INSTRUMENT PERFORMANCE ASSESSMENT IN PHYSICS LEARNING BY SCIENTIFIC APPROACH WITH MODEL PROJECT BASED LEARNING

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ABSTRACT

Assessment is one of the principal component in the learning process. Assessment techniques continue to evolve with the changes and development of the curriculum in the hope of improving the quality of learning. The purpose of this article is to understand the performance assessment in Physics education through scientific approach with problem based learning and was developed the device performance assessment on learning physics through a scientific approach with a model Problem Based Learning developed to change for the better of the future. This article will discuss the performance assessment and how performance assessment in physics through scientific learning and how well the performance assessment instrument on learning physics through a scientific approach with a model of project based learning. Needs analysis is based on data obtained at SMAN 12 Bandar Lampung states that 100% teacher not using the device performance assessment refers to the scientific approach in the assessment and 100% teacher experiencing difficulties and want to develop a performance assessment refers to the scientific approach, and 100% of students agreed that if a Physics teacher make and apply the performance assessment on learning in the classroom. Based on the observations and the data obtained it can be said that performance assessment instrument development is needed.

keyword : Performance Assessment, assessment instrument, Scientific Approach, Project Based Learning Model

INTRODUCTION

The assessment process is very important in the learning process as proposed by Wijayanti, (2014) characteristic of authentic assessment is the process of observation as the basis for project appraisal implications for the assessment which emphasizes on some things as a source of ratings. Assessment process emphasizes the ability to plan, organize and collaboration within the team while emphasizing product assessment on the identification and collection of relevant information, the analysis and interpretation of data and the ability to communicate the product.

Performance assessment is an assessment based on the observation of students' activities as assessment take place. Performance assessment is employed to assess the ability of students such as cognitive abilities and psychomotor abilities through the assignment. The assignment specifically designed to produce a response (oral or written), to produce works (products for example, experimental physics props), or to demonstrate the application of knowledge. The task given to students must be in accordance with the competency and also still meaningful for students (Setyono, 2005). Furthermore Moskal

(2003) reveals that performance assessments can take on many different forms, which include written and oral demonstrations and activities that can be completed by either a group or an individual.

This article discusses a model of learning that uses Project Based Learning and assessment system using the Performance Assessment ratings. Project assessment is the assessment of the tasks to be completed by learners by period / specified time. Project assessment is investigates the activities undertaken by learners ranging from planning, data collection, organization, processing, analysis and presentation of data.

The gap described above, but until now there has been no solution how to solve this problem, especially with regard to objectivity and conformity assessment instruments in student psychomotor aspects or skillsIn addition, other impacts arising from errors in the assessment of the teacher in the classroom is not objective of determining final grades on student learning outcomes. Achievement of student learning outcomes should be measured based on three aspects: cognitive, affective, and psychomotor, where each scope is measured by using instruments and appropriate assessment rubric. However, that is now common in schools is to determining the final value only on cognitive aspects and supported by the teacher's perspective in assessing the affective and psychomotor aspects that determine the final value to the achievement of student learning outcomes that are less objective. It is certainly detrimental for students who actually has the potential to aspects other than the cognitive aspects.

Based on the background of the problem, the problem in this study are (1) whether to develop performance assessment instruments scientific approach to problem-Based Learning Model in need in physics learning?

THEORETICAL FRAMEWORK

Scientific Approach

Learning through scientific approach is a learning process that is designed so that learners are actively constructing concepts, laws or principles through the stages observed (to identify or find the problem), to formulate the problem, propose or formulate hypotheses, collect data with a variety of techniques, analyzing the data, draw conclusions and communicate concepts, laws or principles found according to Fauziah et al. (2013) invites the scientific approach students directly in make inferences problems that exist in the form of formulation of the problem and hypotheses, a sense of caring for the environment, curiosity and love to read. According to Wieman (2007), "We now have good data showing that traditional approaches to teaching science are not successful for a large proportion of our students, and we have a few research - based approaches much better learning. The scientific approach to science teaching works."

Based on some of the above opinion can be said that the scientific approach is the approach used in teaching with an emphasis on the use of scientific methods in the learning process. This approach is expected to make the students' scientific thinking, logical, critical, and objective in accordance with the facts.

Performance Assessment

Burke (2006) reveals that performance assessments show how the performance standards are implemented. They require students to apply their knowledge of the

content and their skills in a real task. While according to the Strecher (2010) "Performance task is a structured situation in which stimulus materials and a request for information or action are presented to an individual, who generates a response that can be rated for quality using explicit standards. The standards may apply to the final product or to the process of creating it. A performance assessment is a collection of performance tasks."

Moskal (2003) reveals that performance assessments can take on many different forms, which include written and oral demonstrations and activities that can be completed by either a group or an individual. While according to Feuer, Fulton, Hambleton, and Slavin (cited in Wulan 2007), performance assessment is a test that aims for students to demonstrate their performance on specific tasks and involve the demonstration of actual knowledge or skills in real life.

According Graffin and Nix (cited in Vali, 2000) as for the type of tasks or activities in accordance with performance assessment including portfolios, writing journal or paper, simulation, design and presentation, critical observation, individual and group projects, field studies, problem solving, making concept maps etc. While Marc Tucker (cited in Marzano 1993) revealed that the task at hand is an absolute requirement does student performance assessment implementation. Based on these opinions, the things that need to be considered in developing the performance assessment is the aspect of performance that will be observed activity can be measured, observed aspects of performance which will have to provide a learning experience that can be measured.

Instruments and Performance Assessment Scale for assessment

In designing performance assessment there are things that must be considered, Chappuis (2009) expresses the things that must be considered in designing a performance assessment are: (1) Align parts of the task. (2) Parts build to "full write" or speech. (3) Develop rubric for each assessment target. (4) Develop exemplars for each rubric. (5) Allow multiple approaches.

In designing a performance assessment must consider the performance measures that will be made of students and develop a rubric for each predetermined performance measures. Furthermore, Burke (2006) argues that: Performance task units begin with the end in mind. That is, they begin with curriculum goals and standards. The unit dictates the content whereas the standards dictate the performances students need to be able to demonstrate they can, in fact, do what the verb in the standard asks them to do. The target standard should be assessed using a criteria checklist composed of vocabulary words from the standards and a rubric composed of descriptors from the checklist.

The check list can only note the presence or absence of certain behavior variables, the drawback is the teacher or evaluator has only two choices absolute, yes-no. Students get a score if certain criteria of competence mastery can be observed by educator / evaluator. However, if the criteria of competence mastery can not be observed then the student does not get a score. Zainul (2001) reveals that: "Rating scale using a structured procedure for obtaining information about something that is observed, which states the position in relation to something else. This scale contains a set of statements about the characteristics or quality of something that will be measured along with the partner that shows the character or quality of the education they have."

Rubric (Scoring Guidelines)

Airasian & Russel (2008) express the sense of the rubric are a set of clear expectations or criteria used to help teachers and students focus on what is valued in a subject, topic, or activity. Chappuis (2009) defines a rubric as an instructional tools to provide feedback to improve student learning, a rubrics needs to describe the important elements of quality that students are to pay attention to and strive for. Furthermore Karkehabadi (2013) expresses the sense of the rubric: "A scoring tool that explicitly represents the performance expectations for an assignment or piece of work. A rubric devides the assigned work into component parts and provides clear descriptions of the characteristics of the work associated with each component, at varying levels of mastery."

Based on some of these opinions, the assessment rubric scoring guide that describes the desired criteria in assessing teacher or give the level of results of student work. According to Zainul (2001), measures design assessment rubrics are: (1) instructional purposes; (2) identify the indicators that will be observed; (3) discuss the characteristics that accompany each attribute; (4) write a complete narrative description for holistic and analytic rubrics; (5) complete with a holistic rubric for all levels between the description of the analytical column performance and complete with descriptions for all levels between performance separately for each attribute; (6) collects samples that represent examples of each level; (7) revising the rubric as needed.

While according to Burke (2006), the steps of the design of the assessment rubric contains six stepsare (1) the target of the standars; (2) find the big ideas; (3) organize teacher checklists; (4) create performance tasks; (5) develop student checklists; (6) design teaching rubrics. Based on the two above opinion, any draft assessment rubrics must go through several stages or steps that are in accordance with the existing procedures in order to scoring rubric is designed to be valid and enforceable. Steps designing a rubric scoring only as a guide so that the resulting rubric is valid and feasible, but for the success of the design is determined by the match between the desired goal by scoring rubric developed

Project Based Learning

According Daryanto (2014) project-based learning (Project Based Learning) is a learning method that uses the issue as a first step in collecting and integrating new knowledge based on experience in the activity significantly.

Based Learning Project has the following characteristics Daryanto (2014) : (1) learners make decisions about a framework; (2) the existence of problems or challenges posed to the learner; (3) learners to design a process to determine a solution to the problems or challenges posed; (4) learners collaboratively responsible for accessing and managing information to solve the problem; (5) evaluation process is run continuously; (6) learners regularly to reflect on the activities that have been carried out; (7) the end product of learning activities will be evaluated qualitatively; and (8) learning situation is very tolerant of errors and changes.

METHODS

This study was conducted to develop a performance-based assessment of the scientific approach with a model of project-based learning. In the development of performance assessment research using methods of research and development. Development of

research methods used to produce a certain product in tested the suitability, convenience, and expediency in order to be useful in physics learning. Development design development model implemented by Sugiyono. However, in this article only discussed at the stage of (1) the potential and problems and (2) data collection, for a more complete development steps contained in figure 1.
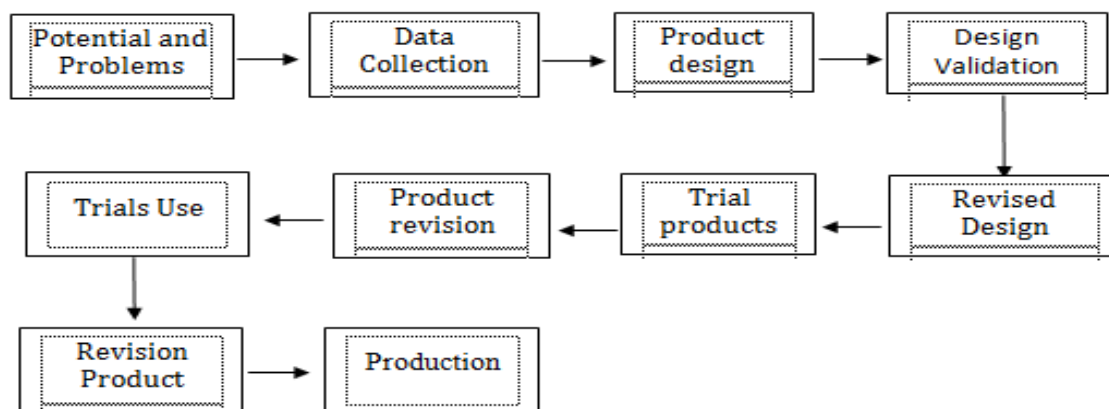

Figure 1: the steps according to Sugiyono Development (2013)

Data collection techniques in this study using a questionnaire. The questionnaire is the technique of data collection by providing a set of written questions to the respondent to determine if they needed a performance assessment instrument development. Sources of data on this development came from the stage of data collection. At this stage of data collection, the data obtained from filling the questionnaire by the teachers and students about the availability of learning tools that refers to the scientific approach, the use of authentic assessment tools, types and techniques applied by teachers to assess student learning outcomes, availability of assessment tools to measure student performance, the design and use of performance assessment to assess the performance of students who refers to the scientific approach, the difficulty of teachers in making and using performance assessment, and the need for the development of performance assessment.

The activities in the questionnaire data analysis techniques instrument performance assessment needs analysis is done by:
1. The coding or classification of data, aiming to classify answers based on questionnaire questions. In coding these data, code book created a table contains the substances to be measured, the questions that become the substance of the measuring tool and code the answer to each question and answer formula.
2. Tabulation of data based on the classification made, aims to provide an overview of each frequency and propensity questionnaire questions and answers based on the number of respondents (filler questionnaire).
3. Giving a score of respondents.
   Scoring respondents in the test the feasibility of using the device based on the Likert scale as in Table 1.

Table 1. Score Assessment of Options Answers (Sudjana, 2005)

Answer Choice	Answer Choice	Answer Choice	Answer Choice	Score
Very good	Very Appropriate	very easy	very helpful	**4**
Good	Appropriate	easy	helpful	**3**
Not good	Less Appropriate	Less easy	Less helpful	**2**
Not Good	Not Appropriate	not easy	useless	**1**

4. Cultivate total score of respondents

5. Calculate the percentage of answers to a questionnaire on each item by using the following formula:

$$X_{in}\% = \frac{\sum S}{S_{maks}} \times 100\%$$ (Sudjana, 2005)

Specification: $X_{in}\%$ = The percentage of the performance assessment questionnaire on learning physics through a scientific approach.

$\sum S$ = Total score of answers

S_{maks} = The expected maximum score

6. The average percentage of questionnaires to determine the feasibility, suitability, convenience, and expediency performance assessment with the following formula:

$$\overline{X_i\%} = \frac{\sum X_{in}\%}{n}$$ (Sudjana, 2005)

Specification: $\overline{X_i}\%$ = The average percentage of the performance assessment questionnaire on learning physics through a scientific approach.

$\sum X_{in}\%$ = Total percentage of the performance assessment questionnaire on learning physics through a scientific approach.

n = The number of questions

7. Visualizing data to provide information in the form of data findings using non-statistical data analysis is the analysis done by reading tables, graphs or figures are available.

8. Interpreting the overall score of the level of feasibility, suitability, convenience, and expediency performance assessment by using the interpretation Arikunto as in Table 2.

Table 2. Being Assessment Score Interpretation Statement Quality Value (1997: 195)

Score (Percentage)	Criteria
80,1%-100%	Very high
60,1%-80%	High
40,1%-60%	Moderate
20,1%-40%	Low
0,0%-20%	Very low

RESULT AND DISCUSSION

RESULT

Based on the analysis of charging needs through questionnaires by 2 Physics teacher from SMA 12 Bandar Lampung and 30 students aged between 16 years at SMAN 12 Bandar Lampung applied learning in the school look less maximize the assessment of psychomotor aspects of learning physics. In terms of the use of learning, teachers physics refers to a scientific approach. In terms of valuation, there are teachers who are already using authentic assessment tools to assess student learning outcomes, but there are also teachers who do not use authentic assessment tools but still do a written assessment to measure student learning outcomes. The written test can only be used to measure cognitive aspectsand can not measure affective and psychomotor aspects of students.

Based on the results of the analysis of data needs on the observation that has been made in 2 Physics teacher from SMAN 12 Bandar Lampung and 30 students at SMAN 12 Bandar Lampung acquired 100% not using the device performance assessment that refers to a scientific approach in the assessment and 100% experiencing difficulties and want to develop a performance assessment that refers to the scientific approach,. It turns out 100% of students agreed that their physics teachers create and implement performance assessment tools in the classroom.

DISCUSSION

Advantages of using authentic assessment is the assessment of the project is expected to teacher assessment can be more objective in assessing the students, not only cognitive but also includes affective and psychomotor aspects (Susila, 2012). The students can improve thinking skills and mastery of the material in the study of physics. In addition, with a variety of valuation techniques that make students more active in learning, because students felt all the activities and events assessed by the teacher in the classroom. In addition to objectivity in the assessment, teachers can also find the weak points of students in learning so that teachers can make improvements to the material.

Based on observations made to teachers and students about the device performance assessment on learning physics through scientific approach Model Problem Based Learning can be said that it takes a learning software development tools such as performance assessment instrument in learning physics through scientific approach Problem Based Learning Model. Results of the analysis of data needs on the observation that has been made in 2 Physics teacher from SMAN 12 Bandar Lampung and 30 students at SMAN 12 Bandar Lampung obtained analytical results obtained scores on average for 2 teacher is is 0:43 data can be said to be a teacher needs a learning device penggembangan , While the results of the analysis of data needs the observation of the

students obtained a score of 0.68 analysis. of these figures shows that the student wants development assessment tools.

Based on data only 47% of students who said he was happy with the way the assessment carried out by their physics teachers over the years. A sense of displeasure student to teacher evaluations, Physics for this can reduce students' motivation because they considered only can obtain good grades if they excel in the written test when in fact there are some students who excel in their skills. It turns out 100% of students agreed that their physics teachers create and implement performance assessment tools in the classroom. Furthermore in line with development assessment using authentic assessment, the assessment is able to measure the performance, achievement, motivation, and attitudes of students in learning. Expected by using authentic assessment of teachers can know the progress of students' skills in three aspects: cognitive, affective and psychomotor.

Expected by using the performance assessment on learning physics through scientific approach Model Problem Based Learning Achievement of student learning outcomes were measured by three aspects: cognitive, affective, and psychomotor, where each sphere is measured by using an instrument and the corresponding assessment rubrics. Thus determining the final value on the achievement of student learning outcomes not only measured on cognitive aspects based on the value of the written tests as a test block, mid-term exams, final exams, and others yet supported by the teacher's perspective in assessing the affective and psychomotor aspects that determine the final value on the achievement of student learning outcomes are objective. It would be detrimental to students tdak actually has the potential to aspects other than the cognitive aspects.

Advantages of using authentic assessment is the assessment of the project is expected to teacher assessment can be more objective in assessing the students, not only cognitive but also includes affective and psychomotor aspects. The students can improve thinking ability and power in physics. In addition, with a variety of valuation techniques that make students more active in learning, because students felt all the activities and events carried out in the classroom assessed by the teacher in the classroom.

CONCLUSION

Based on observations and the results of various studies suggest that performance appraisal is a component that must be implemented by skolah therefore in need of device performance assessment on learning physics through scientific approach Problem Based Learning Model. Physics lesson is a lesson that not only contains about the course material, but students are required to understand a physics concept that can taught by ddemonstration or practicum. At the time of this learning process performance assessment is done. By using the model of authentic assessment of teachers are expected to use the project assessment can be more objective in assessing the students, not only cognitive but also includes affective and psychomotor aspects.

Given the tremendous benefits and opportunities to develop the device performance assessment on learning physics through scientific approach Problem Based Learning Model sanggat recommended for developing device of performance assessment on physics learning through a scientific approach that collaborated with the model Problem Based Learning and other teaching models.

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