

Utilization of Computer Based Testing to Improve Evaluation Effectiveness and Efficiency

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Abstract. Current education is very closely related to technological development. The use of technology in education is using computers in conducting tests, or Computer Based Testing (CBT). The aim is to analyze the use of CBT to Improve Evaluation Effectiveness and Efficiency. In its utilization, tests are presented no longer with sheets of paper, but are packaged in computer applications. This makes the learning outcomes test process more practical to be packaged and implemented. Based on the literature review, the results of CBT are effective for valid testing, CBT can minimize fraud that occurs during the test, CBT is better than paper-based tests, and CBT can minimize the cost of conducting tests.

Keyword: Computer Based Testing (CBT), Validity test

1. Introduction

Learning is a process of mental changes in students both cognitive, affective, and psychomotor. Through thinking activities in the learning process, students can change understanding, knowledge so as to form a learning experience. The learning process is said to be good if the learning objectives have been achieved. To find out the learning objectives are achieved well, it is necessary to carry out measurements and assessments through the process of evaluating learning outcomes. Evaluation of learning outcomes is a process of measuring and evaluating the achievements of the learning process of students. In carrying out the process of evaluating learning outcomes an instrument is needed, one of the evaluation instruments for learning outcomes is a test. Tests can be used in carrying out measurement and assessment of learning outcomes, both in the implementation of formative, and summative evaluations. The use of technology in the process of evaluating learning outcomes can provide many benefits, one of which is to facilitate the process of carrying out tests because a computer-assisted test can collect question banks so that tests can be easily packaged. Furthermore, it facilitates the correction process, and minimizes errors in the evaluation process for both human error errors and can minimize fraud that can be done by students, because with the existence of a question bank, the questions can be randomly displayed to each test participant.

CBT is an innovation in the world of education, as explained by Scheuermann & Pereira cited by [1] explaining that computer based testing (CBT) or computer based assessment is seen as a catalyst for

changes in pedagogical methods (OECD, 2010), It is seen as a catalyst for change, bringing about a transformation in learning, pedagogy and curricula in educational institutions. The definition above can be interpreted as Computer Based Testing (CBT) or computer-based assessment seen as a catalyst for changes in pedagogical methods (OECD, 2010). This is seen as a catalyst for change, bringing transformation in learning, pedagogy and curriculum in educational institutions.

CBT facilitates teacher work in carrying out evaluation of learning outcomes. As [2] explains "The development of a Computer Based Test (CBT) model is very relevant and contextual to answer the demands and needs of the implementation of drill and computer assisted tests because it is in line with government policy through the Ministry of Education and Culture to carry out Computer Assisted National Exams (UNBK).

CBT can also minimize cheating. Through the time allocation settings feature, CBT can manage the work of each question according to the difficulty level of the question. Through the question bank at CBT it is also able to arrange the distribution of questions in various ways. Between computers one with another computer can display different questions. This can be used as a solution to minimize the problem of cheating during the test. So that the implementation of the learning outcomes test can produce real data from the abilities that have been mastered by students. Without valid test results, the analysis of the test results will not get accurate results. This will continue to the policies that must be taken regarding the implementation of further learning.

In response to the above problems, it is clear that the valid evaluation results have important meanings for why the evaluation was carried out. Because basically the learning outcome evaluation process has a dual function, namely the evaluation of learning outcomes does not only function as an effort to strive for student achievement of the learning material delivered during the learning process by the educator and of course in accordance with predetermined goals, but evaluation of learning outcomes also has function for controlling the quality of education, because whether or not a learning process has been carried out depends on the achievement of learning objectives. Achieved or not the goal of learning is good.

1.1 Computer Based Testing

Computer Based Testing is a test that is packaged, and carried out with the help of a computer. As explained by [3] Computer-Based Testing, is a tool for evaluating where the implementation of evaluations is carried out using computer assistance? Questions and answer keys are made in electrical form. Computer-based testing (CBT) creates new possibilities for testing more effectively when compared to tests submitted on paper in the classroom. [2] Citing the opinion of Bull and McKenna (2004) defining computer-based tests as computer use in testing and evaluating student learning outcomes. From some of the above definitions, it can be concluded that Computer Based Testing (CBT) Computer-based testing (CBT) creates new possibilities for testing more effectively when compared to tests submitted on paper in the classroom.

Implementation of computer-based tests (CBT) can be carried out with various implementation models. As stated by Bartram (2001: 25) cited in [3], there are four forms of computer-based test models developed by the ITC, namely: 1) Open Mode, tests with open models like this can be followed by anyone and without anyone's supervision, for example tests that can be accessed openly on the internet. Test participants do not need to register participants; 2) Controlled Mode, tests with models like this, the same as the test with an open model that is without anyone's supervision, but only test participants who have registered, by entering a username and password; 3) Supervised Mode, in this model there is a supervisor who identifies the test participant to be authenticated and validates the conditions for taking the test. This internet mode test requires the test administrator to log participants and confirm that the test was completed correctly at the end of the test; 4) Managed Mode, this model is usually a centralized test. Organizations that regulate the test process can define and convince the

performance and specifications of the equipment at the test center. They also train the ability of employees / staff to control the course of the test.

The application of the four models above, it is expected that the implementation of computer-based tests (CBT) can be carried out according to the needs, circumstances, students, and objectives of computer-based testing, so that it can bring benefits. [2] citing the opinion of Barth B Riley and Adam C Carle (2012) from the Department of Health System Science, University of Illinois, Chicago, USA in a study entitled: Comparison of two Bayesian effects mode detection between paper-based and computerized adaptive assessments : a preliminary, Monte Carlo study ", concluded that CBT provides several advantages over the implementation of tests with a paper and pencil test model including an automatic scoring system and reducing the burden on respondents or test participants because it is younger to work on computer-based tests than the paper test.

Suryanto [4] revealed that there are many advantages of doing tests through computers, including: allowing testing at the right time for participants, reducing the time for test assessment work and making written reports, eliminating logistical work such as distributing, storing and testing using paper, and test takers can immediately know the test results. From some of the above explanations regarding the benefits of CBT, it can be seen that CBT can facilitate the implementation of learning outcomes tests.

In addition to providing many benefits, CBT also does not escape from losses or losses. The disadvantages, namely, the dependence on equipment such as computers, requires adequate computer labs (hardware and software and quantities), if the computer-based test system is problematic the implementation of computer-based tests will be delayed, requiring computer knowledge and skills for test takers.

1.1 Validity Test

The Learning Outcomes test aims to measure the achievement of learning objectives. In order to obtain the correct measurement and assessment, the Learning Outcomes test must be valid. According to Shodiq Abdullah, validity is translated as validity or accuracy, namely the extent to which a measuring instrument is able or successful in measuring what it wants to measure or the extent to which a measuring instrument fulfills its function. While Sudjono reveals Validity is related to the ability to measure precisely something you want to measure [5]

According to [6] broadly speaking there are two types of validity, namely the validity of the question and the validity of the item (validity of the item)

1.1.1 Question Validity broadly speaking there are two kinds of validity, namely logical validity and empirical validity:

Logical Validity The term logical validity contains logical words derived from the word logic, which means reasoning. Logical validity an evaluation instrument refers to the condition for an instrument that meets valid requirements based on the results of reasoning. There are two kinds of logical validity, namely content validity and contract validity: 1) Content Validity A test is said to have content validity if it measures certain specific objectives in accordance with the material or content of the lesson provided.⁴⁵ The learning outcomes test items are declared valid (logically valid) if after examining the contents of the items written have shown conformity by filling in. ⁴⁶; 2) Extract Validity In terms of terminology, learning outcome tests are expressed as tests that have construction validity if the learning outcome test can accurately reflect a construct in psychological theory. The soul of a student can be broken down into certain aspects or domains. Benjamin S. Bloom divides psychiatric aspects into three parts, namely cognitive domains, affective aspects, and psychomotor aspects. **Empirical Validity** Empirical validity contains the word "empirical" which means experience. An instrument can be said to have empirical validity if it has been tested from experience.

Based on the explanation of the above problems, the authors are interested in conducting literature review on the Utilization of Computer Based Testing to improve the validity of the test.

2. Method

This type of research is library research, which is a series of studies relating to library data collection methods. The focus of library research is finding theories, laws, arguments, principles, or ideas that are used to analyze and solve research questions that are formulated. The nature of this research is descriptive analysis, namely the regular breakdown of data that has been obtained, then given an understanding and explanation to be well understood by the reader.

The approach used in this study is a philosophical and pedagogical approach. The data used in this research is secondary data. Secondary data is data obtained not from direct observation. However, the data is obtained from the results of research conducted by previous researchers. The data collection method used in this study is the documentation method. Documentation method is a method of collecting data by looking for or digging data from the literature related to what is meant in the formulation of the problem. The data analysis used in this study is annotated bibliography.

3. Results and Discussion

In accordance with one of the important government agendas contained in the National Education System Law No. 20 of 2003 article 57 paragraph 1, namely seeking the quality of national education through the implementation of evaluations. According to the law, evaluation is carried out in the context of national quality control of education as a form of accountability of education providers to interested parties.

The process of evaluating learning outcomes is not only to get a high score, but along with that through the process of evaluating learning outcomes can the achievement of learning objectives be measured. So that the results obtained from the evaluation process can be used as material for analysis in order to improve the quality of the next learning process.

In measuring and evaluating student learning outcomes, an instrument is needed. One instrument that can be used in measuring and evaluating learning outcomes is a test. Ideally the implementation of the test is useful for measuring changes in behavior from the learning efforts of students. But in reality, the implementation of the test was still colored by several obstacles and obstacles, so the results of the tests were feared to produce invalid data. Continuously the meaning of the measurement will be eroded.

The implementation of the learning outcomes test is still using paper based testing (Paper Based Testing), carried out manually and examined manually, only a few schools have corrected the Computer Answer Sheet (LJK). While for schools that do not have a Scanner machine to correct the answer sheet, it is still done manually. The possibility of Human Error can occur. So that it is feared that the results of correction will not provide an accurate assessment. In addition, paper-based tests (Paper Based Testing) require considerable costs in order to procure question sheets, answers, and opaque paper if needed.

The implementation of paper-based learning test is also difficult to control so that students carry out tests with their own abilities without cheating. Procurement of questions is only able to be carried out by making several question groups. That way the opportunity for students to commit fraud still exists.

To overcome the above problems, innovation is needed in relation to the implementation of learning outcomes tests. Computer Based Testing can be used as a solution to overcome the above problems. Computer-Based Testing (CBT) is a test of learning outcomes conducted by using a computer. In the use of CBT the test is presented no longer with sheets of paper, but packaged in a computer

application. This makes the learning outcomes test process more practical to be packaged and implemented.

CBT also minimizes fraud in the learning outcomes test process, because the application of each question can be limited to the time of the work, of course, adjusted to the difficulty level of the question. The issue of honesty in conducting tests is an important issue to be followed up. Because, the implementation of a dishonest test, the results of the measurement and assessment will not give a valid result. Invalid results, then it will not be able to measure the learning success of students in accordance with it. The problem that occurs in the evaluation process is an important problem that must be addressed, because this problem will sleep on other educational problems such as learning needs analysis, learning planning, and so forth.

The above is in line with the opinion of [7], from the State University of Tetova, Macedonia in linguistic research entitled: "Assessment, Testing and Correcting Students' Errors and Mistakes", concluding that if in spoken language expressions are ignored or not corrected. in written language the error will be carried away and students or language learners repeat their mistakes in various written languages.

Through the research carried out by [7] above, it can be concluded that if the slippage in the initial learning measurement process is not fixed, then the next learning will repeat the same mistakes. Because the results of conducting evaluation tests on learning outcomes can be used as material for analysis and consideration in establishing a new policy for learning. So, the test results obtained from the use of an dishonest test will not be an accurate analysis material.

Furthermore CBT can also make it easier for educators to carry out tests in accordance with the level of understanding of students, and according to the knowledge of students. Educators can group questions according to the difficulty level category of questions that are in accordance with the level of knowledge and understanding of students. With CBT, there is no need to worry that each student will get the type and form of the questions that are not the same or do not need to worry, and each student gets too many types of difficult questions compared to other students. Because the spread of types of questions can be managed and regulated through CBT. This is in line with the results of research conducted by [8] which explains "Questions given to students must be grouped according to the level of difficulty, so that later the percentage of questions that appear on each student has the same level of difficulty, if not grouped then there might be students who get a lot of questions with a high level of difficulty or vice versa get an easy level of difficulty. This will result in the results obtained by students, if the problem is difficult then the value obtained will be low as well as vice versa if the problem is easy then the value obtained becomes high. This will cause difficulties for the teacher to analyze the abilities of students because the questions obtained by students are not the same level of difficulty. For this reason, the Question Composition menu is provided.

The percentage of questions that appear on CBT that are accessed by each student must have the same level of difficulty, if not grouped then there may be students who get a lot of questions with a high level of difficulty or vice versa get a difficult level of difficulty, if that happens, then educators cannot analyze students' abilities validly. In the process of evaluating valid results it will affect the analysis of student learning progress. Because through the evaluation process the educator can determine the decision for the next action to be taken regarding the future learning process.

Educators need to pay attention to the suitability of test content or question material contained in CBT with the level of understanding of students. As Jean Piaget is a cognitive learning theorist explains: the more mature a person is, the more mature the person's thinking process. Piaget also divides the four stages of the cognitive development of students, namely: motor sensory (0-2 years), pre-operational (2-7 years), concrete surgery (7-11 years), and formal surgery stages (11>). The above theory explains

with the division of children's cognitive development, it can be seen that each child with a different age level, the cognitive level is different, and different ways the child in the process of thinking. So it is important for educators to pay attention to the difficulty level of the questions contained in CBT with the level of cognitive development of children. This aims to achieve valid test results.

In line with the explanation above, valid tests in the evaluation process have important meanings. Because without a valid test the learning progress of students cannot be fully measured. The implementation of tests that are dishonest, or cheating by students will certainly affect the validity of the evaluation results, because cheating is one of the invalid factors in assessing student abilities. Through CBT, honest testing can be realized, as described by [9] which explains "The existence of supervisors and randomisation in presenting questions with CBT is a solution that is often used in dealing with fraud. At present there are many content management systems (CMS) and computer based assessments (CBA) for making online or computer-based tests (CBT). "

Besides being taken into consideration in conducting a learning analysis valid test results also function as reports for parents related to the success of their child's learning, reports for schools related to the extent to which the success of teaching and learning activities can be carried out, and reports for the community, the test results are high, if not accompanied by the quality of one's knowledge, it will not be useful for the needs of the community.

Even though the most important thing is the need to create honest test conditions that are carried out through CBT, namely the development of honest personal character. Because honest character will be needed in carrying out various aspects of life. Honest characters cannot grow by themselves, need practice and habituation. As Lev Vygotsky (1886-1934) explained "every human child develops in a cultural context, culture contributes two contributions to the development of children's intellectuals. First, children gain many facets of understanding, second, children acquire many ways of thinking, or intellectual adaptation tools [10]. The above theory explains that through the culture of children learning and experiencing intellectual development. With an honest culture, one of which is the culture of carrying out tests honestly, can foster an honest character for future children.

Errors in the evaluation process of learning outcomes do not only occur in students. Errors can occur from educators. That is either a problem when making a group of questions, loosening the supervision when the test is carried out, until the problem of checking the answer sheet of the students. Through CBT the above problems can be overcome. As explained by [11] from the Department of Health System Science, University of Illinois, Chicago, USA in a study entitled: Comparison of two Bayesian methods to detect mode effects between paper-based and computerized adaptive assessments: a preliminary Monte Carlo study ", concluded that CBT provides several advantages over the implementation of tests with a paper and pencil test model including an automatic scoring system and reducing the burden on respondents or test participants because it is younger to work on a computer based test rather than a paper test.

With the scoring process carried out automatically by CBT, then the possibility of Human Error when correcting answers can be resolved. Moreover, the correction process becomes more practical and time efficient. It does not take long to check the answers of students. This also contributes to realizing valid test results. Through test scoring features can be carried out easily and practically.

4. Conclusion

Based on the analysis and results of the discussions that have been conducted, conclusions can be taken as follows: 1) Computer Based Testing is more practical and economical than Paper Based Testing; 2) Computer Based Testing can be used as a suggestion in training students to test honestly; 3) Computer Based Testing can minimize fraud and the occurrence of Human Error in the implementation of Learning Outcomes Tests

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