

# Development of a Computer-Based Test Platform with a FOSS

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## Abstract

With the advances in information and communication technology, increase in school enrolments and the need for more reliability in students' assessment, Computer-Based Testing (CBT) is recently gaining more popularity as a means of administering tests in educational institutions and corporate organisations. This paper reports the development of a computer-based test platform for Centre of Entrepreneurship Development and Vocational Studies (CEDVS) of The Federal Polytechnic, Ado-Ekiti, Nigeria. A free and open source software (FOSS) called MOODLE was used to develop the platform. The platform was test run to administer tests to students offering Entrepreneurial Courses in the Polytechnic. Out of 202 students tested, 89% preferred CBT to paper-based tests, 92% agreed that the platform was interactive and easy to use while 12% believed that the use of CBT will make test taking difficult.

**Keywords:** CBT, Testing, LMS, MOOLE

## 1. Introduction

CBT is lauded as the answer to having cheaper and speedier test delivery for students' assessments. It is also seen by some as an avenue toward greater accessibility for students with disabilities (Thurlow et al, 2010). The use of CBT for entrance examinations in education, military training, and certification examinations by professional groups and promotional examinations in various stages and categories of

life cannot be overemphasized. Erle, et al. (2006) cited by Olumorin et al. (2013) noted that CBT has gained popularity as a means of testing with largescale professional examinations such as the United States Medical Licensing Examination (USMLE) in 1999. However, the popularity emerged through the post UME and University main examinations in Nigeria. Other institutions such as the University of Ilorin, Federal University of Technology, Akure and Federal University of

Technology, Minna are maximizing the use of CBT as tool for undergraduate and postgraduate assessments.

Recently, the Joint Admission and Matriculations Board (JAMB) conducted the 2013 edition of the Unified Tertiary Matriculation Examination (UTME) with three test options-the traditional Paper Pencil Test, Dual-Based Test and Computer-Based Test. The DBT and CBT which are a novel introduction were largely successful in spite of some challenges especially in the area of infrastructure. However, the JAMB Executive Registrar, Professor Dibu Ojerinde, announced that from 2015, CBT will be used to conduct all UTME. He noted that the objectives of the e-testing was to ensure 100 per cent elimination of all forms of examination malpractice that had been a major challenge in the conduct of public examinations in the country (see Vanguard, 8th November, 2012).

In United States, It is widely believed that all tests will one day be delivered on a computer of some sort (Bennett, 1998, 2002). However, it is difficult to accurately predict when this day will come. It has seemingly been just around the corner since the early 1990s, when a handful of early adopters, including the ASVAB (Sands et al, 1997) and the GRE (Mills, 1999), signed on to computer-based testing (CBT). Today, dozens of admissions, placement, certification, and licensure testing programs are administered on computer, with the number growing each year.

The use of CBT offers some flexibility such as test administration through networked computers that do not require internet, ability to record students' responses and score them electronically, easy means of collecting demographic data of student and compilation of students' reports, and availability of different and advanced questions types such as multiple choice, fill-in-the-blanks, essay, etc. (GED Testing Service, 2014). Aliyu and Adebayo (2014) also highlighted the benefits of CBT are highlighted as follows:

- i. More efficient than paper-based tests
- ii. Year-round testing
- iii. Flexible scheduling
- iv. Individualized testing environment
- v. Faster score reporting, within approximately two weeks of testing
- vi. Immediate viewing of scores on screen
- vii. Convenient to undergraduates, graduates, and the larger university community
- viii. Ability to access all tests that are demanded by students and the community at large
- ix. Worldwide testing opportunities for distance and traveling students
- x. Local and centralized registration and billing systems
- xi. Enhanced consistency and security

Choosing whether to test via computer is the most difficult and consequential decision the designers of a testing program can make. The decision is difficult because of the wide range of choices available. Designers can choose where and how often the test is made available, how the test items look and function, how those items are combined into test forms, and how those forms

produce scores. The decision is consequential because it can impact every aspect of the testing process, from item development and test assembly, through test delivery and response collection, to the scoring and reporting of results (Davey, 2011). Most of the testing programs available are usually developed by corporate organisations as proprietary softwares to be purchased and implemented by educational institutions. Example of such softwares is Blackboard which is a major Learning Management System (LMS) used by most American institutions such as Butler University and Texas Technology University (Butler University, 2011). CBT is usually a component of such LMS and which is used by the institutions for teaching and assessment of their students. MOODLE (Modular Object Oriented Dynamic Learning Environment) as an alternative to Blackboard is a free and open source LMS which has now been gaining more popularity than Blackboard. It is called a FOSS because the code was not only be free, but others are given the right to modify and redistribute it for free. It also does not restrict the functionality of other softwares and is technology neutral (Butler University, 2011). It is a complete LMS which has modules for administering CBT. In this study, MOODLE was used to develop a CBT platform for Centre of Entrepreneurship Development and Vocational Studies (CEDVS) of the Federal Polytechnic, Ado-Ekiti, Nigeria by customising and modifying MOODLE as an intranet-based and a complete computer-based testing platform.

## 2. Methodology

### 2.1 Installation of MOODLE and associated softwares

MOODLE as a free and open source software (FOSS) was used to develop the CBT platform in this study. An official version 2.6 of MOODLE was downloaded from [www.moodle.org](http://www.moodle.org). The downloaded zip files were extracted into the root folder of an Apache server which has been earlier installed on the server computer to be used for the CBT. The server has the configuration of 8G RAM and 500GB HDD with Windows Server 2008 operating system. The MOODLE installation was then launched through a web browser such as Mozilla Firefox. Fig. 1 shows the screenshot of the installation. After the installation, the platform was configured and customised to display the organisation name as shown in Fig. 2.

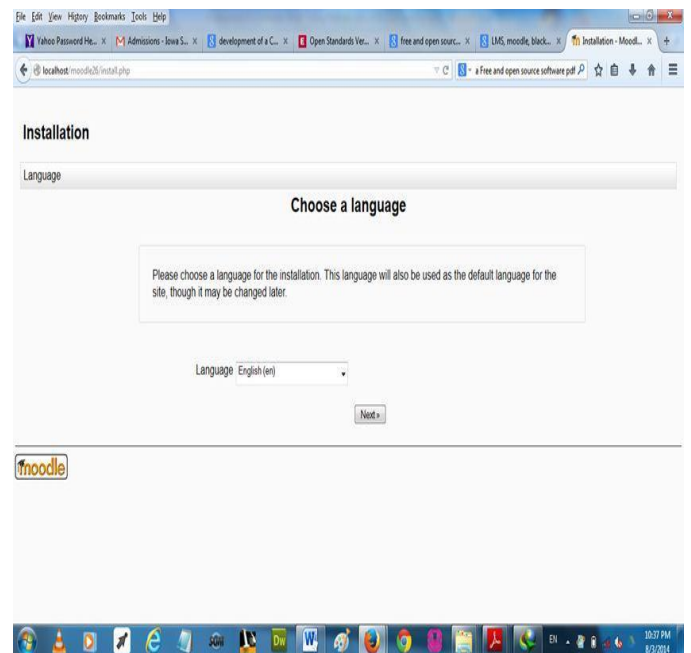


Fig. 1: MOODLE installation screenshot

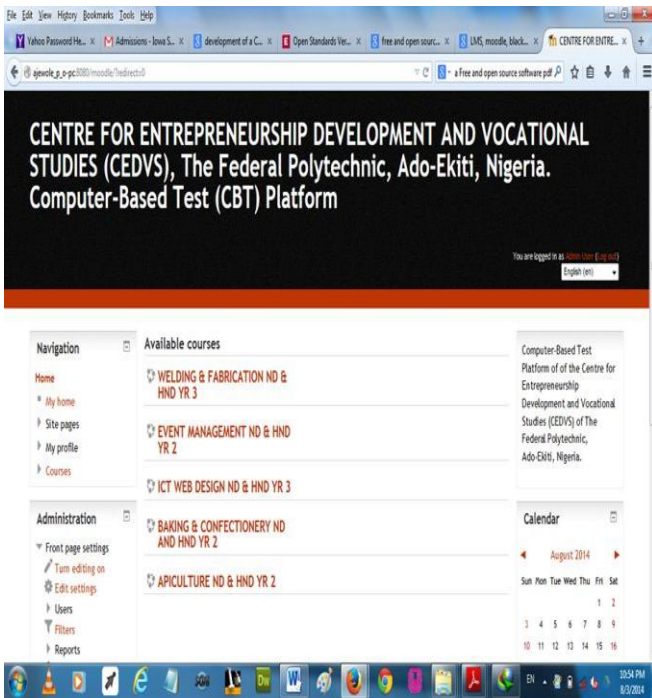


Fig.2: The customized CBT platform

## 2.1 Students' Data Collection

The CBT platform requires student data such as their username, password, first name, surname, class, and email address in order to create profile for each student. The students' matriculation numbers were used as their usernames while passwords were generated for them using a Random Password Generator Software. The data were compiled in MS Excel format and uploaded to the server. Each student or lecturer will access the platform through authenticated username and password which had been stored in the system. Fig 3 shows the format of students data required while Fig. 4 shows the platform login page.

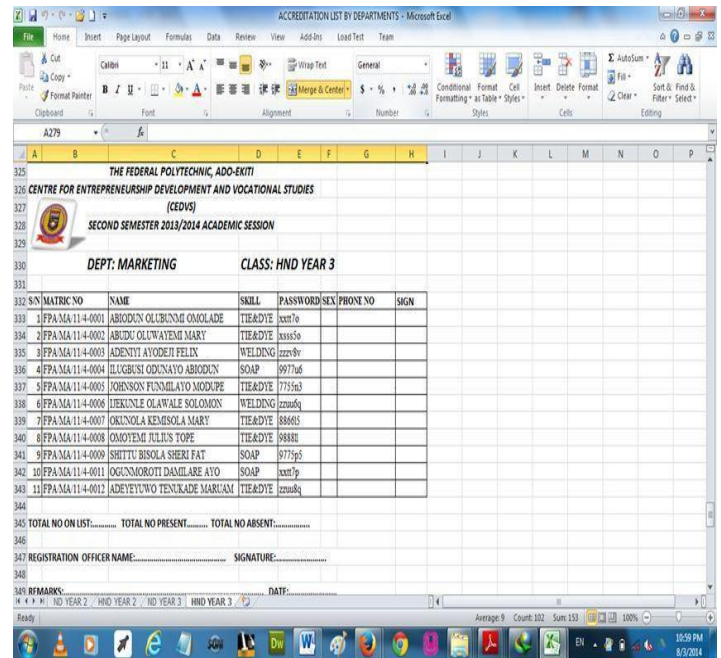


Fig. 3: The student data format

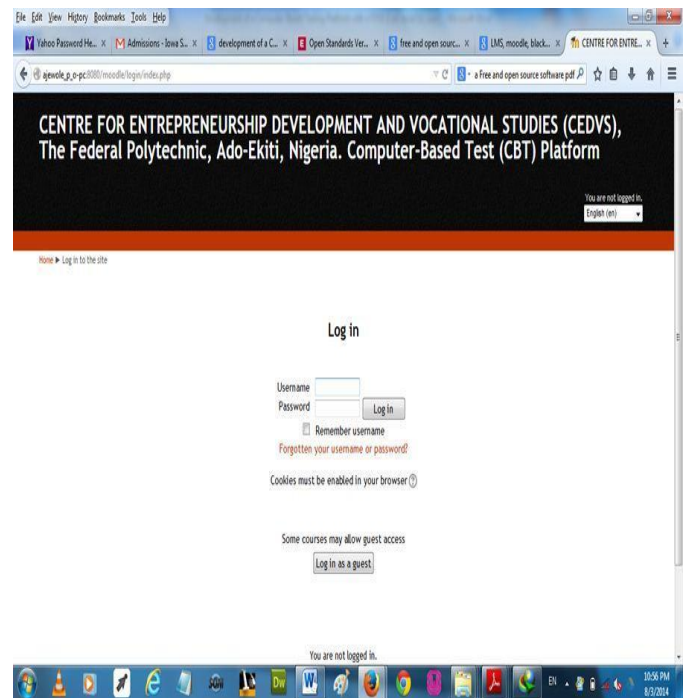


Fig. 4: The login page

## 2.2 Setting up of Courses and Tests

The first page the user of the platform will see after logging in was set up to contain list of available courses on the platform as shown in Fig.

2. Clicking on a particular course will take the user or the student to the test to be taken in the course.

### 2.3 Upload and Setting of questions

Questions were set in Aiken format as shown in Fig. 5. This format allows bulk upload of many multiple choice questions at a go. There are other formats for essay type, short answer, and type in forms of questions. The Quiz activity module of MOODLE was used to add questions to each course. The timing, grade, feedback, layout, question behaviour (either shuffled or not shuffled) were configured as shown in Fig. 6.

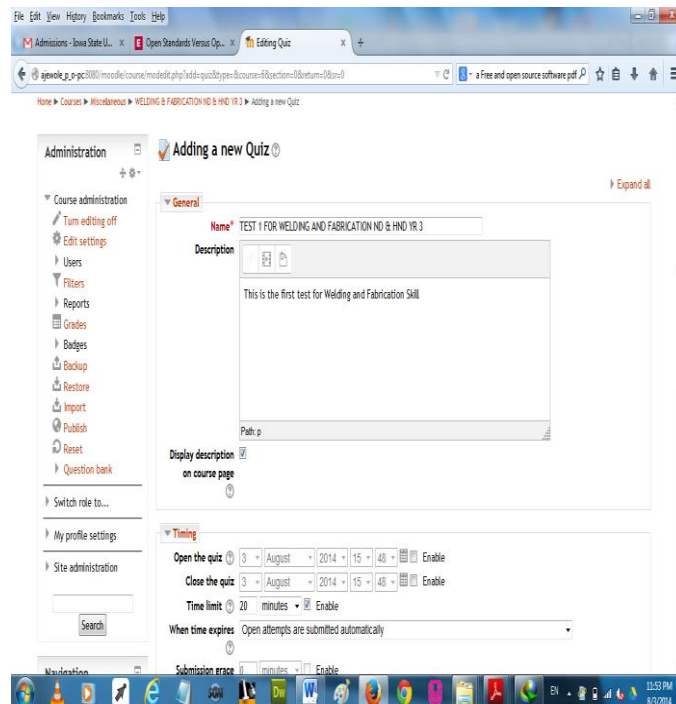


Fig. 6: Configuration of Quiz (Test)

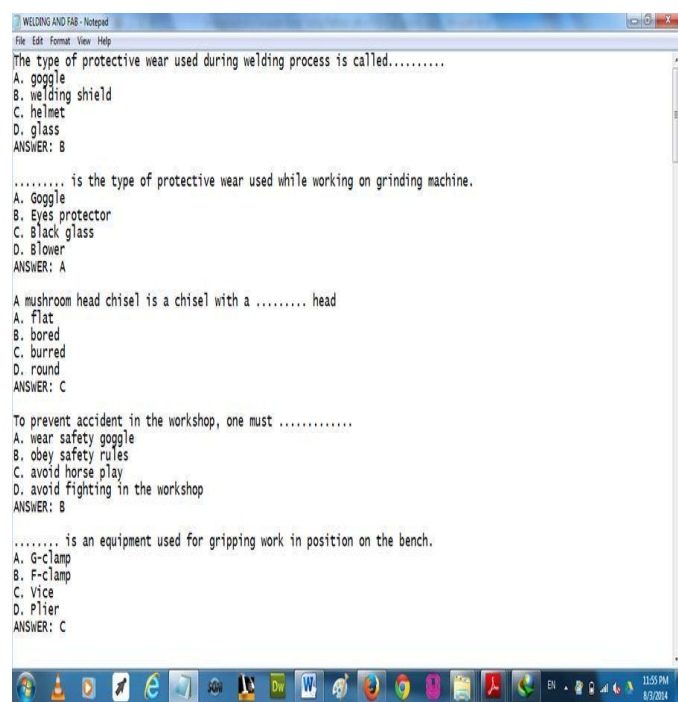


Fig. 5: Test questions in Aiken Format

### 2.4 Test Administration

After the questions were set up, the students whose data had been uploaded to the server as authenticated users were then enrolled for their respective course in order to enable them take the test for the course, using cohort synchronisation. The server was then networked with other computers at the Digital Library of the Polytechnic where there were about 200 computers for CBT purpose. The students were given passwords which had been printed out and were the same with the ones uploaded to the server. When the student logs in at the front end of the platform and click on his/her course, the student will be taken to the page where he will see test questions to answer. The page will also display the student's picture, questions navigation and time as shown in Fig. 7. After submitting the test, the platform can display the student scores depending on how the test was set up by the lecturer or CBT administrator.

## 2.5 Evaluation of the CBT Platform

In order to evaluate the platform, a short questionnaire was given to each student to fill after taking the test. The questionnaire contains questions such as “how easy is it to use the CBT Platform?”, “do you prefer CBT to paper-based testing?”, “will the use of CBT make test taking difficult?” The response expected for each question was either “yes” or “no”. All the students completed the questionnaires and the results were collated and analysed using frequencies and percentages.

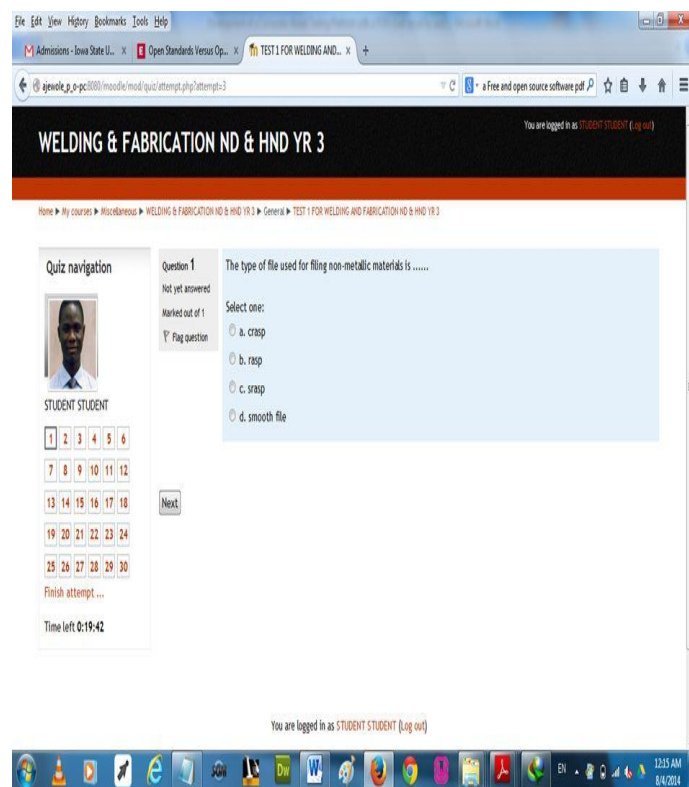


Fig 7: The test page

## 3. Result and Discussion

The result obtained from the questionnaires is shown in Table 1. Out of the 202 students who completed the questionnaires, 89% preferred CBT to paper-based tests, 92% agreed that the platform was interactive and easy to use while 12%

believed that the use of CBT will make test taking difficult.

**Table 1: Result of questionnaires for evaluating the CBT platform**

S/ N	Questions	Responses					
		Yes	%	No	%	Undecided	%
1.	Is it easy to use the CBT platform?	186	92	55	25	11	5.4
2.	Do you prefer CBT to paper-based testing?	180	89	189	89	4	2
3.	Will the use of CBT make test taking difficult?	242	12	175	88	3	1.5

## 4. Conclusion

The use of CBT will go a long way to increase efficiency of test and examination administration in higher institutions as shown in this work. Examination malpractices and irregularities in the conduct of examination will be highly reduced. However there is still room for improvement in the development of the CBT platform in order to make it more interactive. With the level of success recorded, it is recommended that the CBT be further explored for administering tests and

examinations in other schools and departments of the Polytechnic.

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