Enhancing student’s creativity by implementing Project-based Learning (PjBL) in biodiversity concept

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Abstract. Creativity is one of the things that becomes a benchmark for the success of the teaching and learning process in the 21st century. One effort to develop students’ creativity is by implementing the Project Based Learning (PjBL) model. This study aims to determine the creativity of students in applying the PjBL model to the concept of biodiversity at SMAN 5 Banda Aceh. This research was conducted at SMAN 5 Banda Aceh from September to October 2018. The method of this research was descriptive. The study population included all students of class X IPA SMAN 5 Banda Aceh. The sample in this study were students from X IPA 3. The instrument used in this study is about the observation sheet of creativity of students. Creativity data were analysed by percentage formula. The average percentage of creativity in group students is 68.33% with good categories. Thus it can be concluded that the average percentage of creativity of group students in the implementation of the PjBL model on the concept of biodiversity in SMAN 5 Banda Aceh has a good category.

1. Introduction
One of the things that become a benchmark in the learning process includes creativity. Creativity does not only create truly new objects but also in terms of combining existing ideas that are different from previous ideas. To find out how the creativity of students, it is necessary to do an assessment that is decision making using information obtained [1].

One of the things that become a benchmark in the learning process includes creativity. Creativity does not only create truly new objects but also in terms of combining existing ideas that are different from previous ideas. To find out how the creativity of students, it is necessary to do an assessment that is decision making using information obtained [1].

Moreover, products including the results of creative thinking [2]. Besemer & Trefinger in Besemer et al. explains the creative product analysis matrix (CPAM) theory was developed to help cultivate more careful observation of created products and to focus judges’ attention on relevant attributes of products. There are three things found in CPAM, namely novelty, resolution, elaboration and synthesis [3].

From the results of the interview, it was explained that in biodiversity material projects /products were rarely made, and there were products made but did not assess the planning and process. Even though according to Satiadarma in Rati to achieve good learning achievement one of the things that students must have is creativity [4].
Based on the explanation of Susanti, et al. in achieving the objectives of the learning concept, the teacher has the duty to choose the right learning model and media to get good achievement [5]. One effort to improve the creativity of students is to apply a variety of learning models, namely the PjBL (Project-based Learning) model.

Project-based Learning (PjBL) that uses the project/activity as its purpose [6]. Some of the advantages of project-based learning include: focusing on the main concepts and principles of a scientific discipline, involving other parties that are relevant to the needs in the field, providing opportunities to work autonomously to construct their learning, and culminating in producing work products that valuable and realistic [7].

The concept of biodiversity is a concept that about the diversity of living things in nature with all forms of utilization and preservation, one of the efforts to produce maximum student creativity is by implementing PjBL model which is a learning model that provides an opportunity to work autonomously constructing learn the students themselves by directly making the project based on the things learned in particular about the concept of biodiversity to help students bring out the creativity of learning of students.

Based on this explanation, it was designed by the author an attempt to develop the creativity of students through the implementation of the PjBL model on the concept of biodiversity at SMAN 5 Banda Aceh.

2. Methods
This research was conducted at SMAN 5 from September to October 2018. The research method was descriptive. The study population included all students of class X IPA of SMAN 5 Kota Banda Aceh. The sample in this study were students from X IPA3 at SMAN 5. The instrument used in this study was the observation sheet of creativity of students. Learning outcomes data were analyzed by the percentage formula (1) [8]:

\[ Np = \frac{R}{SM} \times 100 \]  

Descriptions:
Np = The percentage value that is sought or expected
R = The raw score obtained by participants' students
SM = Ideal maximum score from the observed thing

The interpretation criteria for the assessment of process and product scores are based on Arikunto in Susanti, which can be seen in Table 1 [9].

| No. | Category     | Value       |
|-----|--------------|-------------|
| 1.  | Very good    | 81-100%     |
| 2.  | Well         | 61-80%      |
| 3.  | Enough       | 41-60%      |
| 4.  | Less         | 21-40%      |
| 5.  | Very less    | 0-20%       |

3. Results and Discussion
Based on the research that has been done, the data obtained from the creativity of students from the implementation of the PjBL model on biodiversity concepts at SMAN 5 Banda Aceh. Data on creativity is obtained from the creativity observation sheet which was observed using the Besemer and Treffinger model indicators consisting of novelty, resolution (resolution), and elaboration and synthesis [10]. Based on the research that has been done, the results are obtained in Table 2.
Based on Table 2, it is known that the novelty indicator percentage is 69.83% with the good category. On the indicator of novelty on the product, students choose the material and the form of the product they have made. Besemer explained that novelty is the extent to which the product is new in terms of number, area, and process [10]. Novelty comprises the originality and newness in making the product which involves materials, ideas, processes, and the concepts. In this case the students have reached the good category in choosing ideas about the materials and forms used, in the form of making products, namely wall magazines and newspaper clip, especially made by discussing first with group friends in the process of the project planning syntax.

**Table 2. Percentage of Creativity of Students of SMAN 5 Banda Aceh**

| Indicator                          | Percentage | Category |
|------------------------------------|------------|----------|
| Novelty                            | 69.83      | Well     |
| Resolution                         | 51         | Enough   |
| Elaboration and Synthesis           | 76.67      | Well     |
| Indicator Amount of Creativity      | 67.78      | Well     |
| Average Percentage of Student Creativity in Groups | 68.33 | Well |

Besemer and Treffinger also explained that in creative products, there is a solution (resolution) [10]. In this indicator students solve problems about biodiversity with a percentage of around 51% with enough categories. Based on the research conducted the results of the percentage of resolution that is still in the category is enough because students have not been maximal in understanding biodiversity concepts. This was explained by Thomas in Kizkapan who explained that students had not succeeded in learning the concept through the project [12]. This indicates that there are some difficulties in understanding the concept of students through the project, it can be seen in the implementation of learning that students are still not accustomed to, or difficulties in discussions with friends in understanding the problem-solving in the project made.

Elaboration and synthesis indicators range from 76.67% in the good category, and this refers to the degree to which the product combines unlike elements into a refined, developed, coherent whole, statement or unit [13]. Whole, five criteria for assessing this product must be organic, elegant, complex, understandable (appear clearly), and show good skills or expertise. In this case the students have tried maximally to put out their ideas to achieve good results of synthesis and product synthesis.

In the assessment of creativity, especially creative products or also called the Creative Product Analysis Matrix (CPAM) in addition to indicators of novelty, resolution, elaboration and synthesis of each indicator has sub-indicators, these sub-indicators explain in more detail than the assessment of creativity that do. The following is presented in Figure 1 which presents sub-indicator data from the indicator of novelty (Novelty). The following is presented in Figure 1 which presents sub-indicator data from the indicator of novelty (Novelty) based on Besemer and O’Quin in Reis and Joseph under the dimension of novelty there are three subscales emerged original, germinal, and startling/surprising [14].

Based on Figure 1 shows that the germinal sub-indicator has the highest percentage of novelty indicators compared to original and surprising. This indicates that students have tried to issue an idea to make products from materials that can bring new ideas from observers to produce products from the same material as other forms of products, this was also explained by Munandar who explained that the product was germinal in terms of raises other original product ideas [10].
Figure 1. Average Percentage of Sub Indicators in the Novelty Indicator in SMAN 5 Banda Aceh

Furthermore, in Figure 2, the data on the creativity sub-indicator is presented in the solution indicator (resolution).

Figure 2. Average Percentage of Sub Indicators on Resolution Indicators in SMAN 5 Banda Aceh

Based on Figure 2 shows that logical sub-indicators have the highest percentage. This explains that in the experimental class the average student makes a product with a source of information, makes a project design that helps students be more focused on making the project, and make products according to the design that has been made. This is in accordance with the explanation of Besemer and Donald that products are made based on certain rules [15]. Next, R. Garcia and R. Calantone in Horn and Gavriel explain the resolution is how well the product fills the need or works to solve the problem [16]. The following is also shown in Figure 3, namely the percentage of sub-indicators in elaboration and synthesis.
Based on Figure 3 shows that understandable is the highest sub-indicator on the indicators of elaboration and synthesis. This indicates that students make products according to their size, according to Munandar’s explanation which explains that in the understandable sub-indicator, the products made can appear clearly and easily used [4].

4. Conclusions

Based on the results of research on the PjBL model, it can be concluded that the average percentage of creativity of group students in implementing the PjBL model on the concept of biodiversity at SMAN 5 Banda Aceh is well categorized.

5. References

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