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USING COMPUTER-BASED TESTING AS ALTERNATIVE ASSESSMENT METHOD OF STUDENT LEARNING IN DISTANCE EDUCATION

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ABSTRACT

This paper addresses the use of computer-based testing in distance education, based on the experience of Universitas Terbuka (UT), Indonesia. Computer-based testing has been developed at UT for reasons of meeting the specific needs of distance students as the following:

- **students' inability to sit for the scheduled test,**
- **conflicting test schedules, and**
- **students' flexibility to take examination to improve their grades.**

In 2004, UT initiated a pilot project in the development of system and program for computer-based testing method. Then in 2005 and 2006 tryouts in the use of computer-based testing methods were conducted in 7 Regional Offices that were considered as having sufficient supporting recourses. The results of the tryouts revealed that students were enthusiastic in taking computer-based tests and they expected that the test method would be provided by UT as alternative to the traditional paper and pencil test method. UT then implemented computer-based testing method in 6 and 12 Regional Offices in 2007 and 2008 respectively.

The computer-based testing was administered in the city of the designated Regional Office and was supervised by the Regional Office staff. The development of the computer-based testing was initiated with conducting tests using computers in networked configuration. The system has been continually improved, and it currently uses devices linked to the internet or the World Wide Web. The construction of the test involves the generation and selection of the test items from the item bank collection of the UT Examination Center. Thus the combination of the selected items compromises the test specification.

Currently UT has offered 250 courses involving the use of computer-based testing. Students expect that more courses are offered with computer-based testing in Regional Offices within easy access by students.

Keywords: **Distance education, online assessment; computer-based testing; testing methods, test delivery; examination**

INTRODUCTION

Computer and Internet technologies are now widely used in the field of education to support teaching and learning activities, including assessment activities (Lee & Tsai, 2005; Savery, 2002; Clariana & Wallace, 2002; Duran, 2000; Gibson et.al, 2000; Olgivie, et.al, 1999). Students now submit course work by email, complete learning activities through the World Wide Web, and complete student assessment in the form of online testing (Bishop, 2000; Newman, 2000; Bitzer, 2000). An Internet-based education environment facilitates student learning without the constraints of time and distance (Wang, 2007; Newman, 2000). Although Internet users still encounter some barriers,

such as a lack of skills, a lack of training, a lack of technologies to ensure authentication and security, and higher costs for accessing the Internet (Aojula et.al, 2006, Cassady & Gridley, 2005; Rowe, 2004; Tsai & Tsai, 2003; Jones, et. al, 2002; Eastin & Larose, 2000), the uses of the Internet in distance education have become common worldwide (Tsai, 2005; Balasundaram & Ramadoss, 2005; Achtemeier et.al, 2003).

Research on computer based assessments revealed that the students' attitudes toward the computer examinations in the course were very positive, the students comfort level of using computer increased, the students' reception to computer testing were positive, and the students preferred the web-based assessment to the paper and pencil assessment (Millet et.al, 2002; Olgivie et.al, 1999). Puhan et. al (2007), Poggio et. al (2005), and Alexander et.al (2001) found out that taking an exam online compared to traditional paper and pencil testing does not have effect on overall exam scores. However, the uses of computer based assessments in the testing administration require high levels of control and security in order to ensure the integrity of the testing results and process (Aojula et.al, 2006, Cassady & Gridley, 2005; Rowe, 2004; Jones, 2002; Morgan &O'Reilly, 1999).

Universitas Terbuka (UT), Indonesia has developed the system and program for computer-based testing method since 2004, and has implemented this testing method since 2007, following successful tryouts in 2005 and 2006. Computer-based testing has been provided to meet the specific needs of UT students due to students' inability to sit for the scheduled test, conflicting test schedules, and students' opportunity to take examination to improve their grades. This paper addresses UT experience in developing the system and program for computer-based testing since 2004 to 2008, and conducting computer-based testing in 2007 and 2008.

METHODS

This paper describes UT experience in conducting computer-based testing, and presents results of the research in the area. The research method was descriptive using a case study design at one Regional Office conducting computer-based testing. Population and research sample of 30 students were the students who registered and took computer-based testing at one Regional Office in UT in academic year of 2008 semester 1.

Data was collected between May and July 2008. Primary data were responses of the students to the questionnaire and information from proctor and Regional Office Staff during interviews, whereas secondary data were the student registration data, test scores of students taking computer-based testing and paper and pencil tests, and Regional Office report on the administration of the examination. The quantitative data were analyzed using the program *SPSS 15.0 for Windows*.

RESULTS AND DISCUSSION

Experience in Conducting Computer-Based Testing

In 2004, UT initiated a pilot project in the development of system and program for computer-based testing method. Then in 2005 and 2006 tryouts in the use of computer-based testing method were conducted in 7 Regional Offices that were considered as having sufficient recourses. The results of the tryouts revealed that students were enthusiastic in taking computer-based tests and they expected that the test method would be provided by UT as alternative to the traditional paper and pencil test method.

UT then implemented computer-based testing method in 6 and 12 Regional Offices in 2007 and 2008 respectively. The computer-based testing was administered in the city of the designated Regional Office and was supervised by the Regional Office staff. The development of the computer-based testing was initiated with conducting tests using computers in networked configuration. The system has been continually improved, and it currently uses devices linked to the internet or the World Wide Web. The construction of

the test involves the generation and selection of the test items from the item bank collection of the UT Examination Center. Thus, the combination of the selected items compromises the test specification. Currently in 2009, UT has offered over 250 courses involving the use of computer-based testing. Students expect that more courses are offered with computer-based testing in more Regional Offices within easy access by students.

Table: 1 presents the number of students taking the computer-based testing, the number of courses offered and registered, the number of online manuscripts downloaded during the period of the testing, and the number score for computer-based testing (CBT) and paper and pencil testing (PPT). Meanwhile, Table 2 presents comparison scores CBT and PPT from 2007.1 to 2008.2.

Table: 1
Number of Students Having CBT from 2007.1 to 2008. 2

Year Semester	N of R.O	N of Students	N of Course		N of Online	N of Score	
			Offered	Registered	Manuscripts	CBT	PPT
2007.1	5	41	264	66	112	112	89
2007. 2	6	56	215	67	167	167	130
2008. 1	9	79	203	85	218	218	174
2008. 2	12	125	205	111	346	346	265

Note: RO = Regional Office

Table: 2
Comparison Scores of CBT and PPT from 2007.1 to 2008.2

Item	2007.1		2007.2		2008.1		2008.2	
	CBT	PPT	CBT	PPT	CBT	PPT	CBT	PPT
N	112	89	167	130	218	174	346	265
Mean	46	45	48	47	50	45	54	45
Std. Deviation	12.42	10.77	12.91	11.32	16.09	11.54	17.05	12.06
Minimum	20	24	20	23	20	22	10	10
Maximum	95	74	90	83	95	75	97	78

Note:
CBT = Computer Based Testing;
PPT = Paper and Pencil Test

Case Study Research in 2008 Semester 1

The case study was conducted in one Regional Office in 2008 semester 1 by distributing questionnaires to 30 students taking computer-based testing. The results of the study revealed the following information. UT website was the source of information about computer-based testing for about 65% of the students. The other sources of information were other fellow students and Regional Office staffs. The information was clear enough for most of the students (70%). About 70% of the students got information more than one month before the test, thus they still had the time to register for computer-based testing.

The reasons for students taking this test were to get better grades (48% of the students), to have more than one examination in one semester (28% of students), to know the number of right answers, to have new experience in testing, and to manage schedule of the study. The students expected that they could arrange examination schedule, manage monitor self-studying, get flexibility, and have immediate feedback. In the other words, computer-based testing has been provided to meet the specific needs of UT students for the following reasons: (1) students' inability to sit for the

scheduled test, (2) conflicting test schedules, and (3) students' flexibility to take examination to improve their grades.

The students reported that 47% of them registered and took computer-based testing for 1 course, 37% of them for 3 courses, and remaining students for 2 and 4 courses. This test was the first time administered to about 60% of students. The students described that they had moderate ability in understanding and good enough skills in operating the computer. The students did not have handicaps with new technology. They perceived that the application for registration and testing was easy to use. Computer connection during registration and downloading of the test was good and fast. There were no failing *hardwar*e and electricity problems. The following table describes the number of students involved in this testing and the courses that was registered from 2007 semester 1 to 2008 semester 2 at this designated Regional Office.

Table 3
The Number of Students Taking Test and Course Registration

Year	Semester	Number of Students	Number of Course Registered	Average Ratio of Student-Course	Number of Scores
2007	1	38	63	2,68	102
	2	56	65	3,02	169
2008	1	79	85	2,76	218
	2	125	111	2,77	346

The Regional Office provided special room furnished with air condition system for computer-based testing in its Office. The computer-based testing was administered in the city of the designated Regional Office. Room for examination was good in terms of temperature, lighting, cleanliness, and tidiness. There were 15 sets of computers that met specification requirements. Those sets of computers were set up properly in terms of position of computers and monitors, space, and distance between tables of computers. Thus, the testees could comfortably do the test and the proctor could easily monitor the test administration.

The students had enough technical assistance for operating the computer application, understanding testing procedure and exam regulation, and signing the attendance form, from the ICT and 3 other Regional Office staffs. The students reported that the ICT and the other Regional Office staffs were ready to assist students and they did their tasks well. Thus, the computer-based testing was administered in the city of the designated Regional Office and was supervised properly by the Regional Office staff, as required by the examination procedures.

UT used computer as media for objective test examination with supervision by proctors and assistance by ICT staffs. This support corresponded to the report about the success of computer use for various areas including learning and testing. Generally, the examination happened properly. There were 3 test sessions in every test day. However, 20% of testees still needed clarification for registration procedure, confirmation procedure, and the date of examination, and 6 % of testees still needed clarification for test locations and method of paying the test fee. In order to increase performance quality of computer-based testing, the Regional Office should consider the following areas for improvement, such as providing more computers for testing uses, increasing the quota of testees, expanding the number of courses offered with computer-based testing, applying double sessions of the test per day, providing wider socialization about the test system and courses offered, clarifying method of registration and payment, and enhancing test confirmation service.

About 1 hour to 30 minutes prior to the test, proctors and ICT staff held the meeting to establish common perception about the procedure of the test and the mechanism to facilitate the testees. The proctors assisted the testees about how to fill attendance list and how to participate in this kind of testing. ICT staff installed the computer-based testing application and password to the Regional Office server and the computer clients.

Then, he configured and set each computer properly and easily without any problem. The process of computer installation and configuration was going well. Time required for installation was about 30 seconds till 1 minute. Internet connection during item test generating was good and fast, thus the online manuscripts of the test could be easily downloaded. It seemed that ICT staff had enough time to re-preparation of the computer from one session to another session of testing. Time required for re-preparing the computer was about 5 to 10 minutes. The process of computer preparation and test item download could be correctly executed. Testees' answers were sent to UT Head Office everyday, right after the third session of the test finished through Internet connection through the UT website. The Regional Office also sent the CD backup of database of testees' answers after the period of examination finished in the Regional Office by using Post Office service.

About 75% of respondents had both computer based testing and paper and pencil test. Table 2 and Figure 1 and Figure 2 provide information about respondents' scores of CBT and PPT. Pearson correlation between CBT and PPT scores was 0.37 and it was significant at the level of 0,01 and it meant that score of CBT had contribution to score of PPT about 14% {(0,37) ^{2} or 0,14}. Table 4 describes the frequency distribution of the two groups of scores.

Table 4:
Profile of CBT Score and PPT Score

Items	N	Mean	Standard Deviation	Minimum	Maximum
Score of CBT	93	54	18. 83	23	95
Score of PPT	71	46	11. 55	22	75

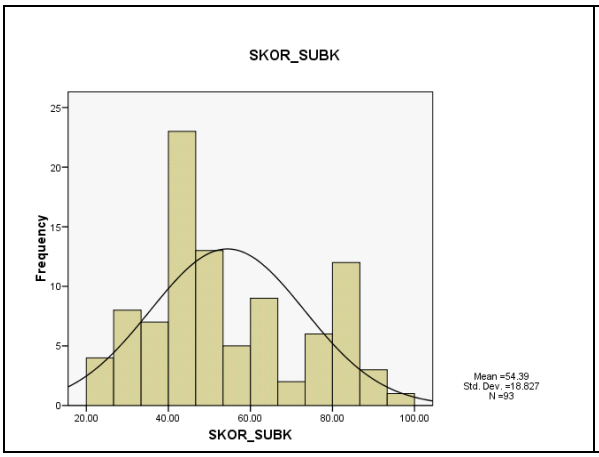

Figure 1. Scores of CBT

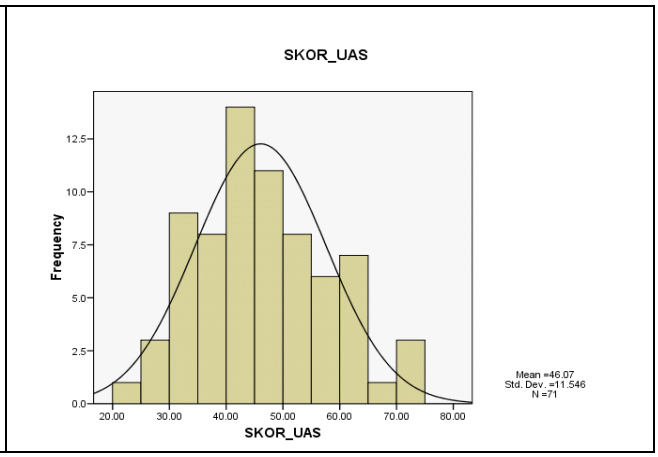

Figure 2. Scores of PPT

Table: 5
Frequency Distribution of CBT and PPT Scores

No.	Score	CBT Frequency	%	PPT Frequency	%
1	40	25	26.88	25	34.21
2	41 – 50	24	25. 81	25	35.21
3	51 – 60	13	13. 98	15	21.13
4	61 – 70	7	7.53	3	4.23
5	71 – 80	12	12. 90	3	4.23
6	> 80.00	12	12.91		

CONCLUSIONS

Students were enthusiastic in taking computer-based testing and they expected that the test method would be provided by UT as alternative to the traditional paper and pencil test method. The number of students taking CBT and the number of courses with CBT registration increased from semester to semester. The students expected that they could arrange examination schedule, manage and monitor themselves in their study, get flexibility, and have immediate feedback. Thus, computer-based testing has been provided to meet the specific needs of UT students in the following areas: (1) students' inability to sit for the scheduled test, (2) conflicting test schedules, and (3) students' flexibility to take examination to improve their grades.

Students expected that more courses were offered with computer-based testing in more Regional Offices within easy access by students, and more computers were provided for testing. They also expected that UT could increase the quota of testees and design more sessions of CBT, In addition, they also still needed more assistance for procedure of registration and test confirmation, and mechanism of getting test information and paying the registration fee.

The computer-based testing was administered in the city of the designated Regional Office and was supervised by the Regional Office staff. The students had enough technical assistance for operating the computer application, understanding testing procedure and exam regulation, and signing the attendance form provided by the Regional Office staffs.

UT had utilized computer as media for objective test examination with supervision by proctors and assistance by ICT staffs. The development of the computer-based testing was initiated with conducting tests using computers in networked configuration. The system has been continually improved, and it currently uses devices linked to the internet or the World Wide Web.

The construction of the test involves the generation and selection of the test items from the item bank collection of the UT Examination Center.

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