

The Development of an Authentic Assessment with Project Based Learning to Improve Creative Thinking Skills

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Abstract—This study aims to describe the validity and effectiveness of an authentic assessment with Project Based Learning to improve creative thinking skills. The subjects of this study were 75 students of the Biology Education Study Program Faculty of Teacher Training University of Lambung Mangkurat who are taking the plant physiology course. This study employed a Research & Development study directed to develop an authentic assessment with a scientific approach. Data collection methods used were a test (open-ended questions), observation, and documentation. The results show that authentic assessment with Project Based Learning has high validity and can improve creative thinking skills effectively. Every aspect of students creative thinking skills has increased. Overall, the increase in creative thinking skills is 0.81 which means an increase with high criteria.

Keywords—*authentic assessment, project based learning, creative thinking skills*

I. INTRODUCTION

In the process of learning, assessment is one of the main components. Assessment is not only aimed to determine the rank and grade but importantly to achieve other functions in the educational process. Assessment has been used for multiple purposes, such as providing students grades, system monitoring, student placement or monitoring, determining interventions, improving teaching and learning or providing individual feedback to students and their parents [1]. Assessment is a process of gathering information that accurately reflects how well a student is achieving the curriculum expectations in a subject or course. Thus, one of the purposes of assessment is to improve students learning [2].

One important factor that affects the level of student achievement in the learning process in the form of learning outcomes and student performance is learning motivation. Therefore, a lecturer must be able to generate student learning motivation so that motivation can be developed within students, and they can obtain optimal learning outcomes and be able to interact actively with the environment.

One of the courses in the Biology Education Study Program in which the learning process makes students interact directly with the environment is the plant physiology. Students when studying plant physiology will increase the admiration for

many things that happen to plants and the surrounding environment. To achieve the learning objectives, students must be directed to understand the theory and apply it in the real world. Plant physiology course in the learning process is included in one of the subjects that integrate cognitive, affective, and psychomotor abilities. Plant physiology is a subject with a learning process that invites students to understand the processes and activities of life that occur in plants. Lecturers to achieve competency standards need to program the learning to instill and develop motivated knowledge, skills, and attitudes so that they can improve cognitive, psychomotor, and affective together.

Regarding this concern, Project-Based Learning has a great potential to make learning experiences more interesting and meaningful for adult students including prospective biology teacher students in order to prepare them in entering the work. In this Project-Based Learning, students become more motivated to be more active, creative, and innovative. The products made by students during the project provide results that can be measured authentically by lecturers in their learning.

The PjBL learning model in the learning process in plant physiology course needs to be applied to explore the ability to make projects and products are in accordance with the learning objectives. This effort is done to attach such an impression to all facts and concepts learned in plant physiology to store, remember, and utilize in daily life. Thus, it is expected that biology teacher candidates will develop their creativity and innovation so that in the future they will contextually teach science concepts.

Then, an appropriate assessment is needed to determine the level of achievement of learning objectives and see the effectiveness of the teaching and learning process of the learning model implemented. The assessment process emphasizes the ability to plan, organize, investigate, and work together in teams. Product assessment emphasizes the results of identifying and gathering relevant information, results of the analysis, interpretation of data, and the ability to communicate products.

The assessment must also consider several things, including factors that influence student attitudes towards science,

including teacher, learning environment, classmates, gender, personality, curriculum, and parents [3]. On previous experience in science learning, the effectiveness of learning positively also influences attitudes toward certain learning and science in general [4]. Indicators of creative thinking skills introduced by Guilford consist of fluency, flexibility, originality, and elaboration [5].

Based on the description, an authentic assessment is based on the Project Based Learning to improve students' creative thinking skills in the plant physiology course. In accordance with the background description, the researchers focus on developing the Project-Based Authentic Assessment with a Scientific Approach.

II. METHOD

This research was an R&D (Development Research). The subjects of this study were students of the Biology Education Study Program FKIP ULM who participated in plant physiology course totaling 75 people. The data was collected using a test (open-ended questions), observation, and documentation.

The result of expert validation was analyzed on the percentage, and then the validity can be measured using the following formula [6]:

$$Pi = \frac{xi}{yi} \times 100\%$$

Pi = Aspect percentage

xi = Value of validation answer

yi = Maximum value

The percentage will be known by the calculation using the formula. The product criteria are shown in Table 1 [6].

TABLE I. VALIDITY BY EXPERT CRITERIA

| Value | Validity | Decision |
|--------------|---------------|---|
| 79.78-100% | High validity | The new product can be used in the learning process |
| 59.52-79.77% | Valid | The product can be used by improving some aspects |
| 39.26-59.51% | Low validity | The product can be used by improving many aspects |
| 19.00-39.25% | Invalid | Big revision and should be consulted |

The effectiveness result of the implementation was investigated through an achievement test. Student learning outcomes in this study were obtained through a post-test and calculated. In order to score the open-ended question, this study used a rubric that has been validated by the experts for each indicator. The data of the test result was analyzed by descriptive percentage to find out the indicators of creative thinking skills achieved by students using the following formula:

$$Pi = \frac{\times i}{yi} \times 100\%$$

Pi = Score percentage

xi = Indicator score

yi = Maximum score

Furthermore, the percentage of creative thinking skills was interpreted by the criteria of creative thinking grade in Table 2 [7].

TABLE II. CRITERIA OF THE VALIDITY

| Percentage | Criteria |
|------------|------------|
| 81-100 | Very High |
| 61-80 | High |
| 40-59 | Sufficient |
| 20-39 | Low |
| 0-19 | Very Low |

III. RESULTS AND DISCUSSION

Validation of the authentic assessment in this study includes validation of designs and products. The validation is carried out by the evaluation lecturer with the following results: a) Design Validation. Based on the results of the design feasibility percentage according to the experts, 90% of the authentic assessment design is in very good criteria. Therefore, the design can be continued to produce with little improvement. There are some typing errors due to the author's inaccuracy, font size, and use of operational words for questions based on High Order Thinking Skills and open-ended. Typing errors include the presence of children whose questions are not coherent and font size is 11 which is considered to be lacking in standards and makes the user's eyes tired when read. So, it is advisable to improve the typing, font size using size 12 and operational words questions that initially use the word design. In accordance with the experts' advice, the researchers refined the authentic assessment design by improving the typing in order, choosing font size and using the operational word question design on the question; b) Product Validation. Based on Table 1, the validation result of the assessment showed the validity level is at high category. This is because from the product design, the researchers always communicate actively with the validator and direct suggestions/ input are applied when producing authentic assessment products. From these results, the product can be tested on a small scale.

The application of authentic assessment is intended to test the effectiveness of the use of authentic assessments developed in improving students' creative thinking skills while completing projects that have been determined when attending lectures. The implementation of authentic assessment is carried out in two stages, namely the small-scale trial and field tests.

In a small scale test involving fifteen students as a sample with five students with top competencies, five students with moderate competencies, and five students with lower competencies as representation of population competency. The trial of the product use was carried out experimentally, namely the pre-experimental design of the one-shot case study model. The trial was conducted on the learning outcomes of the students' skills in creative thinking.

Data on the results of small-scale trial of gain in each aspect of student scientific thinking skills are presented in Table 3.

TABLE III. GAIN IN EACH ASPECT OF STUDENT SCIENTIFIC THINKING SKILLS

| Creative Thinking Skills | | | | | |
|--------------------------|---------|-------------|-------------|-------------|---------|
| Indicator Score | Fluency | Flexibility | Originality | Elaboration | Average |
| | 82 | 79 | 77 | 82 | 80 |

Table III shows that each aspect of the students' creative thinking skills has increased. Overall, the increase in creative thinking skills has an average of 80. It indicates that the increase is high. Therefore, the researchers concluded that the designed lectures that utilize authentic project-based assessment with a scientific approach effectively improve the students' scientific thinking skills. These results are in accordance with Pantiwati's research that authentic assessment can improve cognitive abilities, scientific thinking, and creative thinking while paying attention to the character of students [8]. This can be explained because authentic assessment encourages students to use scientific knowledge in the real context rather than making something new and unknown to students.

In the field test conducted in one class with participants 60 students. The field testing of product use was carried out experimentally, namely the pre-experimental design of the one-shot case study model. The field test data of the value increase of each aspect on creative thinking skills is presented in Table 4.

TABLE IV. THE VALUE OF EACH ASPECT OF THE CREATIVE THINKING SKILLS

| Creative Thinking Skills | | | | | |
|--------------------------|---------|-------------|-------------|-------------|---------|
| Indicator Score | Fluency | Flexibility | Originality | Elaboration | Average |
| | 82 | 81 | 80 | 81 | 81 |

From the results, the obtained results are almost the same as the small-scale try-out and experience an average increase in gain which is equal to 81. This is because students in completing project assignments during lectures through the application of authentic assessment are directed to manage a series of stages well in accordance with the aspects of learning that are expected, namely the stages of: (a) preparation, (b) presentation (responsiveness), (c) application, and (d) evaluation. Syahrul's research shows that after the application of the Integrated Authentic Assessment Model (AAT-model), most students have high performance in practicum, in the sense that the performance of students exceeds the minimum standards of completeness (75%) of competence that must be achieved [9].

Table 4 shows that each aspect of the students' creative thinking skills has increased. Overall, the increase in scientific thinking skills is 81, which means that the increase is very high. Therefore, the researchers concluded that the designed lectures using authentic project-based assessments with scientific approach are effective in improving the students'

creative thinking skills. The authentic assessment can improve cognitive abilities, scientific thinking, and creative thinking while paying attention to the character of students [8]. This is because the authentic assessment encourages students to use scientific knowledge in the real context rather than making something new and unknown to students.

Through the implementation of the authentic assessments in the lectures, it provides opportunities for students to carry out authentic tasks that are interesting, useful, and relevant to students' lives. This task can make students become innovative and creative because they have the opportunity to develop themselves, foster a more positive attitude towards school, learning activities and themselves [10].

IV. CONCLUSION

Based on the results of the study, it can be concluded that: (1) the authentic assessment is on high validity category and (2) the effectiveness of authentic assessment is effective. Every aspect of student scientific thinking skills has increased. Overall, the gain in creative thinking skills is 81, which means that the increase is very high.

From the results obtained by the researcher, it is a scientific approach that can enhance creative thinking skills in other relevant subjects. The study program can use the authentic assessment with an alternative scientific approach in evaluating the students learning outcomes.

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