

ANALYSIS OF COMPUTER-BASED TESTLET TEST MODELS

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Abstract. The purpose of this study was to: find out the form of tests conducted by the teacher, and explore the teacher's needs for computer-based tests. This study was included in a qualitative descriptive study. The method used in this study was a survey using 6 teachers from 3 public schools in Boyolali with high, medium and low-level categories as respondents. Data were collected through questionnaires. Data analysis techniques used descriptive statistical analysis. The results of this study indicate that: first, the tests applied by schools in Boyolali sub-district majority still use paper-based tests, 65.63% students choose tests using computers, 31.77% students choose to use paper-based tests and 2.60% of students do not answer. From the form of multiple-choice tests and essays it was found that 29.17% of students chose the essay form test, 53.12% of students chose multiple choice and 17.71% of students chose the multiple-choice test and essay test, second, the regarding teacher's for computer-based tests namely: first, teachers need insight into making computer-based tests that are easy to compile and implement in learning. second, there needs to be an interest generation to carry out computer-based tests, and third, test questions can be arranged through a simple and easy to operate a device.

1. Introduction

The curriculum-2013 was developed on the theory of "standards-based education", and the theory of competency-based curriculum. Learning activities in this curriculum are directed to empower all the potential possessed by students so that they can have the expected competencies through efforts to grow and develop; attitude/attitude, knowledge/knowledge, and skills/skills. The scientific approach is a learning scientific framework that is carried by the curriculum-2013. Steps to the scientific approach are a form of adaptation of scientific steps in science. The learning process can be paired with a scientific process, therefore the curriculum-2013 defines the essence of the scientific approach to learning. The scientific approach is believed to be a golden platform for the development and development of attitudes, skills, and knowledge of students. Therefore, the application of curriculum-2013 with a scientific approach in accordance with learning chemistry as a science, so that in the learning process it also includes generic science skills. The process that is carried out after a learning activity is an assessment process, in which the assessment functions to find out how far the understanding has been obtained by students. In Article 1 of Permendikbud, number 23 of 2016 concerning assessment standards states that assessment is the process of collecting and processing information to measure the achievement of

learning outcomes of students in education[7]. In the assessment process, a measuring instrument is needed. The measuring instrument used by a teacher usually uses a measuring instrument in the form of a test. Good and standardized instruments for assessment activities are important in the implementation of education because the assessment results provide information as a reference for decision making. According Berry & Adamson states that assessment has two functions, namely: to make judgments about individual performance or system effectiveness; and to improve learning[2].

A good and accurate assessment requires learning outcome test instruments that meet the standards. The preparation of standardized test instruments can be done through several stages. According to Mardapi there are nine stages in the development of achievement test instruments, namely: preparing test specifications; writing test items; reviewing test items; testing the test instrument; analyzing test items; improve test items; assemble test items; carry out testing, and interpreting the test results[6]. Instrument test that meets the standards, will be the first step for schools in developing computer systems assessment if the school has computer lab facilities and supported by a system of local networks (Local Area Network). The availability of information technology and communication facilities is one of the requirements to be able to carry out computer-assisted assessments. The results of observations made at the beginning of the activities showed that the majority of high schools in Boyolali area already have computer labs because the national examination has been using computer facilities (Computer Based Test). The existence of ICT infrastructure provides a vast opportunity for high school schools to implement a computer-aided assessment system.

Testlet test instruments can be used as an alternative in the assessment process. Wahyuni, S Yamtinah, and Budi Utami explained that the testlet test combines the advantages of multiple-choice questions and description questions[13]. A *testlet* test is a set of items that reveal the same information [16]. These items are considered and needed as an assessment group that shares problems in one context [9]. The correct answer to each question can be delivered to students as a whole, in part, or not as a sign obtained before they proceed further with the full knowledge of the matter to the correct. Items are made to provide information to each other about the supporting issues. Questions - testlet test-takers can be independent or dependent. wahyuni developed a testlet test with support problems that are dependent[13]. Another study conducted by Slepko developed supporting questions that were independent or dependent[8].

Testlets (Tissen and Wainer) are a group or group of items (statements) that relate to a particular topic that is developed into a single unit and contains a number of pre-determined steps that can be followed by participants. *Testlets* are included in the type of test that produces more than one response, furthermore, this *testlet* has a relatively hierarchical response with the measured knowledge. The design of a *test* instrument is a system that is given a stimulus.

The instrument used by the teacher in learning more often uses essay questions for daily tests, this is because the teacher wants students to be able to apply the concept. But with a model like that, not all students can express the existing concepts, so that the existing forms of skills cannot be measured properly. As for midterm replications, semester tests and class increases are more often used multiple-choice questions, because with the form of multiple-choice questions will be easier and faster in the correction process.

With the conditions in schools like that, the writer conducted a development research in the form of an assessment tool in the form of a computer-based testlet model test, using the testlet model test is expected to be a combination of essay and multiple-choice questions, with multiple choice views but hierarchical questions so that there are questions next as a continuation of the question. So that it can be seen whether students are just guessing or really understand the problems. Computer-based is expected to be more efficient in the implementation and evaluation process.

2. Method

This type of research is research and development (R & D) or research and development aim to produce a Computerized testlet instrument that is equipped with software analysis of items and individual

profiles. The model used to develop products refers to the development steps proposed by Borg and Gall[1]. The research carried out is the preliminary research phase, namely the initial information collection / Research and Information Collecting. At this stage, it is carried out using literature review, class observation, interviews, and questionnaire distribution.

The method used was descriptive qualitative. The object of the study were students and teachers of chemistry subjects in 3 schools where research was conducted in Boyolali district. The number of students from the three schools in the sample is 192 students, the chemistry teacher used in the sample is 6. The 3 schools used for this study represent the school with the achievement assessed in the 2017 National Examination at high, medium and low levels. In the 3 schools where there were facilities and infrastructure for testing using a computer, it was very possible because in the present condition all secondary schools had already done the National Examination using computers.

From the results of the questionnaire given in the form of questions include: the use of test kits in the form of multiple choice questions, essays, multiple choices and essays for the analysis of the use of test instruments that will be developed and questions include: using a computer test or using paper tests to analyze the use of test media. From the results obtained analyzed using the formula [11]:

$$P = \frac{n}{N} \times 100\%$$

Information :

P = Percentage of a score

n = number of scores obtained / students who answered x points

N = number of maximum scores/number of all students

3. Result And Discussion

The definition of testlet in a book written by Tissen and Wainer testlet is a group or group of items (questions) that relate to a particular topic that is developed into one unit and contains several predetermined steps that can be followed by participants[12]. Testlets belong to the super test type which produces more than one response, furthermore, this testlet has a relatively multilevel response about the construct that will be measured.

By De La Torre In the literature, the test model of the response model and the high-level Item Response Theory (IRT) model are developed separately. But the hierarchical topic can be measured using testlet items. This has good value for the development of the IRT model that connects the testlet to the hierarchical topic structure[9].

The two general concepts commonly used in the testlet model factor are the independence of each item and multi-dimensional. Testlets used are usually not separated from these 2 forms. Testlet with independence means that each test item developed is not related to other items, on the contrary by using the multidimensional concept each item developed may relate to other items for example when presented a data graph the first question is what is obtained from the graph, while the next level question is why it happened. These multi-dimensions may look more reasonable when applied to multiple items that relate to context but are not made directly from each other.

Kusumaningrum, Yamtinah, and Saputra have conducted research to develop diagnostic instruments for learning difficulties in the form of testlets[5], examples of testlet instruments used are as follows:

The following statement is used to work on questions number 5 and 6.
At the formation of 1 mole of magnesium sulfate in standard conditions, a heat of 1284.9 kJ is produced.

5. The proper thermochemical equation for the reaction of magnesium sulfate formation is...

- A. $\text{MgO (s)} + \text{SO}_3 \text{ (s)} \rightarrow \text{MgSO}_4 \text{ (s)} \Delta H = -1284,9 \text{ kJ}$
- B. $\text{Mg (s)} + \text{S (s)} + 2\text{O}_2 \text{ (s)} \rightarrow \text{MgSO}_4 \text{ (s)} \Delta H = -1284,9 \text{ kJ}$
- C. $2\text{Mg (s)} + \text{S (s)} + 2\text{O}_2 \text{ (s)} \rightarrow \text{Mg}_2\text{SO}_4 \text{ (s)} \Delta H = -1284,9 \text{ kJ}$
- D. $2\text{MgO (s)} + \text{SO}_2 \text{ (s)} \rightarrow \text{Mg}_2\text{SO}_4 \text{ (s)} \Delta H = +1284,9 \text{ kJ}$
- E. $\text{Mg (s)} + \text{S (s)} + 4\text{O (s)} \rightarrow \text{MgSO}_4 \text{ (s)} \Delta H = +1284,9 \text{ kJ}$

6. The appropriate thermochemical equation for magnesium sulfate decomposition reaction is...

- A. $\text{Mg}_2\text{SO}_4 \text{ (s)} \rightarrow \text{MgO (s)} + \text{SO}_2 \text{ (s)} \Delta H = -1284,9 \text{ kJ}$
- B. $\text{MgSO}_4 \text{ (s)} \rightarrow \text{MgO (s)} + \text{SO}_3 \text{ (s)} \Delta H = -1284,9 \text{ kJ}$
- C. $\text{MgSO}_4 \text{ (s)} \rightarrow \text{Mg (s)} + \text{S (s)} + 4\text{O (s)} \Delta H = +1284,9 \text{ kJ}$
- D. $\text{MgSO}_4 \text{ (s)} \rightarrow \text{Mg (s)} + \text{S (s)} + 2\text{O}_2 \text{ (s)} \Delta H = +1284,9 \text{ kJ}$
- E. $\text{Mg}_2\text{SO}_4 \text{ (s)} \rightarrow 2\text{Mg (s)} + \text{S (s)} + \text{O}_2 \text{ (s)} \Delta H = +1284,9 \text{ KJ}$

Of the various types of test forms, it turned out to be a multiple-choice test and the most frequently used essay. The teacher has known many learning test models but not many apply them in the assessment process. Therefore, researchers want to develop a test instrument for this testlet form with a computer-based. As technology advances, to make it easier and more efficient when the assessment is done with the help of a computer. National Exams from various levels of school have also been conducted on a computer basis. For the initial research, interviews, class observations and questionnaires were conducted. From the results of the questionnaire used, the data was obtained for analysis. Of the 6 teachers and 192 students in this study that were valid as respondents. From the results of the questionnaire, it was found as the followings :

A. Test form and model of test questions used

Tests were conducted in schools where research in Boyolali district still uses conventional methods, namely PBT (Paper Based Test). PBT actually has many shortcomings, including requiring a lot of time and costs, prone to fraud in its implementation, the inspection process (correction) requires a lot of time, the value processing and giving feedback to respondents is also quite complicated. From 192 students as respondents, it was found that as many as 126 students (65.63%) chose a test using a computer, 61 students (31.77%) chose a test using paper and 5 students (2.60%) did not give an answer.

From the form of tests used by the teacher to more use of multiple-choice tests and essays, this is because using the multiple-choice test questions is possible, there can still be answered to guess from students without understanding the correct concept. By combining with essay-shaped test questions, the teacher will know which ability of the learner really understands and who only tries to guess. From 192 students as respondents, it was found that there were 56 students (29.17%) chose essay test questions, 102 students (53.12%) chose multiple choice questions and 34 students (17.71%) chose multiple-choice test questions and essay.

B. Teacher's needs for computer-based tests

From the results of the questionnaire used, the authors can conclude as the followings :

First, teachers need insight into making computer-based tests that are easy to compile and apply in learning. Because judging from the data that has been obtained actually the willingness of the teachers to streamline and streamline the test is very high. But it is still constrained by updating information related to the method and method.

Second, there is a need for adequate facilities to carry out computer-based tests. The concept of facilities here that need to be straightened out. Current facilities are not required to be a computer. We can use the tools around us such as gadgets and tablets for the learning process. Besides being flexible and easy to operate, almost all students now have it at home.

Third, test questions can be arranged through a simple and easy to operate device. This really must be emphasized because the concept of compiling online questions is still imagined by coding and databases.

In fact, the preparation of the question now it's quite easy to use certain applications that don't need installation and can be operated simply by using a gadget.

To realize all the above needs, there needs to be a collaboration between teachers and schools so that evaluation activities in primary schools can be effective and efficient. Teachers as practitioners in learning activities must always develop themselves, especially related to learning technology. Schools must also support teacher activities, namely by providing various facilities needed by the teacher.

4. Conclusion

The results of this study indicate that: The tests applied by schools in Boyolali sub-district majority still use paper-based tests, 65.63% students chose tests using computers, 31.77% of students chose to use paper-based tests and 2.60% students did not answer. From the form of multiple-choice tests and essays, it was found that 29.17% of students chose the essay form test, 53.12% of students chose multiple choice and 17.71% students chose the multiple-choice test and essay test. Regarding teacher's requirements for computer-based tests namely: First, teachers need insight into making computer-based tests that are easy to compile and implement in learning. Second, there needs to be an interest generation to carry out computer-based tests. Third, test questions can be arranged through a simple and easy to operate device.

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