

## A Prototype Integrated Virtual Classroom: System Implementation

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**Abstract:** Designing a virtual classroom is an enormous task that requires a lot of resources and time. The development and implementation of a prototype of integrated system of virtual classroom using Kaduna Polytechnic as a case study is carried out in this study. The implementation was carried out for asynchronous and synchronous modes of delivering lectures. The asynchronous mode of lecture delivery was through Moodle platform. The synchronous mode of lecture delivery was through Elluminate platform that was integrated into Moodle. The environment setup which includes setting up of users, courses, lectures, quizzes, assignment, glossary, chatting and lessons is presented with students' enrolment. The modes of lecture delivery and business continuity strategy are analysed and presented.

**Key words:** Prototype, virtual classroom, integrated system, lecture delivery modes, synchronous, asynchronous

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### INTRODUCTION

The system of education in Nigeria is getting to a situation of total collapse and all hands have to be on deck to salvage the educational system. Akintola (2004) and Akinyokun *et al.* (2008) stated that the student-lecturer ratio and student classroom ratio have grown to the extent that teaching and learning in the classroom have been less effective. Akinyokun (2003) stated that the field of education provides the most fascinating application of computing system.

Millions of resources are available on the internet to be shared by people across the globe. In this research work, one of the available open source facilities is used to develop an application that can give real-time lectures to students in a school system such as University, Polytechnic and College of Education.

This open source which is asynchronous platform is combined with a synchronous platform to give a blended real time virtual classroom that mimics the traditional face to face classroom.

### FEATURES OF THE VIRTUAL CLASSROOM

**Assignments:** Assignments enable teachers to grade and provide comments for uploaded files and assignments created on and off line. The teacher may choose whether to prevent late submissions, whether to allow students to resubmit their assignment (for re-grading)

and whether to receive email alerts when students add or update their submission (except for offline assignments).

**Chats:** The chat module allows participants to have a real-time synchronous discussion via the web. This is a useful way to get a different understanding of each other and the topic being discussed. It facilitates the control of learning by the student rather than the distant instructor (Jonassen, 1992).

**Choices:** Here a teacher asks a question and specifies a choice of multiple responses. This can be useful as a quick poll to stimulate thinking about a topic to allow the class to vote on a direction for the course or to gather research consent.

**Forums:** It is in forums that most discussion takes place. Forums can be structured in different ways and can include peer rating of each posting. The postings can be viewed in a variety of formats and can include attachments.

**Glossaries:** This activity allows participants to create and maintain a list of definitions like a dictionary. The entries can be searched or browsed in many different formats.

**Lessons:** A lesson delivers content in an interesting and flexible way. It consists of a number of pages. Each page

normally ends with a multiple-choice question. Navigation through the lesson can be straightforward or complex.

**Quizzes:** This module allows the teacher to design and set quiz tests, consisting of multiple choice, true-false and short answer questions and more. Each attempt is automatically marked and the teacher can choose whether to give feedback or to show correct answers.

**Wiki:** A wiki is a web page that anyone can add to or edit. It enables documents to be authored collectively and supports collaborative learning. Old versions are not deleted and may be restored if required.

**Blog:** A blog is a peer assessment activity with a huge array of options. It allows participants to assess each other's projects as well as exemplar projects in a number of ways.

**White board:** The white board is the main presentation window which can be used to present slides or used as a work area where one and other session attendees can display images write or draw.

**Audio feature:** The audio feature lets one participate in conversations during a classroom session using a microphone and speakers (or headset) via Voice over Internet Protocol (VoIP).

**Video feature:** The video feature enables one to transmit and receive video broadcasts with others in a classroom session.

## SYSTEM IMPLEMENTATION

The virtual classroom is specifically set up for Kaduna Polytechnic. Kaduna Polytechnic structure comprises of Colleges, namely, College of Science and Technology, College of Engineering, College of Environmental Studies and College of Administration and Business Studies. The colleges are further broken down into Departments. Programmes are offered by the Departments. The various programmes offered by the Polytechnic include National Diploma, Higher National Diploma and Post Graduate Diploma.

The virtual classroom has been implemented for College of Science and Technology, Department of Mathematics, Statistics and Computer Science. The implementation is specifically done for a Higher National Diploma course, namely, COM 322 Database Design II. However, this does not preclude any other College, Department, Programme or courses from being uploaded. Any number of courses can be uploaded onto the virtual classroom. Limitation is just by the size of the hard disk and RAM.

**Environment setup:** Prior to lecture delivery, a number of activities need to be carried out. The activities include the setting up of server, users accounts and courses.

**Server setup:** The operating system on which the server is installed is Microsoft Windows Vista. WAMP (Windows, Apache, MySQL and PHP) server 2.0 is installed on Windows. The installation of WAMP server automatically installed mysql\_essential\_5.0.51a\_win32.msi, apache 2.2.8 and php\_5.2.5. The installation of WAMP created WWW folder which is Internet root directory (C:\wamp\www). All these software made installation of Moodle possible. The setup of Moodle came after installing the WAMP server. The version of Moodle used for the virtual classroom is version 1.9.1+(Build 20080521). Moodle was setup as follows:

The Moodle installer script (install.php) was run by pointing the web browser to <http://obasa-pc/moodle/install.php>. This created the config.php file which is used by administrator to setup the site configuration. However, for Windows Vista the installer could not create the config.php file. This was created manually using a text editor with the following content:

```
<?php /// Moodle Configuration File
unset($CFG)
$CFG->dbtype      = 'mysql';
$CFG->dbhost       = 'localhost'
$CFG->dbname       = 'moodle'
$CFG->dbuser       = 'root'
$CFG->dbpass       = ''
$CFG->dbpersist    = false
$CFG->prefix       = 'mdl_'
$CFG->wwwroot      = 'http://obasa-pc/moodle'
$CFG->dirroot      = 'C:\wamp\www\moodle'
$CFG->dataroot     = 'C:\wamp\moodledata'
$CFG->admin        = 'admin'
$CFG->directoryp   = 00777; // try 02777 on a server in
ermissions       Safe Mode
require_once($CFG->dirroot/lib/setup.php);?>
```

After successfully running the setup php scripts, the home page for Kaduna Polytechnic (KADPOLY) Virtual Classroom was created and the Administrator can then logon to the site and carry out the processes of:

- Creating and editing user accounts
- Creating and deleting courses
- Administering teacher accounts
- Changing site-wide settings like themes etc.

**Creating and editing user accounts:** Anybody that logon to the Kaduna polytechnic virtual classroom website is considered as a user. However, the users are categorised as student, teacher, non-editing teacher, course creator, guest and administrator.

**Administrator:** Administrators can usually do anything on the site, in all courses.

**Course creator:** Course creators can create new courses and teach them.

**Teacher:** Teachers can do anything within a course, including changing the activities and grading students.

**Non-editing teacher:** Non-editing teachers can teach courses and grade students but may not alter activities.

**Student:** Students generally have fewer privileges within a course.

**Guest:** Guests have minimal privileges and usually cannot enter text anywhere.

The categories of users discussed can be setup using accounts tab under Users in the site administration block (Fig. 1). The Add a new user button under accounts is used to add a single user at a time (Fig. 2). The upload users button is used to upload users that have been captured already in a file. The two methods were used to register users. The record office of each department in the Polytechnic stores records of both old and new students in excels files. These files were converted to CSV format using excel program. The CSV format is the basic format for uploading files into the virtual classroom. The two procedures of adding users are shown in Fig. 2 and 3, respectively.



Fig. 1: User accounts management

The use of upload users requires a number of steps. When the button is clicked the following screen (Fig. 3) is displayed. The file to be uploaded was searched for and the upload users button is clicked. Next, the Browse button is clicked to locate the CSV file to be loaded, the HND I Computer Class List was uploaded. It should be noted that the five fields (username, password, firstname, lastname and email) are compulsory and they must be completed for each user record. Students' registration numbers are used as their username since they are unique for every student. The students' last names are considered as their password. To accept the list, upload users button is clicked. The lecturers that teach various courses were also uploaded the same way using departmental staff list. Deletion of users is done by clicking on the Browse list of users under accounts which can be located under users button in the site administration block. Clicking this button brings out the list of all users that have been registered.

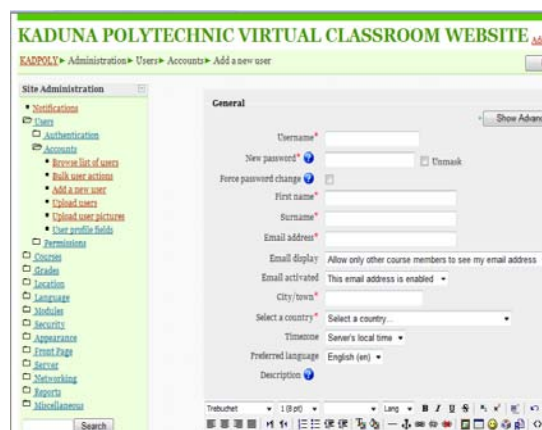


Fig. 2: Screen for adding a user

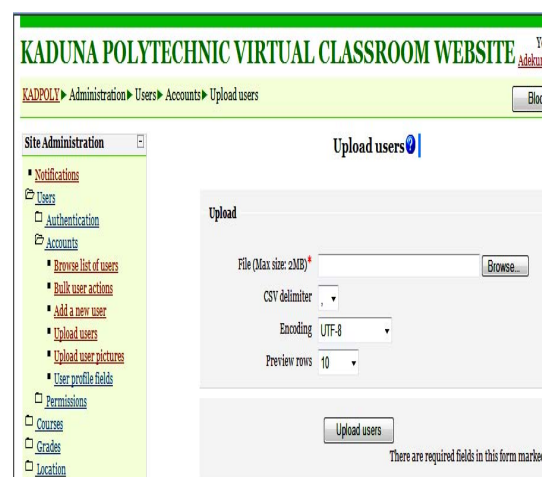


Fig. 3: Upload users screen

Next, the user to be deleted is searched for and the Delete link in the last column of the user's row is clicked to delete the user. The user's record is permanently deleted.

**Creating and deleting courses:** The administrator accesses the course management module from the site administration block of KADpoly.

**Setting up course categories:** After clicking on the Course tab the Colleges are set up at the top level. The Departments are setup as sub-category within the Colleges.

The programmes are setup as sub-category within the Departments and the courses are placed under the programmes as shown in Fig. 4. The final setup of course category is shown in Fig. 5. Courses can be added, deleted and modified using the Add/Edit button.

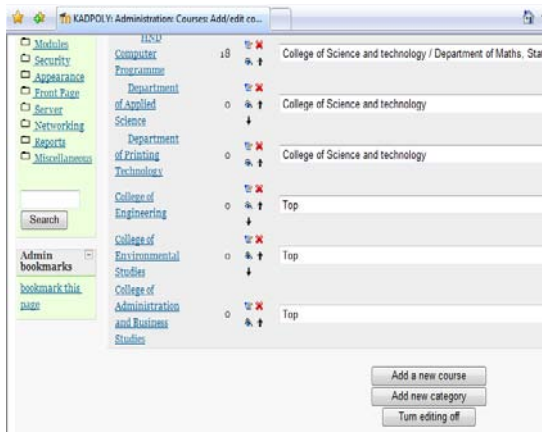


Fig. 4: Adding new course/category

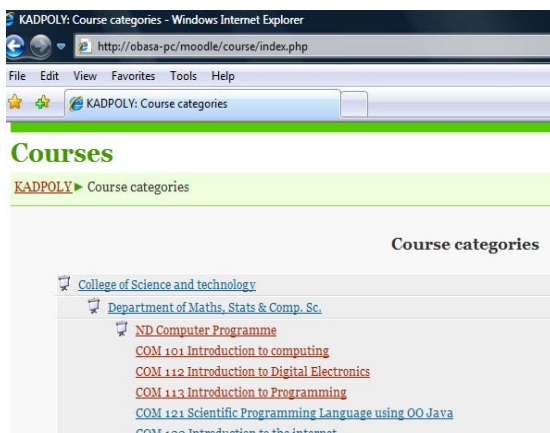


Fig. 5: Set up course categories

**Setting up course contents:** The course categories and course titles have been registered under the appropriate College and Department. The material content of each course has to be setup formally. These contents include the lecture note, quiz, forum, assignment, chat, etc. COM 322 Database Design II was formally setup for HND Computer Programme as follows:

The COM 322 Database Design II registered under HND Computer Programme was clicked to open up the screen shown in Fig. 6. The turn editing on button on the upper right corner of the screen shown in Fig. 6 is clicked to turn editing on. On clicking this button, one is presented with a screen (Fig. 7) that makes it possible to create the various course activities. The course outline adopted is that of weekly. Each course is divided into 15 weeks. This idea is line with the mode of lecture delivery in Kaduna Polytechnic where a course is expected to be taught for 15 weeks.

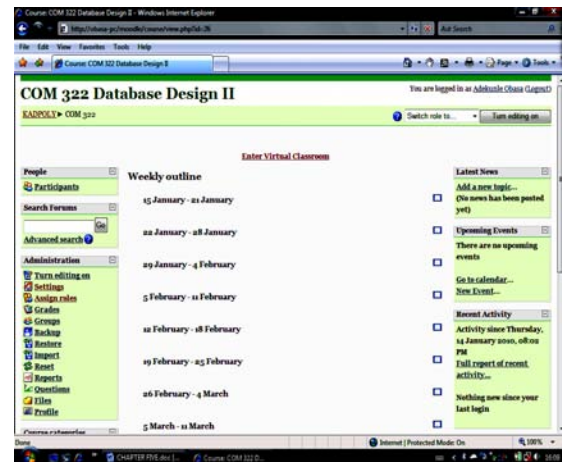


Fig. 6: Course outline screen

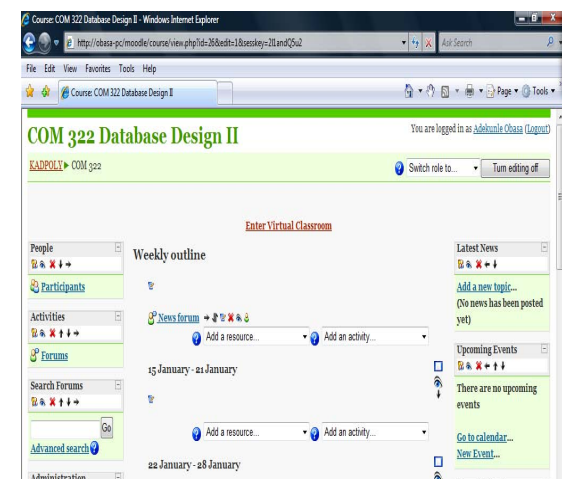


Fig. 7: Course outline editing screen

Resources such as lecture notes; web addresses that can be linked to during lecture for more materials are created using add a resource drop down box. This is the tool used in creating the lecture note for the various weeks. The activities such as assignment, glossary, quiz, forum and chat were created using Add an activity drop down box.

The student view which is the student classroom after setting up all the resources and activities is shown in Fig. 8.

**Students enrolment for courses:** There are 4 methods of associating user data with the correct courses: Internal Enrolment, External Databases, Flat File and Paypal (Modular Object Oriented Dynamic Learning Environment, 2005). The Internal Enrolment requiring students to find their courses and enrol manually is employed in this implementation. For security purpose, students cannot enrol in any course unless they have an enrolment key. A course enrolment key is a code each student enters when they attempt to enrol in a course. The key makes it more difficult for students who are not officially in the class to gain access to the Moodle platform. The key is created and given to students when they are to enrol in the virtual class course. They will need to use the key only once when they enrol.

### Prototype integration strategies

**Asynchronous lecture delivery:** The asynchronous mode of lecture delivery was through moodle platform. The COM 322 Database Design II lecture was delivered in asynchronous mode as follows:

The prepared lecture material in MS Word is first broken down into the required 15 weeks. Assignment

and quiz questions were prepared for each week. The add a resource drop down box shown in Fig. 9 was clicked and Link to a file or Web site was selected to upload the lecture material prepared for the week. It should be noted that any file in whatever format can be uploaded provided the size of the file is not >2 MB. The uploaded file can be opened and read by students online or saved to disk.

**Synchronous lecture delivery:** The synchronous mode of lecture delivery was through elluminate platform that was incorporated into moodle. The COM 322 Database Design II was delivered in synchronous mode as follows:

A duly registered student would have access into Kaduna Polytechnic virtual classroom after supplying necessary logon parameters. On entering into the asynchronous platform, he/she would be able to see Live Lecture Time-table link. This link brings out the prepared live lecture time-table prepared for COM 322.

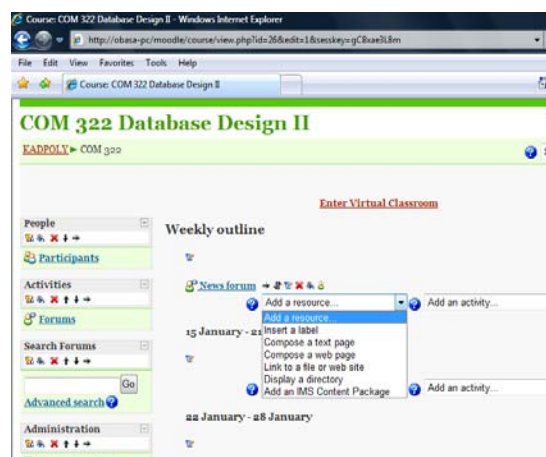


Fig. 9: Add a resource drop down box

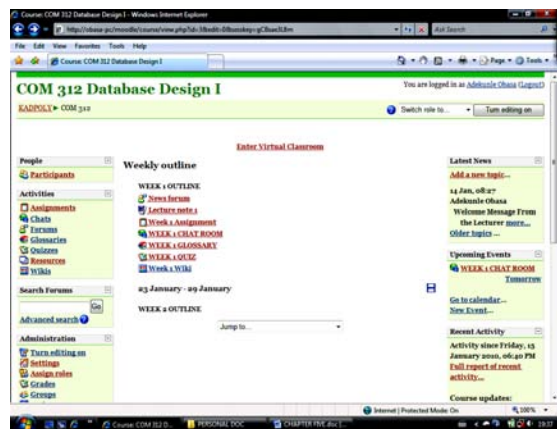


Fig. 8: Student view of the classroom

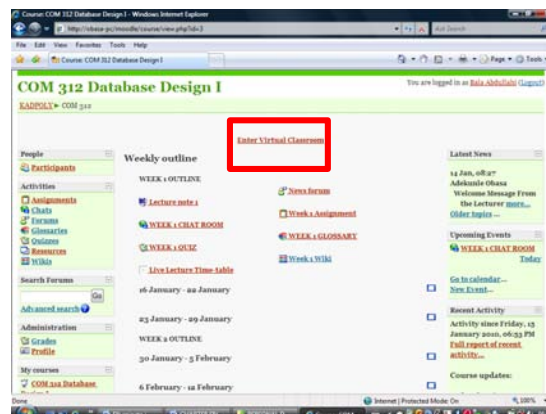


Fig. 10: Enter virtual classroom link



Elluminate platform recognises two categories of users such as Moderators and Participants. The course lecturer is the moderator while the students are participants. The virtual classroom used for COM 322 Database Design II can accommodate 25 participants. The students entered Elluminate platform recognises two categories of users: Moderators and Participants. The course lecturer is the moderator while the students are participants. The into the room through the Kadpoly web site platform (Moodle) by clicking on a link labelled Enter virtual classroom (Fig. 10).

Two URL's were made available for purpose of conducting the virtual classroom in Elluminate synchronous platform. One of these URL's is for the participants while the other is for the moderator. The URL for the participant is incorporated into Moodle platform

```

SCFG->blocksdrag = $useajax; // this will add a new class to the header so we can style
differently

SPAGE->print_header(get_string('course'), '%fullname%', NULL, $bodytags);
// Course wrapper start.
//the highlighted codes below are used to integrate elluminate with Moodle
Shomelink = '<div class="sitelink">';
'p align="center">';<br><a
href="http://www.elluminate.com/trial/p.go?pk=3qq5lkrymXk342zk">Enter Virtual
Classroom</a><br>';
echo Shomelink;
//processMyForm();

echo '<div class="course-content">';

$modinfo =& get_fast_modinfo($COURSE);
get_all_mods($course->id, $modinfo, $modnames, $modnamesplural, $modnamesused);
foreach($modinfo as $modid => $modinfo) {
    if (isset($modinfo->cms($modid))) {
        rebuild_course_cache($course->id);
        $modinfo =& get_fast_modinfo($COURSE);
        debugging('Rebuilding course cache', DEBUG_DEVELOPER);
        break;
    }
}

```

Fig. 11: Moodle and Elluminate integration code

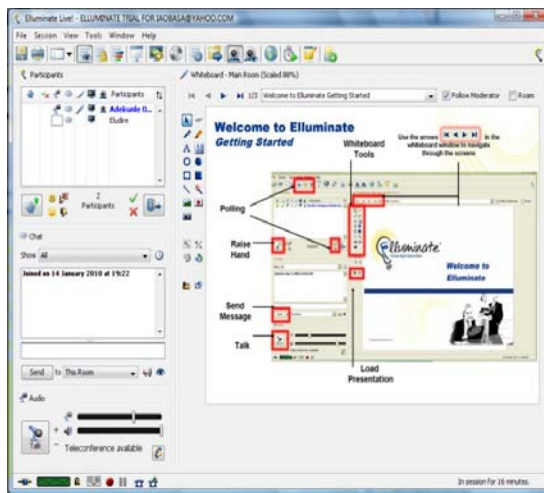


Fig. 12: Elluminate virtual classroom

source code for integration as shown in Fig. 11. Elluminate platform runs on Elluminate server as a result some charges are usually demanded. All that is given are URL's unless one wants to pay for licence to have the programme runs on his own server. This arrangement attracts a lot of money. The URLs used in this study were trial versions to test the integration capabilities. Either the moderator or participant can start the virtual classroom. The moderator will start the virtual classroom by entering his own URL directly into a web browser. This will take him in as the moderator (Fig. 12). The moderator is expected to enter into the classroom 30 min before the commencement of the lecture so that he/she can have time to setup the resources needed for the lecture. He needs to practice using the tools he intends to use during the session (Elluminate Live, 2007).

One of the researchers was able to deliver a lecture in the virtual classroom on COM 322 Database Design II by uploading powerpoint presentation on the whiteboard and using audio facilities with webcam (Fig. 13).

### Business continuity strategy

**Backing up system data:** As part of business continuity strategy and because eventually, a hard drive will fail or the database will collapse on the Moodle server and data will be lost, it is essential to have a backup procedure in place. Moodle has an automated backup system that can run on a nightly basis to export all the course materials for the entire site. The backup tool in Moodle actually runs the same functions as an individual course backup. It simply runs automatically on all of the courses on the site at a designated time. Running the backup tool over all the courses is processor-intensive, so backups are scheduled for when the server is not usually busy when there are not a lot of students trying to access the server (nightly full-server backup). Moodle is equipped with backup facility

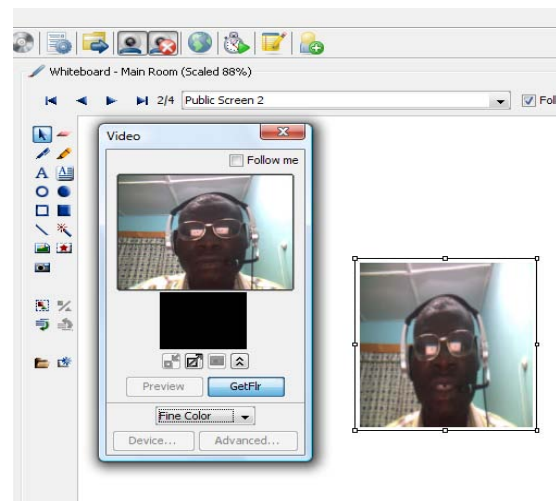


Fig. 13: Lecture presentation in the virtual classroom

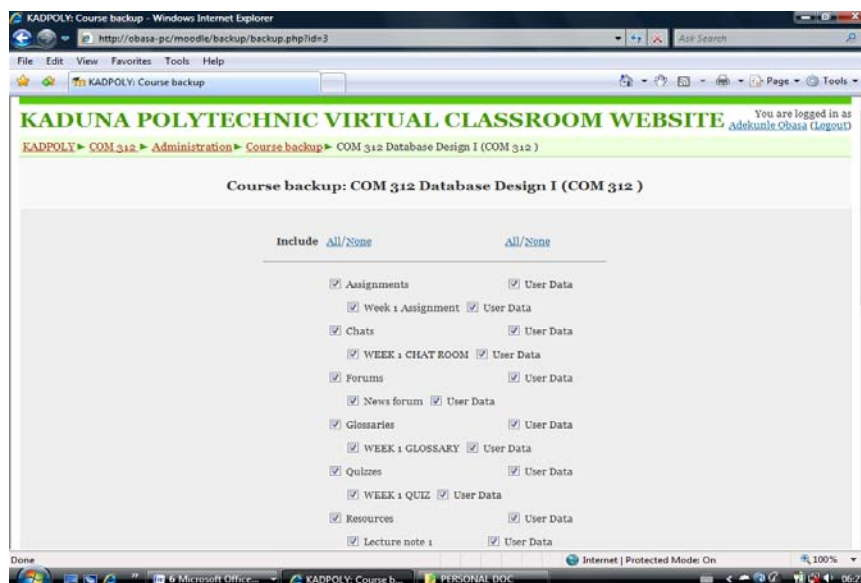


Fig. 14: Backing up data files

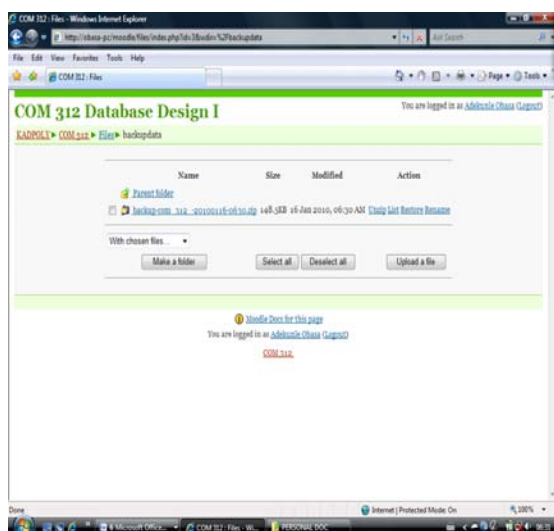


Fig. 15: Backup result

that copies the course database data into a file named under/moodledata folder with the format backup-course short name-date-time.zip e.g., backup-com\_322-20100115-1839.zip (Fig. 14). This folder should be regularly backed up onto external storage devices like CD or external drive.

There are two steps to setting up the backup set the backup settings and types of material to be backed up using the following settings: Include Modules is set to Yes with user data to preserve all student work for each course.

**Users:** Set to all so that no account is lost, even if they aren't associated with a current course.

**User files:** Set to Yes so that the restored server to look as much like the original as possible, so all user files should be restored as well.

**Course files:** Set to yes so as to restore all course files after a server restore. Set a backup schedule as shown in Fig. 15 by turning on the automated backup system and choosing daily backup process. The execution time is set to early morning.

It is a good idea to choose a backup path on another machine or on a different drive than the one moodle is on so there will not be data loss of backups if the moodle site drive fails. Once the backup is complete, moodle will send you an email describing the status of the backup.

**Restoring system data:** Allows the restoring of course data that was previously backed up. This procedure can get the backed up files from the moodledata folder or from an external backup source.

## CONCLUSION

In this research, an integrated virtual classroom which is capable of delivering the following: assignments, chats, quizzes, lessons, glossaries, whiteboard, audio features, wikis, blogs and video features is developed for Kaduna Polytechnic via.

## RECOMMENDATIONS

The scope of this research work was limited by the recourses at the disposal of the researcher. For a successful implementation, institutions need to wake up and embrace ICT in lecture delivery so that we can be able to train all our youths that are seriously yearning for higher education. It would be worthwhile if Federal Ministry of Education, Education Trust Fund and other education agencies collaborate with universities to fund researches on e-learning and virtual classroom instead of spending money in constructing classrooms that will never be adequate for the ever-increasing population.

Recognition given to certificates acquired through distance learning is still very low. Government may have to come up with legislations and guidelines for the implementation of e-learning and virtual classrooms so that the certificates obtained through e-learning can be universally acceptable. In order for distance learning via Internet to be firmly established in this country, the following infrastructures must be enhanced:

- Electricity
- Internet connectivity
- Problem of bandwidth
- Wireless networks

Further improvements can be made on this research work by incorporating concept of mobile learning whereby students can be alerted of assignment deadline,

important news etc. A plug in device that will enhance direct writing on the white board may also have to be looked into.

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