

Computer-Based Examination Management for Subjects with Essay Test Items

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ABSTRACT

Sukhothai Thammathirat Open University has developed a model of computer-based examination which is a guideline for measurement and evaluation that meets the needs of individual students. It is in accordance with the teaching management of the distance education system in Thailand. The examination is held during weekends for four weeks every semester. It is conducted approximately a month before the paper-based final examination. The past method of examination operation was applied for subjects with multiple-choice questions. As the university's examinations are in both multiple-choice and essay test formats, this research aims to design computer-based examination management for subjects with essay test items as well. Data providers for this research comprise 15 respondents who are made up of two members of the board issuing and examining the essay test items, six members of the Advisory Board of Examination Development System and seven lecturers and staff involved in measurement and evaluation, and related staff. Content analysis of a focus group discussion involving the 15 respondents provided information on the three phases of examination management covering actions before, during and after the examination. Based on the research, necessary steps were identified for each of the phases. For preparation before the examination, lecturers are to issue several editions of essay test items to avoid repetition of the examination, and scoring must be completed within 10 days after an examination is conducted. The essay test must be held in the first or second week of the computer-based examination each semester. After the examination, essay test items inspectors could log in from anywhere to check the answers. The administrator must determine who would be the inspectors and the number of tests to be examined. The scores must be entered into the processing system and the results must be sent to students at their registered e-mail address.

Keywords: *computer-based examination, essay test items, computer-based examination for essay test items*

Introduction

Sukhothai Thammathirat Open University (STOU) is an open university in Thailand which uses the open and distance learning approach for the delivery of its courses. Everyone can study anywhere, any time and in any style to acquire the knowledge they require, through the appropriate courses.

A research which evaluated distance education at the university found that students and professors needed to measure and evaluate the students' abilities during their studies for their individual development. The students also required immediate and accurate feedback on the measurement's results (Pinyopanuwat, 2003; Aungsuchoti & Wipatsil, 2005). In fulfilling this need, STOU developed a computerised examination system in 2001 called "Measurement system based on the readiness of individual students with computers" or in short, "walk-in examination". Students who wished to test and improve their examination readiness could take the walk-in examination before sitting for their final examinations, which is a traditional paper and pencil test. The results of the walk-in examination are known immediately and used to assess school records. If students did not pass the examination, they could still take the final examination and if they also did not pass it, they could register for a remedial examination.

The walk-in exam in the first stage was initially in multiple-choice format, but due to the diverse range of course contents, essay test items needed to be used as well. This inclusion of essay test items in the walk-in examination required adjustments in the management of the examinations in terms of operational procedures, supporting regulations, announcement of examination results and personnel involved. The operational procedures covered the answering of examination questions by examinees, the marking of essay tests by lecturers and the processing of scores. The supporting regulations covered examination rules, announcement of examination results and determination of various compensation rates. The personnel involved comprised the teachers who examined the essay answers, the staff who processed the results of the multiple-choice questions and essay test items and the staff who informed on the results.

Through the research process, the researcher aimed to design guidelines for conducting computer-based examinations with essay test items according to the readiness of individual students, which would lead to policy formation, preparation of examination regulations, and a manual for standardised examination practice.

The study seeks to develop computer-based examination management for subjects with essay test items at STOU.

Literature Review

Computer-based testing (CBT) is popular today, and is likely to increase in popularity in the future. Al-Amri (2009) studied the efficiency of using computers for classroom testing in relation to the learning environment i.e. students' concerns and achievement and lecturers' attitude. This kind of testing requires the integration of computer knowledge. It can be arranged for an unlimited number of examinees and unidentified locations. It is important to ensure that the examination context is the same for all examinees.

CBT can secure the collection of questions and answers in a database. The examination organiser can choose questions randomly from an item bank. This method reduces the cost and time required to organise a test, enables simultaneous testing of a large number of examinees and reduces errors in data collection.

Karadeniz (2009) compared the efficiency of exams using paper, mobile phones and the Internet through a three-week trial exam. The first week revealed no significant differences but the second week showed web and mobile phone testing to be much more convenient, leading to higher scores. It was concluded that computer-based exam was faster than paper-based exams and allowed for more comprehensive reflection. In an earlier study, Bodmann and Robinson (2004) compared the response speed between a computerised examination and a paper-based examination with 30 multiple-choice questions in 35 minutes. They found that examinees with the same level of knowledge answered faster in the computer-based examination. In comparing both types of tests, Ghaderi, Mogholi, and Soori (2014) found that motivation to sit for a test affected the ability to answer the questions well. In addition, they found that motivation to sit for an online examination was higher due to the standardised questions.

Gao, Wang, Zhou, and Cheng (2016) developed an offline computerised examination for mathematics at the University of Japan, in order to study its benefits, safety and user-friendliness. The efficiency of the examination was evaluated by six groups of people – examiners, item writers, examination supervisors, examinees, inspectors and examination processors. All of them were satisfied with the examination and agreed that it was useful, safe, convenient and not too expensive.

In summary, the studies mentioned above prove that computerised examination is effective in terms of security, reduces examination costs, enables large-scale testing and reduces errors in answer collection (Al-Amri, 2009). It is convenient to use, able to provide comprehensive reflection and is faster than paper-based examinations (Karadeniz, 2009). Examinees with the same levels of knowledge are able to answer faster (Bodmann & Robinson, 2004) and are more motivated to answer the questions (Ghaderi, Mogholi & Soori, 2014). Computer testing is also safe to use and not too costly (Gao, Wang, Zhou, & Cheng, 2016).

Concept of Essay Test Items

Essay test items are questions which act as a stimulus or require problem-solving strategies. Examinees need to provide answers which demonstrate their thinking ability and skills in solving advanced cognitive problems. Examination creators may use test stimuli such as images, tables, graphs and short articles for examinees to analyse and find the best answer. The examination may require examinees to fill in the blanks or write an essay (Karnchanawasri, 2013). Essay test items may include a sample content along with questions which require limited or short answers. They may also require longer answers, with the aim of measuring students' ability to think, analyse, synthesise and evaluate a problem. This type of testing is usually used with advanced-level students. They will need to compile and prioritise their knowledge which is related to the questions and then answer with the time limit and score in mind. This examination method, which is used at STOU, seeks to measure the advanced learning abilities of students as part of their learning process.

Measurement of student readiness via computer-based examinations at STOU

The measurement of students' readiness through computers or walk-in examination at STOU was developed into a web-based application system. It uses a browser such as Internet Explorer or Netscape Navigator and consists of four related subsystems (Aungsuchoti & Wipatsil, 2007) as follows:

1. Examination registration system

Students enrolled in particular courses who wish to test their readiness must register for the walk-in examination. The registration system will check their enrolment status and if they are qualified, the students must specify the date, time and place of examination as well as provide payment. The system will process their registration and request. Then, the relevant staff will transfer the registration information into the examination management system through offline transfer.

2. Item bank system

The university keeps all the examinations permanently in a database called item bank. Each test is identified in terms of whether it will be used for the paper-based or computer-based examination. The STOU item bank system includes sub-system management tasks such as a system for organising the item bank, test set management system (random test system), and an examination review system for the walk-in examination. Test sets which have been published and reviewed will be transferred into the examination management system through the offline method.

3. Examination Management System

This is a system receiving the transferred examination from the university's item bank system. It covers the set of examined subjects, registration information from the database, and the management of the examination. It has sub-systems such as examination system, examination control system, multiple-choice examination scoring system, query management system, results printing system, results reporting system, results management system, storage of students' examination history and the examination. For subjects with essay tests, the system identifies the inspectors, provides the scoring system and checks the number of students. Students' answers could be checked on screen or printed out and the scores would be recorded into the system.

4. Online registration information system

This is a database system which collects and maintains various information on students which is used to check their registration for a test. It accepts scores from those who pass the examination management system and transfers these to the system for further processing in preparation for the final examination.

The walk-in examination is a computerised examination for multiple-choice testing. Essay tests require a different way of management in terms of importing test items, scoring, processing data and announcing results. This research aims to design computer-based examination management for subjects with essay test items at STOU, according to the research concept framework shown in Figure 1.

| Computer-based examination in subjects with essay test items |
|--|
| <ul style="list-style-type: none">- Management before examination- Management during examination- Management after examination |

Figure 1. Research framework

Research Method

The design of the computer-based examination for subjects with essay test items at STOU is a guideline for the management of examination according to the readiness of individual students. It was developed from the knowledge acquired from reviewing the computer-based examination management formats.

The researcher organised a focus group of experts and related parties to design the examination management approach according to the concept of computer-based examination, essay test items and measurement system. The focus group comprised 15 respondents – two people who issued and scored the essay test items, six members of the Advisory Board of Examination Development System and seven people concerned with the development of the examination system. The focus group engaged in a discussion on the 10161 Thai language course for communication as it conformed to the drafted guidelines.

Findings and Discussion

Research Results

The group focused on examination management in three stages – before the examination (determination of characteristics of courses suitable for the walk-in examination, test preparation and determination of examination period), during the examination and after the examination (essay test inspectors, examining the essay test, processing and notification of examination results).

Based on the group discussion, the researcher designed the computer-based examination management for subjects with essay test items at STOU as the following:

1. Management before the examination

Courses with essay test items which qualify for the walk-in examination should have the following qualifications:

- There should be at least 500 students enrolled in the course for the semester;
- The examination must not be held during the course details update;
- The course lecturers could issue the specified number of essay test items; and
- The course lecturers could complete grading within 10 days after the examination.

1.1. Test preparation

- The course must be held at least three months before the examination to encourage students to register;
- The Chairman of the Board issuing the examination must submit the essay test items and list of inspectors two months before the examination;
- Multiple-choice questions must be randomly selected from the item bank and combined with the essay test items received from the board of examiners;
- Additional instructions must be given for the answering of essay test items such as font size and type, spelling, word wrapping and review of answers before sending; and
- The examination system must not underline wrongly typed words as the 10161 Thai language course for communication also has a rating for spelling.

1.2. Determination of examination period

- The examination must be conducted only in the first or second week of the walk-in examination each semester as it takes 10 days for inspection of the essay test;
- The essay test items inspectors must check the answers and enter the scores into the system within 10 days;
- The test results must be sent to students by e-mail; and
- Announcement of the test results must be made within two weeks after the examination.

2. Management during the examination

- Students must evaluate the examination system in terms of service system, examination system and processing. They are also allowed to offer suggestions for improvement of the examination system and other related matters.
- Examiners and system administrators must evaluate the examination system.

3. Management after the examination

3.1. Determination of essay test items inspectors and the number of examinations to be checked in the scoring system

- The names of the examination committee members must be informed about eight weeks before the examination;
- An account with username and password must be created to log into the scoring system;
- The essay test items inspectors and inspection percentage in the system must be determined according to the names listed;
- Essay test items inspectors could check both types of items for the same students; and
- There must be coordination of examination inspection methods, examination date and time, and submission of scores.

3.2. Processing and announcement of examination results

Examination results must be processed and reported to students within two weeks after each examination. The system will send an electronic mail attached to the test result sheet in pdf format, similar to the multiple choice test result sheet, but with the signatures of the Director of Registration and Evaluation Office on the test results sheet.

Discussion

Computer-based examination with essay test items for courses offered at STOU will be held only in the first to second week of the walk-in examination. Teachers must be given 10 days to calculate test scores and two weeks for the announcement of results as the scores cannot be known immediately like for multiple choice tests. If other activities are carried out during the walk-in examination, the lecturers must be given sufficient time to mark the tests. The announcement of results within two weeks after the examination will allow them to know the results at least a month before the final examination, thus ensuring that if they do not pass the walk-in examination, they will have enough time to improve their preparation for the final examination. This approach corresponds with that of the writing section of the Test of

English as a Foreign Language (TOEFL), which uses a similar examination method, with scoring criteria (rubric scoring) and the announcement of test results by registered e-mail after the examination date for 10 days as well (Educational Testing Service, 2015).

Conclusion

Examination management according to the readiness of individual students by computers in subjects with essay test items consist of management before, during and after examinations. Management before an examination involves determination of the characteristics of the course set with essay test items to organise the walk-in examination. Matters which must be considered are the number of students enrolled in the semester, course status, consent of the examining lecturers and examination preparation. Also to be considered are details about random selection of multiple choice tests, recording of essay test items, the display screen of the examination system, determination of the examination date and duration (including for the essay test items) and the method of reporting the results. Management during the examination requires consideration of the details of the examination system assessment of students, examiners and system administrators. Management after the examination requires the identification of essay test inspectors and the numbers of the examination. It includes details about the name list of the examination committee, login process, determination of inspectors, and coordination of the examination scoring. As for the processing and reporting of the examination results, there are details about the time of the examination results, the channel used to report the results and the format of examination results sheet.

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