An Essay- Based Examination Assessment Model Using Double Blind Marking Technique

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Abstract - Most existing online examinations are limited to atomic, closed form assessment units, such as Multiple Choice Questions (MCQ), which allows students with poor knowledge of course concepts to pass examination simply by guessing. This type of examination is unsuitable for testing student true cognitive knowledge. This limitation along with other factors makes MCQ online examination type ineffective . To provide a solution to the problems associated with MCQ, an online essay based assessment system is proposed in this paper. This discursive examination system uses blind marking techniques to assess student performances in examination. The system was developed using PHP, HTML and M ySQL software.

Keywords: e-learning, e-asssesment, essay-based examination, Double blind marking .

I Introduction

The interest in the development and in the use of Computer-based Assessment Systems (CbAS) has grown exponentially in the last few years, due to both increasing number of students attending universities and to the possibilities provided by e-learning approaches to asynchronous and ubiquitous education. As online teaching and learning become widespread, there is a growing need for educators to consider modes of assessment [1], [2].

According to [3], the benefits of online assessment include student motivation, immediate feedback, assess to larger classes effectively [1]. Beyond this advantages, online examination in most tertiary institutions have some constraints in terms of quality,validity,reliability and fairness [5]. online exam is limited only to atomic, closed form assessment units, such as Multiple Choice Questions (MCQ). This makes it possible for a student with poor knowledge of a course concept to pass MCQ examination simply by guessing.

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This is unsuitable in testing students' true cognitive knowledge. This, along with other factors makes MCQ online examination type to be ineffective. Assessment systems normally require students showing full spectrum of competencies by reading the answer carefully and looking for specific features, such as clarity, logic, and key points among others.

Often, the best assessment is achieved by awarding scores according to explicit ordered categories which reflect an increasing quality of response. These questions should be scored according to a uniform grading rubric for greater consistency and reliability. To provide a suitable solution to the problems associated with MCQ, a suitable online essay based assessment system is proposed in this paper. This discursive examination system uses double blind marking techniques to assess the performances in examination.

II Literature Review

[5] describes the rapid growth of computer technology use in workplaces and education as inexorable. This technology offers the potential to broaden educational assessment beyond what traditional methods allow. [6] found that valid and reliable data can be gained through online ability assessment when comparing online and paper-based intelligence tests. According to [7] context of assessing essays on screen demand an enquiry into construct validity; explore whether the same constructs or qualitative features of essay performance are being attended to by assessors in different modes.

[8] presents an excellent argument for having online courses. Their research-based findings support the argument for having online courses as well as a detailed analysis of the characteristics of online learners.

According to [9], assessment plays different roles in teaching and learning process. It provides teachers with a means of evaluating the quality of their instructions. Students also use it to drive and direct their learning. Online assessments can be offered at different time, location or even different test or different students. In many cases, online assessments are carried out using an institutional Learning Management System (LMS) such as BlackBoard, WebCT, or an in house product via quizzes, forums and digital assignments[10]

E-assessment can be justified in a number of ways. It can help avoid the meltdown of current paper-based systems; it can assess valuable life skills; it can be better for users – for example by providing on-demand tests with immediate feedback, and perhaps diagnostic feedback, and more accurate results via adaptive testing; it can help improve the technical quality of tests by improving the reliability of scoring.

The earliest online assessment makes use of Multiple Choice Question Techniques (MCQ). in the view of [11], MCQ exams can be used not just for testing lower level cognitive skills, b ut can be implemented to measure deeper understanding if questions are imaginatively constructed

Double blind marking ensure that all the assessments have been considered thoroughly, conscientiously and objectively, There are three types of double blind marking according to [2],[12]

(i) *Sampled double marking*: In this process, all scripts are 1st marked (in small numbers usually by the course leader' or chief examiner and then a percentage is double marked by a moderator for the purpose of verification. In best practice the first marker has put the marks and comments on the assessed work or the provided proforma

(ii) *Full "seen" or "open" double marking*: in this process, all scripts are marked by two markers but the second examiner marks with knowledge of the first marker's marks and comments. The second examiner is expected to exercise independent judgment and the final marks are awarded by computing the average.

(iii) *Full double blind marking*: in this process, all scripts are marked by two examiners and the second examiner marks with no knowledge of the marks or comments of the first examiner. This method maximizes independence in marking. Marks may be agreed by simply averaging the scores from the two independent markers.

For both open and full blind double marking, When examiners cannot agree a third party moderator is required. in the past, this role was often given to the 'external examiner'. In this paper, full double blind marking techniques was employed in the assessment .

III System Architecture

To successfully represent the traditional assessment model, the following user requirements were put into consideration in the design of the architecture:

(i) an intuitive and familiar interface to students when entering extended answers / essays.

(ii) Secure, distributed, on-screen marking by multiple markers.

(iii) secure offline marking such that markers can download data to laptops for marking as and when, and support the subsequent synchronisation of data on upload

The System Architecture is shown in figure 1 consisting of five modules: System Administrator Module, Instructor Module, Student Module , Inference Engine and Knowledge Base.

(i)   System Administrator Module

This module of the solution controls the entire operation of the system. With this module, the administrator can add lecturers, instructors and students. The module defines the registration process. The system administrator can determine which kind of questions should be available when setting up a test, period of the exam and other site administrative issues.

(ii)   Examiner Module

The examiner module handles the setting up of exams. It is only accessible to users with the examiners rights and privileges. this module allows the examiner to create new exams and set up the exam with the required configuration that fits the exam the user is administering . Examiner can later re-edit the examination setting to fit into the maybe a new session or curriculum. After setting up the examination, the user can then add questions of different types to the examination using randomization facility. Also, setting the score profile of each question to be assessed manually by the examiner. The examiner module allows setting up a number of examiners to mark the essay type questions. Others include registration of exam candidates, Creat/edit/delete candidate groups.

The examiner can also access candidates who have taken a test, the time spent on the test and also their respective scores. The score statistics like average score, pass rate and cumulative score can also be viewed by the examiner, setting time limit of the exam and randomizing the questions. When markers log into Exam Online, they are presented with a list of questions / papers to be marked. Clicking on a question brings them to the main marking interface that is shown in figure 3.

(iii)   Student Module

This module is the aspect that is visible to the 'exam-takers'. If the exam is free-for-all, then any visitor to the web application can partake in the exam. But restricted exam will require pre-registration. Examinations to be taken are visible only to candidates who have the privilege to take a particular exam. So candidate may be privileged to take several tests while another may not have any pending test based on their curriculum and department. Exams are available only for a period of time set by the examiner, and the duration of the examination can also be pre-configured by the examiner. Candidates are served questions which can be of different types.

(iv)   Knowledge base.

This is the knowledge repository for this application system. It consists of three categories of repositories as shown in figure 1 which are:

(i)   Data Bank
(ii)   Student /Markers Data
(iii)   Student Scores

Inference Engine

This is the intelligent (reasoning) component of the architecture. The roles which could be broadly categorized as coordination of all module components as well as computation roles. This is achieved through the intelligence embedded using integrated rule and case based reasoning scheme.

IV. E-essay Assessment Model

A Full Double Blind Marking Technique (FDBMT) is adopted as the assessment model in this paper. This model describes scoring written essay exam without an awareness of other raters and /or visual bias by the result of other graders numerical marks or identity. E- essay examination model in this study consist of essay / extended response / short answer questions (and possibly a mixture of all three). Also some questions that require drawings and calculations are also taken care of in this system design.

Assessments of the examinations require detailed human marking. This is achieved by posting the answers by a student's to two independent markers and the average of the scores are forwarded to the database. We adopt the following simple model for the generation of the marks for a student. An essay examination conducted for student i is marked by marker j and the mark X_{ij} obtained is computed as the average of the marks returned by all the markers j .

The mathematical model is represented in equation (1)

$$X_{ij} = \sum_{J=1}^{n} X_{ij} / \sum n \qquad (1)$$

When two marker are involved, Marker $J = 2$ so we have

$$X_{ij} = \sum_{j=1}^{2} X_{ij} / 2 \qquad (2)$$

Let the score obtained by the same student i in extended response / short answer be Pi
The total score obtained by the student i is

$$\text{Exam Score } M = \sum_{i}^{2} X_{ij} / 2 + Pi \qquad (3)$$

if student has taken continuous assessment m the total test score(tts) is

$$tts = \sum_{i=1}^{m} T_{ij} / m \qquad (4)$$

The final score obtained by the student i is

$$\text{Score } M = \sum_{i=1}^{2} X_{ij} / 2 + Pi + \sum_{i=i}^{m} T_{ij} / m \qquad (5)$$

V. Choice of Development Software

PHP and mySQL were used because of its graphical user interface (GUI) feature which makes communication with other user possible by displaying pictures and other standard objects. It has other enhanced features which makes it an ideal choice for coding program. Some of its features include:

i. It is now object oriented
ii. Application and components written in PHP runs on web
iii. Application developed using PHP run with a managed runtime environment.

VI. Implementation

The System Model in equation (5) was implemented in this study by storing student data, questions and answers in the database with the use of mySQL on an Apache server. The students , administrator, examiner interfaces were designed using HTML, javascript and other appropriate programming languages; PHP connects the data in the database with the user interface. The application was installed on the university server in the ICT laboratory housing about 100 systems connected to the university intranet. Figures 2,3 and 4 show the student, administrator and examiner scoring modules.

A particular essay- based exam was used as a test case (CIT 404) for the implementation. As each student complete a particular question, this question is sent to two blind markers and the average of the marks scores returned by the two markers are stored in the knowledge base by the inference engine for the final computation.

VII. Conclusion

In this paper, the limitation of MCQ examination assessment was highlighted and, online essay examination and assessment was proposed as a remedy. The software design was conceptualized , the system was implemented using PhP , HTML ,and My SQL. A sample essay- based exam was used as a test case (CIT 404) for the implementation. As each student completes a particular question, this question is sent to two blind markers and the average of the marks scores returned by the two markers are stored in the knowledge base by the inference engine for the final computation. The software was implemented on Osun state University Intranet The response from sample users shows that the assessment is better than MCQ.
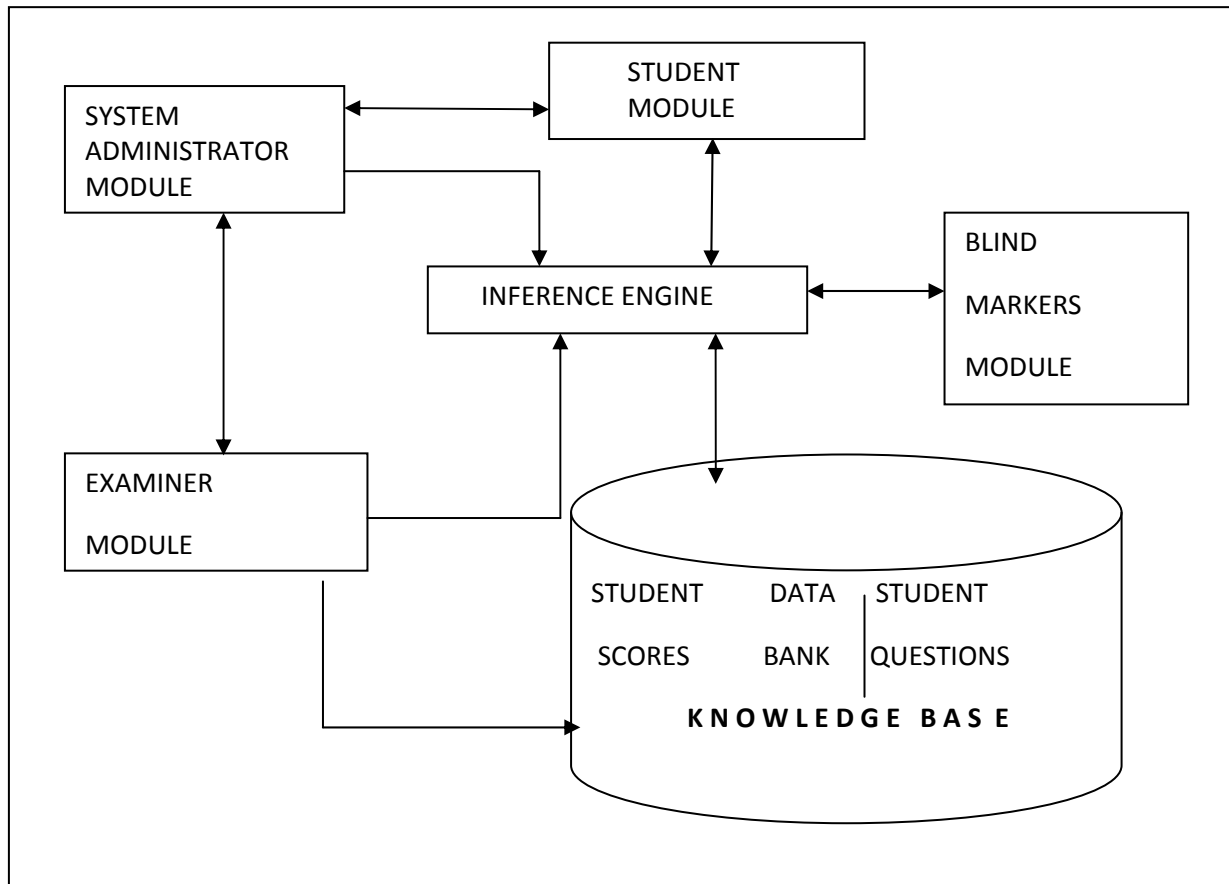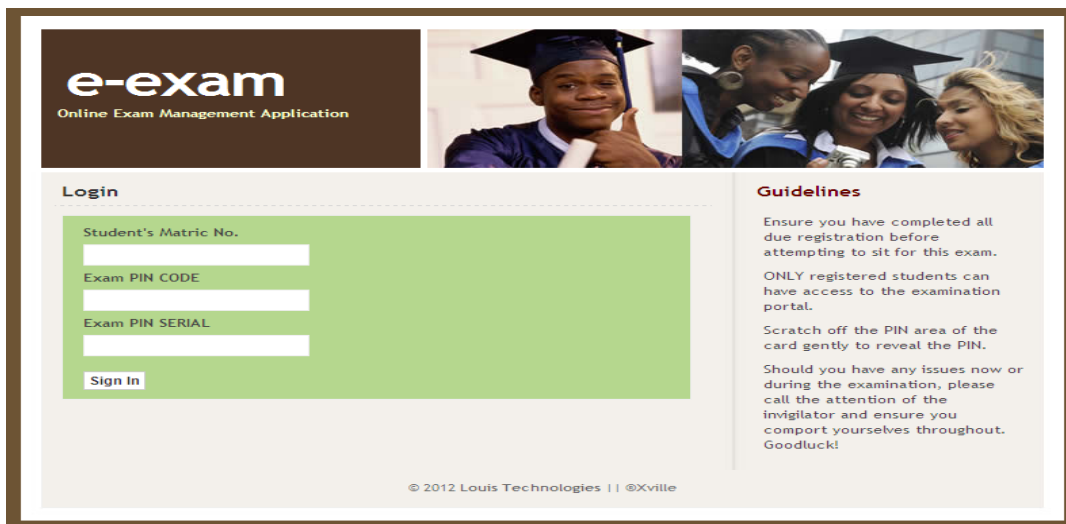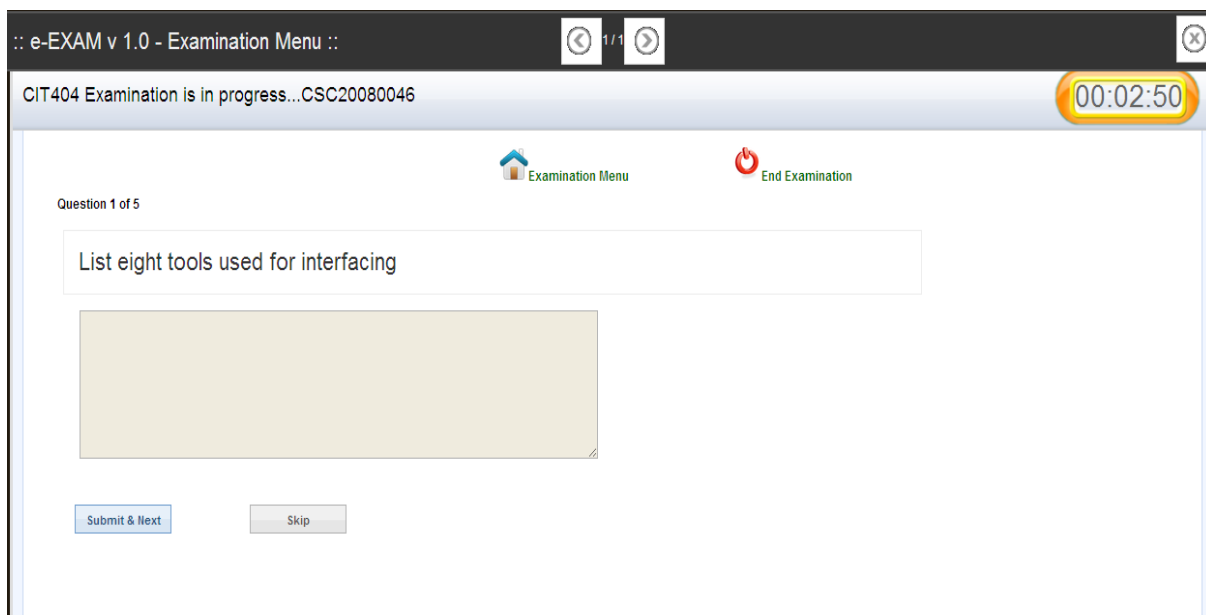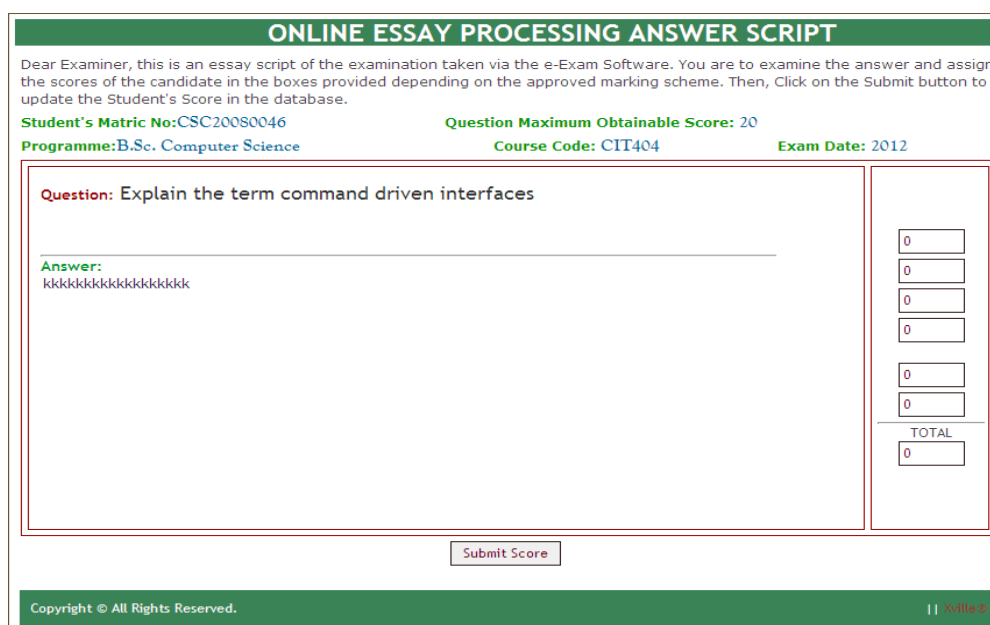
Figure 1: System Architecture

Figure 2:Student login page

Figure 3   : Student Interface

Figure 4:Examiner Scoring Page

References

[1] A. Fluck, D. Pullen and C. Harper: Case study of a computer based examination system Australasian Journal of Educational Technology, 25(4), 509-523. 2009.

[2] Wales, J. & Baraniuk, R. (2008). Technology opens the doors to global classrooms. The Australian, 2-3 February, p. 27.

[3] Bull, J. & McKenna, C.   Blueprint for computer-assisted assessment (London, RoutledgeFalmer , 2004. Christie, J. Automated essay marking for content—does it work?, in J. Christie. (Ed.) 7th International CAA Conference, Loughborough, 8–9 July 2003.

[4] Rowe, K.J. In good hands? The importance of teacher quality. Educare News, 149:4-14. 2004.

[5] Bennett, R. E. Inexorable and inevitable: the continuing story of technology and assessment. The Journal of Technology, Learning, and Assessment. Vol. 1(1), 1-24 2002

[6] Preckel   F. and Thiemann H. Online Versus Paper –Pencil of a High Potential Intelligence Test Saves Journal of Psychology 62(4) 2003.

[7] Paek, P. Recent Trends in Comparability Studies. PEM Research Report 05-05, 2005.

[8] Allen, I. E. & Seaman, J. Sizing the opportunity: The quality and extent of online education in the United States , 2002 and 2003. The Sloan Consortium, Needham , Massachusetts . Retrieved February 12, 2004 from http://www.sloan-c.org ,2003

[9] Harvey J and Mogey N(1999) Pragmatic   issues when integrating technology into the ssessment of students. In Brown S, Race, P & Bull J (1999) Eds), Computer –assisted assessment   in higher education London: Kogan –Page .

[10] A.Ricket D. Pullen and C. Harpers Case study of a computer based examination system Austalian Journal of Educational Technology 25(4) , pg 509-523,2009.

[11] Engelbrecht, J. and HardingA. Combining online and paper assessment in a web-based course in undergraduate mathematics. Journal of Computers in Mathematics and Science Teaching, 23, (3), 217-231,2003.

[12] Pullen D and Cusack BContent Management systems ; The potential for open education Fact Sheet, FS01, Australian College of Educators, Canberra 2008.