2ME-encoded program to run on the mobile device.

The Java Micro Edition was chosen for the following reason:

1. **Platform independent**: Java Micro application runs regardless the mobile phone platform. Pocket PCs, Smybian phones, Google Android, etc all support java Micro applications.
2. **Small footprint**: Like every other java application, Mobile Java application leaves small footprint on mobile phone memory. Memory and processor usage of Java Micro Application are the least with high level of efficiency when compared with other tools.
3. **Security**: Java has high level of security implementation in the Java Virtual Machine. This makes every java application hacking proof.

Java Micro Edition is without its weaknesses. During the course of this project work the following weaknesses were discovered:

1. Any mobile phone without java support will not be able to run JME applications.
2. Limited graphic support: Java Micro Edition supports limited graphics for developing graphic centric application

5.1 System Simulation

The Netbean 6.8 IDE with the help of Java Micro Edition version 2 is used for the simulation. Starting the application depends on the choice of the user and the system depends on the model of the mobile phone. On most Nokia Phones follow the steps below:

1. Open the application menu
2. Locate mobile collaboration in the menu
3. Select the application, the log in interface appears, enter the login parameters such as the users' name (i.e. matric number) and the password. The login parameters will be validated, if successful, the mobile collaboration menu appears, else error message appears.

Fig 3.5 shows the screen short of the e-collaboration interface input and output.

Fig. 2: Mobile collaboration Login interface

After a successful login, the interface that shows all the available mobile collaboration appears. The interface is show below:

Fig. 3: Application Main menu

Joining Group

The developed mobile collaboration application permit student to join a group before you can collaborate. The most important function here is that you must join a group. To join a group, select join a group and press select button. The interface below appears.

Figure 4: Group joining interface

Select any group and press the join group button, then the interface below appears.

Fig 5: Group joining data form

After filling all the necessary data into the form, select join now button. The data will be validated; if any error is found, error message will be displayed else the data goes to database.

Submitting Topic for collaboration

To submit topic for collaboration, select submit a topic from the application main menu. Use the interface to submit the topic which must be related to your group, else there may not be any contribution.

Fig 6: Topic submission form

Contributing To Collaborative Topic

To contribute to current collaborative topic, select contribute to topic from the application main menu. The interface below allows you to contribute to topic.

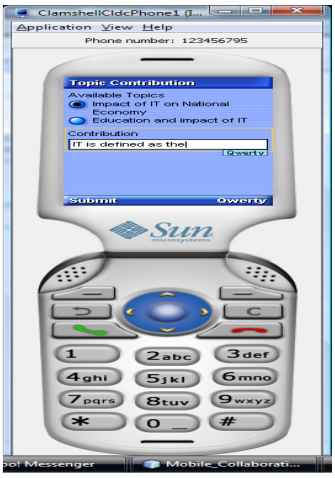

Fig 7: Contribution interface

The same interface enables you to view the entire available topic in your group.

End User Training

The end user can to successfully use the application without the appropriate training. There are several training methods that can be used; the method that will enhance adequate dissemination of the training information will be utilized. Orientation, user manual and help feature will go a long way in ensuring that the users receive adequate training on how to use the software.

6. CONCLUSION

In the era, where there is advancement in mobile phones' technology with mobile phones that have the power of computers, there is need to embrace the concept of mobile technology towards academic use. In third world countries, like Nigeria, mobile technology can go a long way in increasing access to academic information and therefore increase participation in academic activities through the use of Mobile e-collaboration. For instance, 21% of students in academic institutions have owned computer systems, while 80% owned mobile phones; this is an indication that mobile application will have wide coverage in Nigeria. Internet access is very expensive; cyber cafes in most cases are congested and not conducive for academic activities. These have affected students negatively in the area of not being able to take part in electronic academic activities.

Implications to Practice

- The various organs in academics will benefit from the mobile e-collaboration software concept, since it will be available to the users at all time.
- It will improve student performance since will expand their academic exposure.

Implications for Policy

- The technology would permits institutions within and outside the Nigeria to contribute to issues across the globe through collaborative medium which the proposed software will provide.
- It will foster joint academic relationship to the nation at large.

7. FUTURE RESEARCH DIRECTIONS

1. Effort should be made towards actualizing full development and the implementation.
2. Mobile computing application development should be embraced for future use.

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Author's Brief

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End Notes.

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