

## **VIRTUAL LEARNING IN NIGERIAN UNIVERSITIES: A Panacea for Enhanced Academic Standards**

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### **ABSTRACT**

*Currently, local area network (LAN) is commonplace in the Nigerian tertiary institutions and can be a good platform for distributing and disseminating instructional materials. Thus, this paper proposes to improve the quality of academics through online provision of learning resources based on Free and Open Source Software (FOSS); wired and wireless access to contents; and availability of the system 24/7. The system is based on third party software or FOSS called phpBB and Windows 2003 Server Active Directory Services. Both are installed and configured on an intranet. It has a discussion forum which is accessed through Hypertext Transfer Protocol using a web browser; and directory services for files/folders upload and download based on a set of privilege levels in Discretionary Access Control List (DACL) as a way of improving security.*

*The system leads to the development of a virtual campus in Covenant University. Also, it has helped improve the quality of teaching by making lecture notes available on the intranet, lecturer/student interaction, accessibility to teaching materials and reduce student's idle time. The system helps in no small measure to correct the problems plaguing the educational sector such as examination malpractice, decline standards of education and cultism, as students are gainfully engaged in academic and social activities. The creation of a virtual campus would enhance the level of e-participation, and e-readiness of the graduate for the employment market. In particular, it bridges the divide between the developed and the developing nations.*

**Keywords: FOSS, E-learning; virtual campus; active directory.**

### **BACKGROUND INFORMATION**

There is pressure on governments all over the world through the Millennium Development Goals (MDGs) to reduce poverty by half by the year 2015 and e-learning is one of such methods to be employed [1]. A good education and qualification can directly improve job prospects and quality of life. Thus, government is faced with the challenge of improving educational services and offering better teaching resources. E-learning is a generic term that encompasses the learning channels and system such as remote delivery of

multimedia content, email, video conferencing, online interactive classes and learning management systems. It is used to improve efficiency and reduce cost of learning through simple video, animation clips and fully interactive training courses [2].

E-learning caters for all types of educational environments and individual learning needs affecting teachers, pupils, students in higher education, adult education, and particularly for part-time studies. The e-U (electronic University) project virtual campus was designed to create University services online as well as to produce and share academic contents.

Virtual campus provides a comprehensive facility for virtual learning. Its main purpose is to argument traditional lecture-based teaching with online learning materials and communication. In other words, it creates University services online. Virtual campus enables students to have access to classes, students' papers, grades, bookshops and academic administrative services online. In most cases, the design of the virtual campus is based on the virtual world concept. Virtual worlds are networked environments that look like the physical world, and create a sense of place for the person navigating and doing things in the virtual world [3].

The standard of Nigerian Higher Education has been falling for decades [4]. Since democracy returned, it has been improving, though marginally, and this can be traced to the poor educational processes, for example, teaching methods and materials. Therefore, educational processes which contribute to the quality of learning and teaching environments are those that encourage dialogue, exchange of ideas, intrinsic approaches to study and optimal utilization of time and resources. Networked learning establishes relationship between teachers and learners based on collaboration and co-construction of knowledge rather than that of expert and acolyte. This therefore makes virtual learning an important aspect of the higher institutional learning environment.

In the past, in an attempt to improve the fallen standard of education, ICT (Information and communication technology) was introduced, which has been faced with a lot of challenges. Prominent among them are: Inadequate infrastructure including hardware and software, bandwidth access, lack of skilled manpower to manage resources and resistance to change from traditional pedagogical methods to modern and innovative technology-based teaching and learning methods [5].

Currently, the demands to raise the fallen educational standards have brought to the fore, the need to establish wireless networks and connections within campuses. This will offer wireless access to all students and teachers in the university campus and implement a complete server infrastructure to support the wireless access thereby increasing interaction among students and teachers, which in turn increases greatly the standard of education.

The rest of the paper is arranged as follows: a heading tagged statement of problem enumerates some of the challenges facing the education sector in Nigeria; followed by objectives; and design methodology section explains the design methodology starting with FOSS, the State chart and Use case diagram. The system specifications are also presented here. The University's experience with the system is discussed in another column inclusive of the Virtual Campus diagram, the discussion group, the mailbox, and the directory services. This is followed by benefits of the system. The last section presents the conclusion.

## **STATEMENT OF PROBLEM**

For some years back, Universities in the developing world have been witnessing decline in the standards of education. Particularly, in Nigeria, Universities are facing serious challenges ranging from poor funding to poor quality of academic output, insecurity, and cultism among others [6]. The reasons for this fallen standard in education were traced to poor educational processes, particularly, teaching methods and materials.

Besides, the teachers across the various tiers of learning had embarked repeatedly on strike actions to press home the demands for better funding of education and improved conditions of service to arouse their commitment to the noble profession. The need for the use of information and communication technology (ICT) was identified as a major tool for improved standards.

## **OBJECTIVES OF RESEARCH**

**The paper is an attempt to:**

- Restore integrity to the university system using Covenant University: a private university in Nigeria as a case study to drive the delivery of education resources through ICT
- Monitor the quality of teaching resources
- Enhance better interaction between staff and students on academic and social matters.

## **DESIGN METHODOLOGY**

The Free and Open Source Software (FOSS)

Free and open source software is a general term that is used to classify software and solutions conforming to both or either free software and open source software. Free software guarantees four freedom (to run, copy, distribute, change and improve), summarized in [7].

In the same vein, open source refers to applications that are freely distributed, non-platform specific, and the programming codes are open and visible [8]. Thus, FOSS offers a platform for skilled developers and acquisition. It is beneficial to small and medium enterprises. PHPBB is a high powered, fully scalable, and highly customizable Open Source bulleting board package. It is based on PHP, the fastest growing server-side scripting language on the web, which results in one of the fastest, feature-rich bulleting board system [9].

System Specifications

The developed system is based on a third party software or FOSS called phpBB and Windows 2003 Server Active Directory Services. Both are installed and configured on an intranet. It has a discussion forum which is accessed through Hypertext Transfer Protocol using a web browser; and directory services for files/folders upload and download based on a set of privilege levels in Discretionary Access Control List (DACL) as a way of improving security.

Hardware Specifications

Server – Pentium IV 2.5 GHz, 256MB Computer

Stackable Hubs/Switches

Wireless Access Point

Software Specifications

Operating System – Microsoft Windows 2003 Server (Enterprise Edition)

Database – MySQL version 4.0

Web server – Apache version 1.3.33

Script Engine – PHP Engine version 4.4.1

Third Party Software/FOSS – PHPBB version 2.0.10

**SYSTEM OVERVIEW**

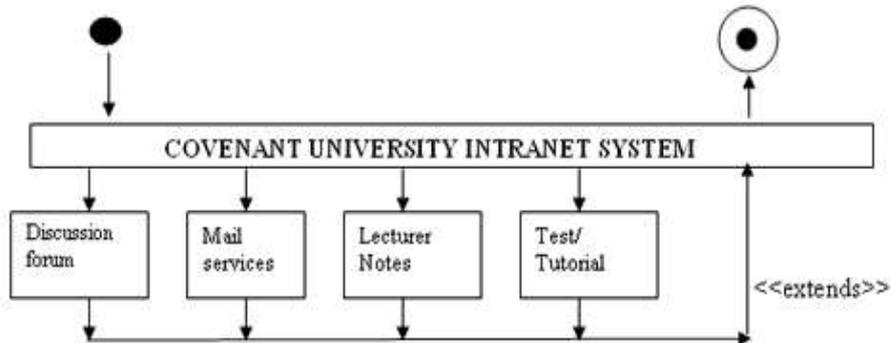


Figure: 1  
State chart for e-learning

From fig. 1, the available services on the intranet include discussion forum, mail services, lecturer notes, and test/tutorials. All of these are made available on a high speed server accessible via the wireless and wired network.

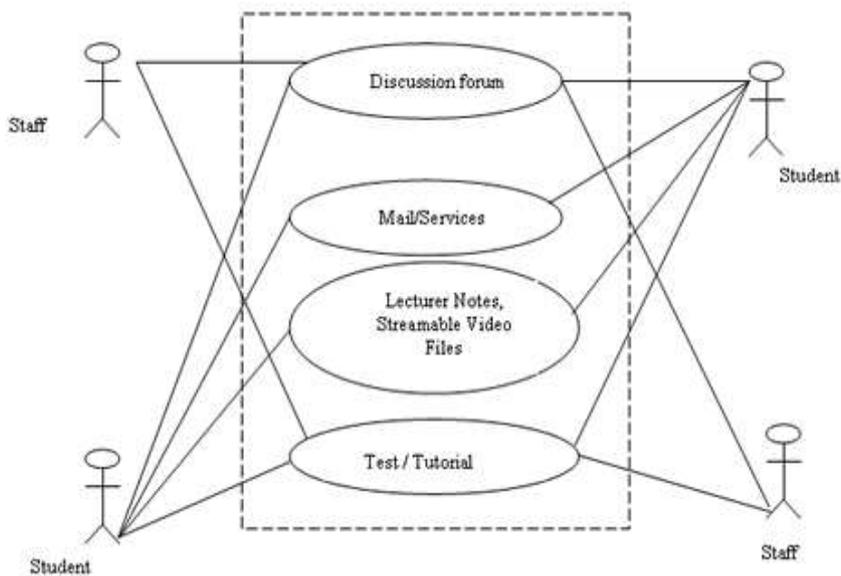


Figure: 2  
Use case diagram for e-learning

## THE COVENANT UNIVERSITY EXPERIENCE

The University is a private Christian owned institution with a total student population of 6,000. Out of this number, the Science and Engineering students belong to the College of Science and Technology (CST) and constitute over 50% of the students' population. The other colleges are the College of Business and Social Sciences (CBS), and the College of Human Development (CHD).

Over 70% of the students in CST have personal computers particularly laptops. They are all required to possess one. In addition, the University has a number of computing laboratories with close to 500 systems in addition to a number of cybercafé distributed across the campus for use by the students. The University has a Very Small Aperture Terminal (VSAT) situated in CST that offers a link to the Internet and the services extended to other colleges which are about 100m apart. The availability of these resources has greatly helped this experiment.

The colleges are connected through a backbone network of fiber optics. There is a wireless access point in CST building that makes its environment a hotspot zone. Though all computers on the entire university network exist on same network address, this gives a merit of minimizing network bottlenecks or troubleshooting. The intranet was earlier meant for College of Science and Technology but later extended to CBS and CHD based on contributions from students in those colleges.

The server has Windows 2003 Server (Enterprise Edition) as its operating system. Apache, MySQL and PHP were separately installed and configured. Also, PHPBB a third party software/FOSS was installed. Streaming media server was added and configured as a role on the server. Permissions on the shared folders were carried out by installing, configuring and administering Active Directory on the operating system [10].

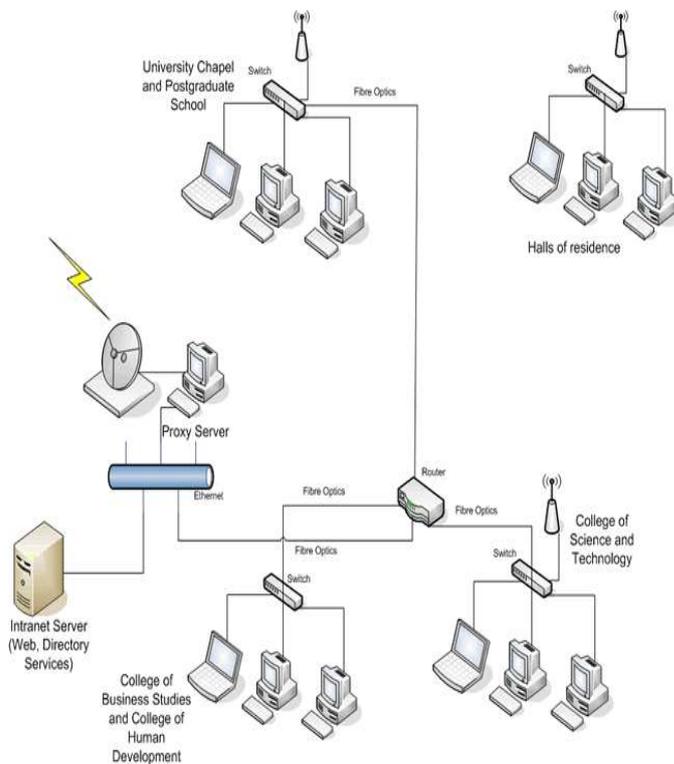


Figure: 3  
Covenant University Virtual Campus

Figure: 3 shows the network structure of the entire university. The VSAT provides Internet access for the university through a proxy server as a circuit-level gateway. While the Intranet server and proxy server are placed on same Ethernet switch, CBS (with CHD) and CST computers are connected to each college’s switch. CST has a wireless access point whereby staff and students with wireless PCs or laptops can access the intranet. Students’ halls of residence are interconnected through wireless access points.

Also, there is a wireless connection between the chapel and the halls of residence. Where CBS, CST and University chapel can be likened to separate collision domains, they are interconnected though a router which is also linked to the Proxy and Intranet Servers. Fibre optics cables have been used for the entire university backbone network owing to their large bandwidth or data transfer rate.

## ANALYSIS OF THE SYSTEM

The major features available on the intranet are discussion forum, mailbox and directory services.

### The Discussion Forum

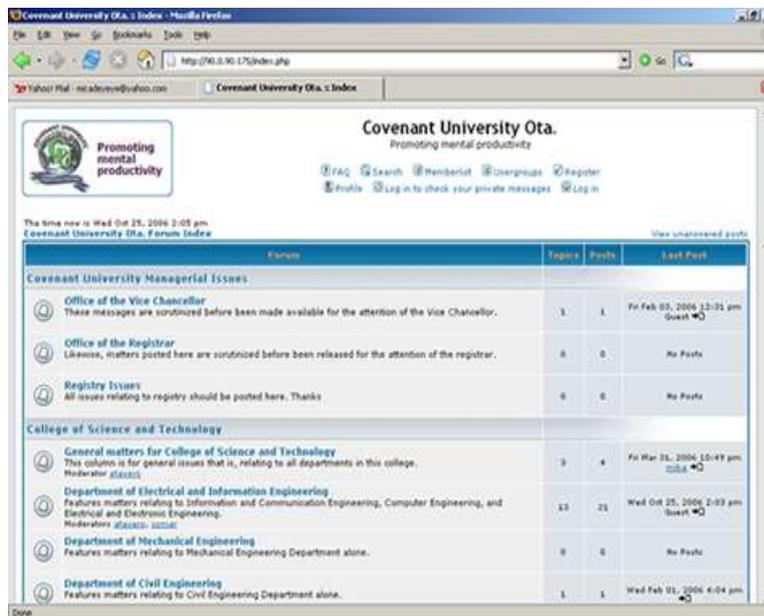


Figure: 4  
The discussion forum interface

Figure: 4. show the interface of the discussion forum. This is a web program (PHPBB) which runs on the server and other computers connect to it through their web browsers. The underlying protocol is HTTP (Hypertext Transfer Protocol). There can be multiple discussion forums going on simultaneously.

This administrator(s) grants/denies posted messages or contributions based on guidelines/instructions set for each forum. It is opened to all, and anyone can contribute to discussions in any of the forums so long he has registered else, his contribution may reflect guest as his username.

### The Mailbox

During registration for the use of the discussion forum, one is expected to supply username/id with a password.

This log-in information is needed to make contributions to the discussion forum or to check the mailbox. Though the usernames are not fully Qualified Domain Names (FQDN) such as jide@covenant.com, they are unique and case sensitive.

The mailbox has features such as Outbox, Inbox, Draft and many more. All users are entitled to same storage space which is set during installation of the PHPBB. The figure below shows the mailbox after successfully logging in. This is based on HTTP.

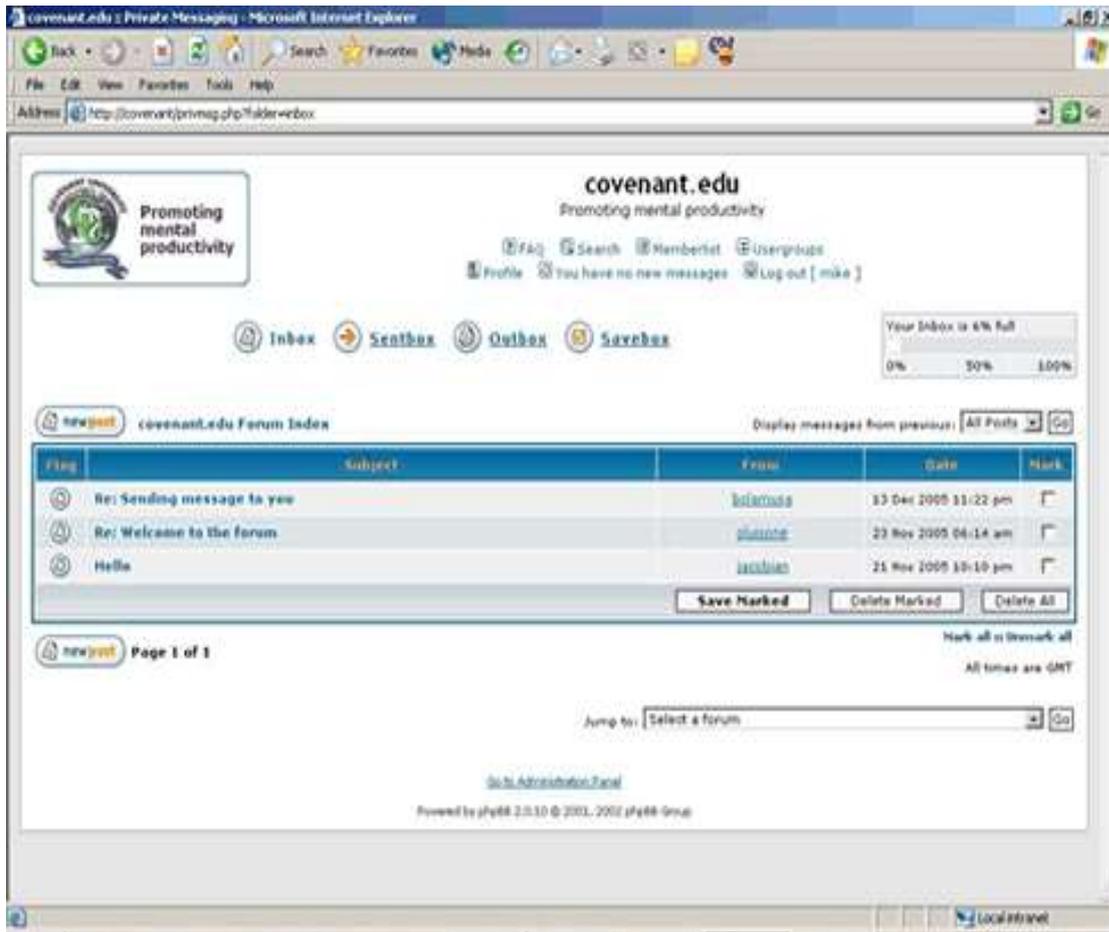


Figure: 5  
The mailbox homepage

### The Directory Service

Directory services now called Active Directory in Windows 2003 server environment is the underlying technology for setting privileges to folders for academic staff and students.

The server can be accessed using its Internet Protocol (IP) address or computer name when the connecting PCs acquire their IP addresses from the server.

In this case, the server acts as a Dynamic Host Configuration Protocol (DHCP) server [11]. Alternatively, the server can be accessed by its name if the connecting system successfully joins the domain that the server resides. The server remains the only domain controller.

In operation, each department has unique username (Log-in ID) with password while all students share same username with password. Illustratively, the privileges have been set in a manner that a lecturer from department A has Write access only to the folder designated to his department though he has Read access to all folders meant for other departments. Students have equal read access to all folders of the various departments.

This read privilege granted to all staff and students enables them to have access to resources from other departments if need be. Files transferred can not be deleted by the lecturer or students.

By this, a lecturer in same department can not delete his or other lecturers' files without contacting his departmental administrator. The privileges are set in an environment called Access Control List (ACL).

ACL of each folder of the various departments is inherited by its subfolders based on the default settings of the Active Directory or operating system. The figure below shows folders representing all departments in CST.

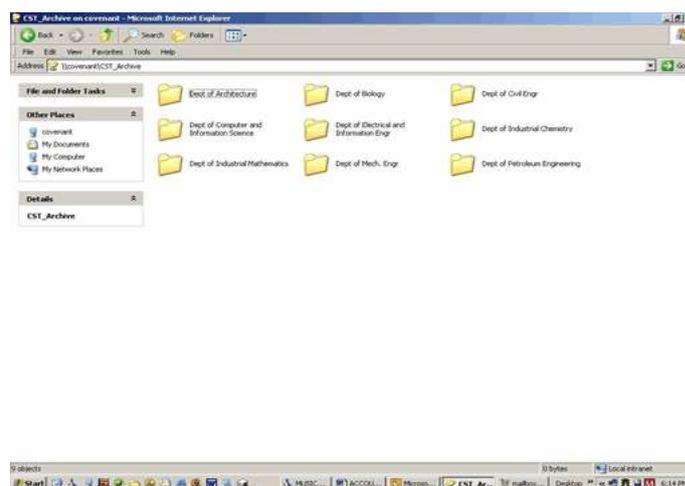


Figure: 6  
Various folders indicating departments in CST

## BENEFITS OF THE SYSTEM

The benefits of the system include among others the following:

- Full access to university services 24/7.
- Constant access to research and instructional materials (E-book and e-Journal).
- Scheduled web casting and streaming of video files on different lectures/ seminars made it possible for students to learn or study with ease.
- Efficient distribution of lecture materials and critical information to multiple locations easily and conveniently.

- Elimination of the expenses and inconveniences of getting the instructor and students in the same place all the time for learning to take place.
- Instant update of lessons and materials across the entire network. This keeps contents current and consistent for students' immediate access.
- Customization of the learning materials to one's needs. It offers control over the learning process.
- Enhancement of teaching and communication techniques which create an interactive online environment that includes case studies, story-telling, demonstrations, role-playing, simulations, online references, personalized coaching and mentoring, discussion groups, project teams, chat rooms, e-mail, bulletin boards, tips, and tutorials.
- Bridging the digital divide between the developed and the developing nations through productive use of ICT devices.
- Enhancement of maximum utilization of student's time, leading to reduced social vices in the society and on campus.
- The software is free and open source.

## CONCLUSION

The system fosters interaction among students and staff through the discussion forum, mail services, online lecture notes and tutorials. Similarly, making instructional materials available online, streaming video files on different lectures/seminars and web casting would enhance the quality of presentation because of the wider reach and the possibility of being perused by senior colleagues. This to a greater extent improves the academic standard.

The proposed system offers a cost effective way to provide instructional materials because of the free platform of implementation. It is an ideal means of bridging the digital divide between the developed and the developing nations of the world. There is improved academic standard, e-participation and e-readiness of the graduates for the employment market. In particular, the instructional materials are readily available for the students, which when put into full use in any university would boost the integrity of the educational system.

Finally, the system to a greater extent would reduce students' idle time, thus, getting them engaged in productive academic discourse, and reducing the chances of their involvement in cultism and other social vices.

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