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Practicality of Performance Assessment Instruments in Measurement Topic 10th Grade Secondary School

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Abstract. One of the competencies in Curriculum 2013 is having the skills to apply knowledge in doing scientific inquiry, while the skills are divided into two kinds: concrete and abstract. Achievement of these competencies can be determined by assessment. The information of student's ability given by authentic assessment is believed to be more holistic and valid, one of them is performance assessment. It is conducted to assess how appropriate the students in completing their tasks in the form of action or deed. The aim of this research is to obtain a description of the practicality and percentage of agreement of performance assessment instruments on measurement topic for 10th grade secondary school. This research subject of trial as many as 19 students in 10th science class at SMA Muhammadiyah 2 Surabaya with trial design one group pre-test post-test. Data are collected by using observation and direct questionnaire methods. The results showed that the practicality of the instrument based on the implementation of the assessment and the results of student responses fulfills the practical criteria and agreement between observers on the implementation of product performance assessment and process performance assessment are well categorised.

1. Introduction

The Government has made improvements and development of the Curriculum 2013 from the previous curriculum as an action to deal with internal and external challenges [1,2], so that students have the necessary competencies in the life of society in the present and future. Assessment is requires to receive information about the achievement of these competencies. According to Jones [3], assessment in learning is all information about the progress of students to authorise them in taking the necessary action to improve their performance. Therefore, in Curriculum 2013 there are three main competencies: attitude, knowledge and skill [2]. The skills are divided into two kinds that are concrete and abstract.

Physics as part of natural science is a systematic attempt in organizing knowledge of natural phenomena through observation and the truth is obtained empirically through the five senses. Therefore, measurement is an important aspect in the process of building physics concepts [4]. Competence required in the measurement topic is present the measurement results of physical quantity following the accuracy by using the appropriate tools and techniques and follow the rules of significant figures for a scientific inquiry [5]. In this case, the appropriate skills to assess the achievement of these competencies are concrete skill and abstract skill, so that the proper assessment technique is performance assessment (PA). It is an assessment that can measure cognitive thinking,



reasoning skills and the ability of students in applying knowledge to solve realistic and meaningful problems. In doing these assessments, students should build an answer or do an activity [6].

The result of preliminary study that was conducted by Susila [7] with interview method found that there are constraints faced by teachers in performing performance assessment because of unclear guidelines scoring in the instruments. This condition is supported by interviews on January 9, 2018 to one of the teachers of SMA Muhammadiyah 2 Surabaya which is known that the measurement rarely performed performance assessment so that the form of assessment used is written test.

In answer to the reality of that problems, then carried out development research to produce performance assessment instruments in measurement topic. The feasibility of the developed instrument meets three aspects of validity, practicality and effectiveness. It is also explained by Nieveen and Folmer that four quality criteria to get best solutions for resolving complex issues in education: relevance, known as the content validity; consistency, also called construct validity; practicality, indicating that can be used based on the setting; and effectiveness, turn in product according to desired result [8]. The designed performance assessment have been validated by experts with very valid category. It is further tested to find out the practical level of the instrument. Jan van den Akker, *et al.* stated that practicality is usable, cost effective in normal conditions, and refers to the extent that users consider the intervention as clear [9]. The practicality is related to use performance assessment instruments by users such as teachers, students and other experts that should be seen in the normal class condition [10]. It means the performance assessment that have been designed for measurement topic should be implemented and tested in the classroom. There are two components to determine the quality of practicality, that are performance assessment execute and students' responses. When the performance assessment was implemented, it is also determined the percentage of agreement between observers to know the consistency. Therefore, this research is aimed to describe the practicality of performance assessment instruments that have been designed in measurement topic.

2. Research Methods

The type of research is a development research, designed to produce a concrete skill and abstract skill instrument in the form of performance assessment (PA) on the measurement topic by using ADDIE Model (Analysis, Design, Development, Implementation, Evaluation). Concrete skill will be measured by process performance assessment and abstract skill will be measured by product performance assessment. Then the instrument is validated by experts and tested on 19 students of 10th science grade SMA Muhammadiyah 2 Surabaya in the even semester of academic year 2017/2018 with trial design one group pre-test post-test design. The operational definition of practicality is the implementation that evaluated by two observers and then were given a questionnaire of the students' responses. Observation of the implementation is also determined the percentage of agreement between observers.

Table 1. Score Interpretation of Students' Responses.

Percentage (%)	Categories every Aspects		
	Content Understanding	Task Execute	Legibility
80 – 100	Strongly understand	Very good	Very clear
66 – 79	Understand	Good	Clear
56 – 65	Moderately understand	Fair	Moderately clear
41 – 55	Slightly understand	Poor	Less clear
0 – 40	Not understand	Very poor	Unclear

Data on the implementation of assessment and percentage of agreement between observers were collected by using performance assessment sheet with observation method. While the response data of students were collected by using questionnaires students' responses with direct questionnaire method.

Data analysis technique used descriptive quantitative. The implementation performance assessment divided by two kinds: process and product. Each of kinds consist of two stages, preparation and execution. It is determined in 4 categories: very poor, poor, good and very good. For the category of students' responses divided by three aspects: content understanding, task execution and legibility. Each aspects are determined by percentage which is categorised into five level (Table 1) and then decided by mode of the criteria achieved in each aspect.

3. Results and Discussion

Practicality of the instrument is determined by the implementation of assessment and positive response of students. The implementation of process performance assessment has been done 100% with good quality. Based on Table A1 (in appendix), the preparation stage outlined in seven aspects of observation has been done 100% well. Similarly, at the implementation stage is obtained good criteria. This means that both stages in the implementation of the process performance assessment well passed.

On the results of the implementation of the product performance gets the good quality with 100% implementation. Different with the process performance assessment, for the implementation of the product performance assessment in Table A2 (in appendix) have five aspects that is observed in the preparation stage. Four aspects of getting good criteria and another aspect are very good criteria. This aspect is to explain the tasks that the students will do clearly. Thus, in the preparation stage of product performance implementation can be done well. For the implementation stage, the five observed aspects can be accomplished with good criteria. Therefore the overall product assessment can be done well (Table 2).

Process and product performance assessment can be done well because PA instruments can facilitate the teacher in doing the assessment. This is because the instrument has included a performance assessment component in accordance with Marhaeni's explanation: (1) performance task, which contains topic, standard, description, and condition of task completion; (2) performance rubric, which contains the components of an ideal performance and description of each component; and (3) the way of scoring (scoring guide) [11]. A similar study by Sujarwanto and Rusilowati [12] found that PA instruments that have been developed have ease in the implementation.

Table 2. Observation Result of Performance Assessment Implementation.

Performance Assessment (PA)	Categories every Stage	
	Preparation	Implementation
Process PA	Good	Good
Product PA	Good	Good

The observation result of the implementation of the assessment by two observers is also determined the percentage of agreement. Criteria for acceptance of percentage of agreement (PoA) is if obtained $\geq 75\%$ [13]. Implementation of the assessment is done twice: product performance assessment and process performance assessment, presented in Table A1 and Table A2 in the appendix. Each assessment is done in two stages: preparation and implementation. In the preparation stage, the process performance assessment has a PoA of 96% and the implementation stage of process performance assessment has a PoA of 90%. Observer's agreement in observing the implementation of the process performance assessment in the preparation stage is very good and the implementation stage is categorised well. For the implementation of product performance assessment at the preparation stage has a PoA of 89% and the implementation stage has a PoA of 89%. Observer's agreement in observing the performance of product performance assessment at the preparation stage is good category and so do implementation stage.

Ease in implementing the PA is supported by the results of the questionnaire response of student, which is divided into three categories: content understanding, task execution and legibility, presented in Table 3. Based on Table 3 it is known that in terms of content understanding, all statements meet

the criteria are strongly understand. Although there are still two students who do not clearly grasp the delivery of assessment procedures. While on the third aspect of the teacher explains the tasks that will be done clearly with the students, for the PA process has been done very well and for the PA product performed well. This means that the two students may be caused by not paying attention to the teacher when delivering the assessment procedure.

Table 3. Questionnaire Result of Students' Responses Categories.

No.	Statements	Percentage (%)	Categories
Content Understanding			
1.	I am not confused in performing a performance task because the instructions on the assessment sheets are written in a coherent manner	100	Strongly understand
2.	I understand the performance tasks because the instructions that be given on the assignment sheets are clear	100	Strongly understand
3.	I understand the assessment procedure because it is clearly communicated	89	Strongly understand
Mode of Content Understanding			Strongly understand
Task Execution			
4.	The performance assessment sheet helps to show my performance during the lesson	100	Very good
5.	I can perform optimally because of the description of the assessment criteria	74	Good
6.	Assessment of process performance can motivate me because I can show my competence to the maximum	89	Very good
7.	I can apply what I've learned through the performance assessment sheets	100	Very good
8.	I get the necessary tools easily	100	Very good
Mode of Task Execution			Very good
Legibility			
9.	I easily understand the sentences that be used in the assessment instruments	100	Very clear
10.	I am not familiar with the terms used in the assessment because according to the concept that has been submitted	89	Very clear
11.	The assessment instruments use standard Indonesian	100	Very clear
12.	The language used on the instrument is clear and fulfill EYD	100	Very clear
Mode of Legibility			Very clear

In the aspect of execute task, there are five respondents who can't perform optimally despite the description of assessment criteria. Although it is still in a good category, this section is the one that gets the most negative responses and has the lowest percentage among all statements on the questionnaire sheets. This means that assessment criteria do not help student to perform optimally. The reason could be because student do not understand the description of the assessment criteria and do not have the courage to ask. Another thing can also be caused by the students' low performance ability. It due to several things that are not have the curiosity and the lack of motivation to learn and to show

competence. Supported by two students who give negative respond to the statement "The performance appraisal of the process can motivate me because I can demonstrate my competencies to the maximum". This indicate that students need motivation and cultivate their curiosity before learning about measurement topic. It also can provide benefits so that students can pay attention to the teacher when explaining the assessment procedure. Therefore, no student give a negative response on the content understanding aspect. But overall aspects of the execute task get very good response by students.

In the response of legibility aspect is very clear, although there are still two students who feel odd to the term used. Implementation of the assessment on the aspect of providing the same understanding to the learners has been done well so that the terms used in the PA instrument have been presented to the students. Of all respondents, there is one that provides comments about the assessment process that has been done, i.e. the tool used is not feasible. Although the tools have been checked for its feasibility and ensured to be calibrated before doing assessment, it needs more time to prepare performance assessment before implementing.

From the above statement, it can be said that the developed instrument is practice because the performance assessment is done well and students' responses are strongly understand with the content of PA instruments, can perform tasks very good and the legibility of PA instruments is very clear. The PA that has been developed by Susilaningsih *et al* also generally has a practical qualification [14]. With the description outlined about the practicality of performance assessment, it means that the PA can be used to support the assessment in learning. Arends mentions that performance assessment is one form of assessment with the purpose as an assessment of learning [15]. Therefore, PA has an advantage to measure the students' skill that needed to face the 21st century.

4. Conclusions

Based on the research that has been done, obtained the following conclusions: (1) The practicality of the performance assessment instrument on measurement topic 10th grade secondary school fullfil the practical criteria. Performance assessment is done well and getting students' responses that are strongly understand with the content of the assessment instrument, can perform the task very well and the legibility of the students to the instrument is very clear and (2) agreement between observers on the implementation of product performance assessment and process performance assessment are categorised well.

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Appendix

Table A1. Observation Result of Performance Assessment (Process) Implementation.

No.	Observation Aspects	O1		O2		PoA (%)	Mode	Categories
		Execution	Score	Execution	Score			
A. Preparation Stage								
1.	Teacher conveys information to the students about the purpose of the assessment	Yes	4	Yes	4	100	4	Very good
2.	Teacher convey information to the students about ethics in doing assessment	Yes	3	Yes	3	100	3	Good
3.	The teacher explains the task that the students will do clearly	Yes	4	Yes	3	86	3	Good
4.	The teacher presents a checklist to the students before doing assessment	Yes	3	Yes	4	86	3	Good
5.	Teachers provide students with the same understanding of the assessment aspects and criteria	Yes	3	Yes	3	100	3	Good
6.	Teacher gives an example of length measurements by using vernier caliper	Yes	4	Yes	4	100	4	Very good
7.	Teacher gives an example of mass measurements by using triple beam balance	Yes	4	Yes	4	100	4	Very good
Mode of Preparation Stage								Good
PoA Average of Preparation Stage						96		
B. Implementation Stage								
8.	Teacher distributes the assessment sheet to the students	Yes	4	Yes	3	86	3	Good
9.	Students do the assessment sheets that be provided	Yes	3	Yes	4	86	3	Good
10.	Students do the assessment enthusiastically	Yes	4	Yes	4	100	4	Very good
11.	Teacher monitor the students in doing performance tasks	Yes	4	Yes	4	100	4	Very good
12.	Students submit the results of their work	Yes	3	Yes	4	86	3	Good
13.	The room were conducive	Yes	4	Yes	3	86	3	Good
14.	The time provided is sufficient to complete the assessment	Yes	3	Yes	4	86	3	Good
Mode of Implemetation Stage								Good
PoA Average of Implementation Stage						90		
Conclusion: Assessment of process performance can be done 100 % with good quality								

Table A2. Observation Result of Performance Assessment (Product) Implementation.

No.	Observation Aspects	O1		O2		PoA (%)	Mode	Categories
		Execution	Score	Execution	Score			
A. Preparation Stage								
1.	Teacher conveys information to the students about the purpose of the assessment	Yes	3	Yes	4	86	3	Good
2.	Teacher convey information to the students about ethics in doing assessment	Yes	3	Yes	4	86	3	Good
3.	The teacher explains the task that the students will do clearly	Yes	4	Yes	4	100	4	Very good
4.	The teacher presents a rubrics to the students before doing assessment	Yes	3	Yes	4	86	3	Good
5.	Teachers provide students with the same understanding of the assessment aspects and criteria	Yes	3	Yes	4	86	3	Good
Mode of Preparation Stage								Good
PoA Average of Preparation Stage						89		
B. Implementation Stage								
6.	Teacher distributes the assessment sheet to the students	Yes	3	Yes	4	86	3	Good
7.	Students do the assessment sheets that be provided	Yes	3	Yes	3	100	3	Good
8.	Students submit the results of their work	Yes	3	Yes	4	86	3	Good
9.	The room were conducive	Yes	4	Yes	3	86	3	Good
10.	The time provided is sufficient to complete the assessment	Yes	3	Yes	4	86	3	Good
Mode of Implemetation Stage								Good
PoA Average of Implementation Stage						89		
Conclusion: Assessment of product performance can be done 100 % with good quality								