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THE USE OF PORTFOLIO INSTRUMENTS TO ASSESS SCIENCE PROCESS SKILLS OF STUDENTS IN JUNIOR HIGH SCHOOL

Tri Khairunnisa[1i],
Supramono[2],
Arif Sholahuddin[3]
[1]Master Program of Natural Science Teacher,
Lambung Mangkurat University,
Banjarmasin, Indonesia
[2]Department of Biology Education,
Faculty of Teacher Training and Education,
Palangkaraya University, Indonesia
[3]Department of Natural Science Education,
Faculty of Teacher Training and Education,
Lambung Mangkurat University,
Banjarmasin, Indonesia

Abstract:
Permendikbud Number 104 of 2014 emphasizes that the National Curriculum use authentic judgments which prioritize not only the assessment at the end of learning but also the assessment of processes during learning. The 2013 curriculum encourages the use of portfolios made by students as the main instrument of assessment. Teachers in general are familiar with portfolio assessment, but there are difficulties in applying and adjusting it to the demands of the 2013 curriculum. Science process skills that are in line with the scientific approach in the 2013 curriculum have not been the focus of many goals in learning activities. This study attempts to use portfolio assessment to assess students' science process skills which are declared valid, practical, and effective in the concept of classification of living things. The design used to develop the device is the Tessmer design with the research sample being VII grade students at Al Mazaya Islamic Middle School in Banjarmasin. The sample used in the one-to-one evaluation phase consists of five respondents from teachers and students. The stage of the small group evaluation consists of one teacher and six students, and the stage of the field test was conducted in two classes, each of which had twenty-five students. The portfolio assessment focuses on the topic of classification of living things. The results of the study indicate the achievement of learning activities based on the activities of teachers and students and the effectiveness of achieving learning objectives. The results of the study show that portfolio assessment of the concept of classification of living things can assess

[i] Correspondence: email khairunnisatri@yahoo.co.id

and train students' science process skills, even though the overall value has not received maximum results.

Keywords: assessment, portfolio, science process skills

1. Introduction

In Permendikbud Number 104 of 2014, it is emphasized that the Indonesian education curriculum requires the use of authentic assessment. Paradigmatically authentic assessment requires the realization of authentic learning (authentic instruction) and authentic learning (authentic learning). It is believed that authentic assessment is able to provide better information on learners' abilities in a holistic and valid manner.

Kunandar (2013) states that one of the elements of change in the assessment of the 2013 curriculum is to encourage the use of portfolios made by students as the main instrument of assessment. Teachers in general are familiar with portfolio assessment, but there are some difficulties in applying and adjusting it to the demands of the 2013 curriculum.

Findings by Fitriani's (2015) show that portfolio assessments have not been carried out in schools. The results of the questionnaire analysis on the application of portfolio assessments can be seen in the percentage of 75% of teachers who have never applied portfolio assessments. This is in line with the results of interviews with one science teacher in Banjarmasin who said he had never applied portfolio assessment in learning. Assessment is only given at the end of each chapter or the end of subject matter. That is because teachers still do not understand authentic assessment.

Science learning in its implementation is inseparable from science process skills, but what happens now is the science process skills of students are still low (Saida, 2012). Teachers who are members of the Banjarmasin MGMP forum also stated that most students showed low science process skills because they were not trained in observing, collecting data, analyzing, making conclusions and communicating the results of investigations (Astina, 2017).

1.1 Portfolio

Keeler (1997) states that portfolio is a purposeful collection of student work that exhibits the student’s efforts, progress and achievements over time. Portfolio assessment is a procedure for collecting information about the development and ability of students through their portfolios, where information is collected formally using certain criteria for the purpose of making decisions on the status of students (Marhaeni, 2004).

Williams, et al. (2005) state that portfolio based assessments method also allows the student to demonstrate specific skills within the context in which they were taught rather than within the context determined by the test constructors. Whereas G. Lucas, in a paper that raised the topic of portfolio assessment, states that portfolios are collections of students’ works over time. They often document students’ best works and may include other types of process information such as drafts of the students' work, the students' self-assessment of the work, and the parents' assessment.

Portfolio assessment is a continuous assessment based on a collection of information that shows the development of students' abilities in a given period. Portfolio assessment can show the progress of student learning progress through his work (Kunandar, 2013).

Damiani (2004) states that a portfolio is a collection of student work with a common theme or purpose. Portfolio assessment is most appropriate when learning can be best demonstrated through a product. Birgin and Baki (2007) in their journals concluded that portfolio is not arbitrary collections or observation or student's works to be filled haphazardly. It is important that the portfolio collections should be purposeful, systematic, the determined evaluation criteria, and take a period of time.

Moya and Malley (1994) stated that a portfolio is a collection of a student's work, experiences, exhibitions, self-ratings, whereas portfolio assessment is the procedure used to plan, collect, and analyze the multiple sources of data maintained in the portfolio. A portfolio that is based on a systematic assessment procedure can provide accurate information about the depth and breadth of a student's capabilities in many domains of learning.

Five features typify model portfolios that can be used as a systematic assessment tool in instructional planning and student evaluation.

a. Comprehensiveness. The potential for determining the depth and breadth of a student's capabilities can be realized through comprehensive data collection and analysis.
b. Informative. The information in the portfolio must be meaningful to teachers, students, staff, and parents. It also must be usable for instruction and curriculum adaptation to student needs.
c. Predetermined and Systematic. A sound portfolio procedure is planned prior to implementation. The purpose of using a portfolio, the contents of the portfolio, data collection schedule, and student performance criteria are delineated as part of portfolio planning. Each entry in the portfolio has a purpose, and the purpose is clearly understood by all portfolio stakeholders.
d. Tailored. An exemplary portfolio procedure is tailored to the purpose for which it will be used, to classroom goals and objectives and to individual student assessment needs. Assessment instruments and procedures are adapted to match information needs, to reflect student characteristics, and to coincide with student linguistic and developmental capabilities.
e. Authentic. A good portfolio procedure provides student information based on assessment tasks that reflect authentic activities used during classroom instruction.

The proposed Portfolio Assessment includes six interrelated levels of assessment activities (Moyaa and Malley, 1994):

a. Identify the purpose and focus of the portfolio procedure (establish a portfolio committee and a focus for the portfolio);

b. Plan portfolio contents (select assessment procedures, specify portfolio contents, and determine the frequency of assessment);
c. Design portfolio analysis (set standards and criteria for interpretation of portfolio contents, determine the procedure for integrating portfolio information and schedule staff responsibilities for portfolio analysis);
d. Prepare for instructional use (plan instructional use and feedback to students and parents);
e. Identify procedures to verify the accuracy of the information (i.e., establish a system to check the reliability of portfolio information and to validate instructional decisions); and
f. Implement the model. (Moyaa and Malley, 1994)

1.2 Science Process Skills

The domain of skills is the domain that relates to skills (skills) or the ability to act after a person receives a particular learning experience (Kunandar, 2013). Skills competency is an implication of achieving knowledge competencies from students. These skills indicate a person's level of expertise in a task or a set of specific tasks.

Science process skills are an extension of the scientific method that includes the skills to express opinions, make observations (observations), classify (classification), make inferences, predict, interpret information/ plan experiments, conclude, and communicate.

Skill competency assessment is an assessment carried out by the teacher to measure the level of achievement of skills competencies of students which includes aspects of imitation, manipulation, precision, articulation, and naturalization (Kunandar, 2013).

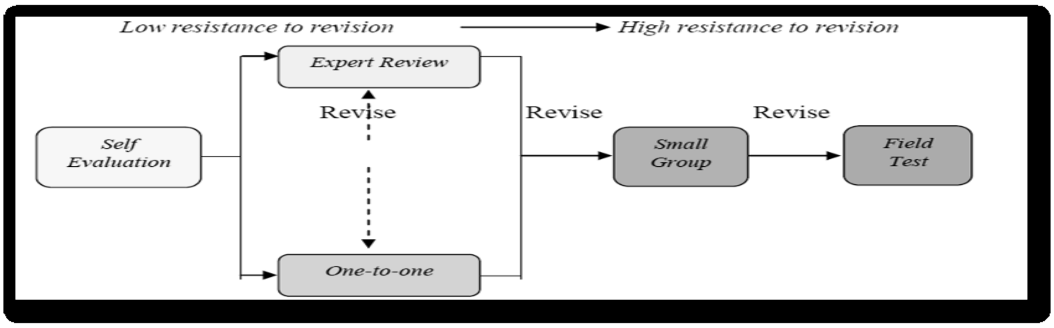
Nur in Saputra (2012) writes that science process skills are processes carried out by students through a scientific method to obtain solutions or answers to a problem. The science process skills include the skills to carry out scientific methods, namely: the skills of observing, formulating problems, formulating hypotheses, designing experiments, conducting experiments, analyzing experimental results, making conclusions and skills in delivering experimental results verbally or in writing (Af'idayani et al. 2018).

Science process skills need to be developed through direct experience involving the use of various materials and physical actions (Ekene and Ifeoma, 2011). The development of science process skills according to Abungu, Okere, and Wachanga (2014) is used to help students gain an understanding of material that is more long term memory so that it is expected to be able to solve all forms of daily life problems, especially in facing global competition. Jack (2013) added that the development of intellectual attitudes and skills needed to improve understanding of concepts can be done by developing science process skills as a basis for inquiry activities.

This background shows the importance of a scoring system that not only measures the ability of students as a whole in cognitive, affective, and psychomotor skills but also trains science process skills in learning. In addition, an instrument is also needed to facilitate teachers in applying judgments that are in accordance with the demands of the Indonesian education curriculum. Therefore, the development of portfolios that can provide convenience to teachers in assessing science process skills is needed. This becomes necessary, so that the quality of learning, especially in terms of assessing the development of students, can be better.

2. Methods

The method used in this study is the Tessmer (1993) learning design model which consists of 5 steps, namely: 1) Self-evaluation by analyzing important characteristics related to learning; 2) Expert review consisting of three experts; 3) One to one evaluation to evaluate the devices to be developed; 4) Small groups to find out the practicality or responsiveness of learning devices developed; and 5) Field tests to observe the trial process in real situations with groups of students.



Picture 1: Stages of Tessmer Learning Design (1993)

The subjects in One to One stage consisted of 5 respondents and the small group stage consisted of small groups of 6 students who had different levels of knowledge. While the field tests stage consists of 2 classes, students in class VIII.3 and VII.2, each of which consists of 25 people.

3. Result and Discussion

The results of each stage are described as follows.

2.1 Self Evaluation
At this stage, an analysis of the initial character of students and teachers is carried out as well as an analysis of the learning material and applicable curriculum. The results of this first stage form the basis for the next step.

2.2 Expert Review
At this stage, the portfolio created will be assessed in terms of its validity, so that the results of this expert review will produce a portfolio of devices that are valid and can be used at school.

2.3 One to one evaluation

At this stage, the portfolio that has passed through the validator will go through a readability test by examining the language and the content. The respondents for this stage consist of teachers and students. Therefore, a good and appropriate portfolio is obtained.

2.4 Small group

At this stage, the portfolio that has passed the validation stage and readability test will be used directly but with a small scope. The result showed that portfolio use was able to train students' science process skills, especially on the fourth indicator: making observations.

2.5 Field test

At this stage, the portfolio was tested in 2 classes consisting of 25 students in each class. The use of portfolio with 4 different LKPD showed good results, meaning that the portfolio could train students' science process skills even though the overall results have not been maximized. Science process skills of students can be seen from the answers in the LKPD with indicators such as formulating problems, making hypotheses, designing experiments, making observations, analyzing observations and making conclusions made during the learning process. The table of development of science process skills obtained from the LKPD on each indicator is presented in Table 1.

Table 1: Recapitulation of Average Value of Development of Science Process Skills

No	Hal	Average of Indicators											
		Class VII.3						Class VII.2					
		1	2	3	4	5	6	1	2	3	4	5	6
1	LKPD 1	2.28	2.36	2.20	2.20	2.20	2.16	2.24	1.68	2.00	1.56	2.00	1.64
2	LKPD 2	1.76	1.80	2.20	2.52	2.36	2.20	2.24	1.68	2.00	1.56	2.00	1.64
3	LKPD 3	3.04	2.64	2.68	2.72	2.72	2.92	2.68	2.60	2.72	2.72	3.24	3.08
4	LKPD 4	3.44	3.44	3.48	3.40	3.56	3.48	2.96	3.16	2.88	2.96	3.32	3.24
Rata-rata		**2.63**	**2.56**	**2.64**	**2.71**	**2.71**	**2.69**	**2.53**	**2.28**	**2.40**	**2.20**	**2.64**	**2.40**

Information:
Indicator 1: Making a problem statement
Indicator 2: Making a hypothesis or temporary answer
Indicator 3: Designing an experiment
Indicator 4: Making observations
Indicator 5: Analyzing observations
Indicator 6: Making conclusions

Based on the recapitulation, the results show that in class VII.3 the lowest indicator value is found in the second indicator, namely making a hypothesis or temporary answer. The highest score are in indicators 4 and 5 which are making observations and analyzing the results of observations. In class VII.2, the highest indicator value classically is in the fifth indicator, namely analyzing the results of observations. The lowest indicator value is found in the second indicator, namely making a hypothesis or temporary answer.

This situation happened possibly because students worked together in groups when learning. Hence, when students were asked to analyze and write the results of their observations, they can discuss and exchange opinions so that they can provide the best answers. Meanwhile the lowest values in class VII.3 and VII.2 are found in the indicators of making hypotheses or temporary answers. This could occur because students were not accustomed to making predictions from an investigation. Therefore, they were not trained to provide suspicions or temporary answers from their investigations.

The use of portfolios as an option in assessment instruments is appropriate especially in terms of assessing science process skills. Portfolios can be a means for teachers to assess the development of science process skills possessed by students. The weakness found in this study is the limited time and place of the teacher in using portfolio assessment. The portfolio requested from students requires a longer time to correct and the teacher must give feedback to the students one by one so that the learning objectives can be achieved.

3. Conclusion

The use of portfolio is able to train students' science process skills. LKPD that recurs every meeting with a question pattern leading to a scientific approach trains students to look for and find the knowledge by themselves. This is what ultimately can train students' science process skills, because they are directed to do scientific stages in finding a fact or concept of a material.

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