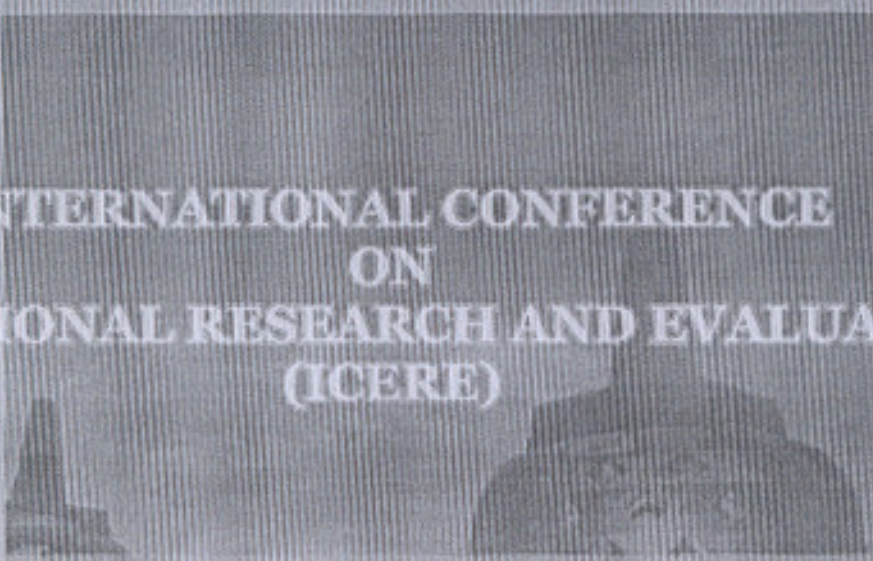
ISSN: 2407-1501

PROCEEDING

INTERNATIONAL CONFERENCE ON EDUCATIONAL RESEARCH AND EVALUATION (ICERE)



"Assessment for Improving Students' Performance"

May 29 – 31 2016

Universitas Negeri Jakarta

Developing an Authentic Assessment Science Process Skills, Creative Thinking Skills and Manipulative Skills

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Abstract - This research is aimed to know the procedure of instrument development of authentic assessment and to know the worthiness of authentic assessment instrument of development result is seen from the content validity by the validator. This research is a development research by model of non-test instrument. Development model of non-test instrument used has steps as follows: (1) determining of the instrument specification, (2) writing the instrument, (3) determining the instrument scale, (4) determining the scoring system, and (5) beating out the instrument. The writer used quantitative and qualitative technique to analyze the data obtained. The qualitative approach was used to analyze the input from experts and teachers, and the quantitative approach was used to analyze the results of experts' validation using Aiken's validity. Conclusion of this study are as follows: (1) The procedure of the development of authentic assessment follows the stages of research and development. The stages include pre-survey research, problem analysis, analysis of curriculum, research studies, experts' consultation, and drafting an instrument. The stages of development include experts' validation. (2) The quality of the develop products the developed authentic assessment has a valid criterion as an instrument, in terms of aspects of the construct, substance, and language. All these aspects meet a very good criterion and can be used with revisions.

Keywords: *authentic assessment, science process skills, creative thinking skills, manipulative skills*

I. INTRODUCTION

Natural Sciences is the mastery of facts, concepts, principles, and a process of discovery. The process of discovery in learning the natural sciences in accordance with the Nature of Science (NOS) means that science is a way of knowing. Lederman, et al. (1992: 231), stating that "that science is a way of knowing and there are values and beliefs inherent to the development of scientific knowledge". Based on these statements, NOS is defined as the concept of complex natural sciences involves philosophy, sociology, and historical knowledge.

Natural Sciences are the mastery of facts, concepts, principles, and a process of discovery. Learning the natural sciences is based on the contents of the standard form students who have a body of knowledge; standard process will shape the students with scientific skills, thinking skills and strategy of thinking; the standard scientific inquiry will form students capable of critical and creative thinking; as well as a standard assessment evaluates students humanely.

The learning process is directed at the development of the third realm of knowledge, attitudes, and skills should be implemented as a whole or holistically, meaning the development of one domain cannot be separated from other domains. The question that still occurs in the process of learning one's current assessment of the natural sciences still dominated the test form, which can only measure the realm of knowledge. The fact that learning the natural sciences is not always judged by using an assessment form test to measure student learning objectives. Assessment can be done by collecting information about students to give more accurate information about the skills and attitudes of students. The assessment directive can also be done to measure the learning process of students (Phopam 2008:6). That kind of assessment called the authentic assessment.

Authentic assessment is an assessment of immediate or direct size so that the assessment will be more obvious when votes directly to do with the granting of a task or project (Mueller 2006:1). Authentic assessment can be used to measure performance, achievement, motivation, and attitude of students in relevant activities in learning. The results of the study are eligible to be used as a basis in determining the kind of authentic assessment is (Stiggins, 1994:67): students ' ability against (1) the substance of knowledge; (2) knowledge in doing the reasoning and solving problems; (3) skills in the mastery of knowledge; (4) the making of a product; and (5) achievement attitude in applying knowledge. The basic types of assessment methods offered by Stiggins (1994:53) include: (a) selected response assessment; (b) assessment essay; (c) performance assessment; and (d) personal communication assessment.

Portfolio, containers of evidence are becoming valuable tools for teacher and student assessment for reflection and metacognition, and for building collegial relationships (Collins, 1992: 451). Science process skills are all necessary to acquire, develop, and apply the concepts, laws, and theories of natural science, both in the form of mental skills, physical skills as well as social skills. The project assessment is an activity of the task of judging students from the stages of planning, implementation, and reporting that can develop creative thinking skills. According to Wang (2011: 1) defines creative thinking as the ability to sense problems, make guesses, generate new ideas, and communication results. Perfomance assessment requires students demonstrated their skills when performing the experiments so that can develop the manipulative skills. Manipulative skills i.e. the skill of preparing teaching materials and tools, take precautions and treatment (Das, 2007).

The material has different characteristics of natural sciences so not all matter natural sciences can be taught with the same method. Thus, the assessment instrument used of course will also be different, because if the instruments used are the same for all natural sciences material then there will be some aspects which cannot be measured. The selection of basic competence (KD) should be conducted to determine the appropriate type of assessment. In the development of this research material of the selected class VII natural sciences KD 2.3 can be used kind of an assessment portfolio. The assessment of the project can be used on a KD 3.8 with learning that directs students to develop creative thinking skills through assessment project. In addition, KD 3.6 performance assessment can be used to measure manipulative skills students in doing the experiment.

Referring to the problems outlined, then researchers trying to develop authentic assessment instrument can measure a few skills students i.e. science process skills, creative thinking skills and manipulative skills on some of the KD in the natural sciences learning in junior high school.

II. RESEARCH METHOD

A. Type of Research

This research included in the classification of research development. The products developed in this research in the form of instrument performance assessment, portfolio and project. Research development uses a five-step development instrument non test. Procedure of development following the stages of the development of non instrument test. Stages of the development of authentic assessments include (1) determining of the instrument specification, conduct an analysis of the specification of the instrument being developed include the analysis of students, needs analysis, analysis of curriculum, selecting the shape and format of the instrument, determine the indicators, making the latticework of instruments: (2) writing the instrument, writing of authentic assessment was developed based on the lattice that have been created and then draw up the details of the statement; (3) determining the instrument scale, the scale of the instrument that was used in the development of this authentic assessment instrument in the form of scales with a scale of 1 to 4; (4) determining the scoring system, a system of scoring in this authentic assessment instrument refers to the scale of use that is the scale of 1 to 4 to the emergence of student activities provided by the observer; and (5) beating out the instrument, perform the validation material, expert assessment and teacher.

B. Population and Sample

Population development of this authentic assessment is grade VII of the entire SMP/MTs in DIY. As for the samples used to involve grade VII of 3 SMP/MTs that is in DIY i.e., SMPN 2 Playen, SMPN 1 Piyungan and SMPN 2 Girisubo

C. Research Instrument

Data collection instruments used in this study consist of guidelines for interviewing sheet, observation sheet, and sheet now.

D. Data Analysis Techniques

Analysis of the validation of the content of the descriptive and quantitative basis. Quantitative analysis using V'aiken analysis (Azwar,2014: 113) by the following formula:

$$V = \frac{\Sigma s}{n\ c-1}$$

Description:
s = r – lo
n = number of panels of assessors
lo = lowest validity assessment
c = highest validity assessment
r = the numbers given by an assessor

III. RESULT AND DISCUSSION

A. Procedure the development of Authentic Assessments

The products developed are authentic assessment instrument which covers the instrument performance, portfolio, and projects. The instrument used to measure the performance of science process skills learners in the material system for excretion. The portfolio of instruments used to measure critical thinking skills learners on the material pressure of the liquid. Project assessment instrument used to measure problem solving skills learners on optical materials on the human eye. The assessment instrument developed is in the form of sheets of observations accompanied by grating and rubric assessments. Authentic assessment instruments development procedure is as follows.

1. Preliminary Studies

Some of the things done on the preliminary study include: analysis of the problem, an analysis of the curriculum, and the analysis of the learners. Problem analysis was done based on interviews with a number of teachers of science in SMP N 2 Playen, SMP N 2 Girisubo, and SMP N 1 Piyungan. The issues that emerged from the interviews that is not yet the availability of valid assessment instruments to measure skills learners, so it is important to develop these instruments. Curriculum analysis conducted to determine the competence of the basic curriculum of 2013 which corresponds to the selected material. Learner analysis aims to find out the characteristics of the students i.e. students of class VII junior high school.

Table 1. Curriculum Analysis Result

Types of Skills	Core Competence	Basic Competencies
Science Process Skills	3. Memahami pengetahuan (faktual, konseptual, dan prosedural) berdasarkan rasa ingin tahunya tentang ilmu pengetahuan, teknologi, seni, budaya terkait fenomena dan kejadian tampak mata. 4. Mengolah, menyaji dan menalar dalam ranah konkret (menggunakan, mengurai, merangkai, memodifikasi dan membuat) dan ranah abstrak (menulis, membaca, mengarang) sesusi dengan yang dipelajari di sekolah dan sumber lain yang sama dalam sudut pandang/teori.	3.9 Memahami konsep suhu, pemuaian, kalor, perpindahan kalor, dan penerapannya dalam mekanisme menjaga kestabilan suhu tubuh pada manusia dan hewan dalam kehidupan sehari-hari. 4.10. Melakukan percobaan untuk menyelidiki pengaruh kalor terhadap perubahan suhu dan perubahan wujud zat. 4.11 Melakukan penyelidikan terhadap karakteristik perambatan kalor secara konduksi, konveksi, dan radiasi.
Creative Thingking Skills	3. Memahami pengetahuan (faktual, konseptual, dan prosedural) berdasarkan rasa ingin tahunya tentang ilmu pengetahuan, teknologi, seni, budaya terkait fenomena dan kejadian tampak mata. 4. Mengolah, menyaji, dan menalar dalam	3.8 Mendeskripsikan interaksi antar makhlukhidup dan lingkungannya. 4.12 Menyajikan hasil observasi terhadap interaksi mahluk hidup dengan lingkungan sekitarnya

Types of Skills	Core Competence	Basic Competencies
	ranah konkret (menggunakan, mengurai, merangkai, memodifikasi, dan membuat) dan ranah abstrak (menulis, membaca, menghitung, menggambar, dan mengarang) sesuai dengan yang dipelajari di sekolah dan sumber lain yang sama dalam sudut pandang/teori	
Manipulatives Skills	3. Memahami pengetahuan (faktual, konseptual dan prosedural) berdasarkan rasa ingin tahunya tentang ilmu pengetahuan, teknologi, seni, budaya terkait fenomena dan kejadian tampak mata 4. Mencoba, mengolah,dan menyaji dalam ranah konkret (menggunakan, mengurai, merangkai, memodifikasi,dan membuat) dan ranah abstrak (menulis, membaca, menghitung, menggambar, dan mengarang) sesuai dengan yang dipelajari disekolah dan sumber lain yang sama dalam sudut pandang/teori.	3.6 Mengenal konsep energi, berbagai sumber energi, energi dari makanan, transformasi energi, respirasi, sistem pencernaan makanan, dan fotosintesis 4.8 Melakukan pengamatan atau percobaan sederhana untuk menyelidiki proses fotosintesis pada tumbuhan hijau. 4.9 Melakukan percobaan untuk menyelidiki respirasi pada hewan.

2. *Determine the instrument's specifications*

Science process skills indicators used in the assessment instrument are the prediction, measurement, experimentation, concluding, and communication. Indicators of creative thinking skills used in the instrument are analyzing, losing an idea, synthesing, evaluating, creating, and visualizing. Indicators of manipulative skills used in the instrument teaching tool is to use correctly, clean the tool properly and store teaching tool teaching correctly.

3. *Writing instruments*

Writing instruments are carried out taking into account the aspect of material, construction, and language. The assessment instruments developed contain: title, usage instructions, scoring guidelines, e.g. scoring, and the observation sheet.

4. *Determine the scale of the instrument and scoring system*

The instrument was developed using a scale of 1-4. Scoring is determined in accordance with the scale used. The highest score of each indicator is 4 and the lowest is 1.

5. *Reviewing instruments*

Authentic assessment instruments developed were investigated by seven rater i.e. two expert lecturers and of five practitioners (teachers).

B. Results of Authentic Assessment Validation

Validation of product based on the assessment of the substance, construction, and language. Subsequent validation results are analyzed with the Vaiken approach that aims to quantify the magnitude of the content validity coefficient (V). The magnitude of the numbers V obtained confirmed with numbers based on table Vaiken. The minimum figure should be reached based on table V Aiken (1985: 134) category 4 range and number of panel 7 are 0,86. The magnitude of V is obtained on the validation of the portfolio assessment sheet to measure process skills in science is about 0.86-1. The magnitude of V is obtained on the project assessment sheet validation to measure creative thinking skills are about 0,90-1. The magnitude of V is obtained in the performance assessment sheet to measure manipulative skills is of 0,89-1.

Based on the results of the analysis of the magnitude of the content validity of the assessment instrument's third showed that magnitude V instruments already exceed the minimum coefficient of Vaiken. Thus, the assessment instruments developed meets the validity of the content. In addition to knowing the validity of the instrument developed, validation is aiming to obtain advice which can be used as material for the repair of the instrument before conducted trials at the school.

C. Revision of the product

Assessment instruments are revised based on some suggestions by experts and practitioners. During limited trials and operational field test or measurement is in not discovering things that demanded he do revision, so that the revision could be made only when the process of examination of the instrument. In more detail, some revisions to the product can be outlined as follows.

1. Revisions to the usage instructions of the instrument so that more communicative and clear.
2. Revision of the observation sheet so that each observation sheets are given examples of scoring.
3. Revision of the rubrics so that homogeneous and focus on the systematic sequence.
4. Details of revision of the statement: so that the statements communicated and homogeneous with other grains in one indicator.
5. Details of revision of the statement on the indicators devised the hypothesis so that made that clear parameters for measuring the skills of learners and presented grain statement about the interconnectedness between variables.
6. The revised grain statement on indicators composing the purpose of probation order made clear parameters for measuring the skills of learners and presented a statement stating the presence of grains of the verb.
7. Revision details of a statement on the observation sheet so that the language clarified.
8. Revised assertions so that the grains statement made clear parameters for measuring the skills of learners.
9. Revised assertions so that the grains statement clarified.
10. Revision of the format of the observation sheet so that there are six columns on a sheet for granting score the learners are assessed.
11. Clarify how to use observational science process skills sheet that is by adding the phrase "give a sign check (√) in the number of students in student performance met observation of grain" on a

IV. CONCLUSION AND SUGGESTION

Conclusion of this study are as follows: (1) The procedure of the authentic assessment development follows the stages of research and development. The stages include pre-survey research, problem analysis, analysis of curriculum, research studies, experts' consultation, and drafting an instrument. The stages of development include experts' validation. (2) The quality of the developed products the developed authentic assessment has a valid criterion as an instrument, in terms of aspects of the construct, substance, and language. All these aspects meet a very good criterion and can be used with revisions.

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