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Analysis of Product Differentiation Through Problem Based Learning on the Level of Creativity of Class X Students of SMAN 2 Semarang

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ABSTRACT

The characteristics of students are different, so teachers need to accommodate this diversity to achieve the desired learning outcomes. One of the successes to be performed is creating quality human resources by having creativity triggered by solving problems using problem-based learning models. The research aimed to measure the level of creativity of class X students of SMAN 2 Semarang after receiving learning with differentiated learning methods through problem-based learning. The study was conducted in March 2023 at SMAN 2 Semarang, the research subjects were class X-4 with a total of 36 students. This research is included in the quantitative descriptive method using various product assessment instruments or product differentiation, limiting the assessment to content assessment. The data analysis technique uses descriptive percentages to determine the category of students' creativity levels. Based on the results of the data, it is known that the level of creativity of students with the highest frequency is Very High, consisting of 5 groups with scores of 94 and 100. This shows problem-based learning with various product presentations. Can increase student creativity.

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INTRODUCTION

The application of problem-based learning can increase independence to solve problems that are carried out in groups. In addition, problem-based learning is able to activate the mindset and skills that exist in students (Aziz et al, 2014). The skills of each student are different based on talent or character Juliya, M., & Herlambang, Y. T. (2021). The existence of diverse talent differences is a consideration for teachers to improve the learning process so that they can accommodate the talents or characteristics of students.

As a teacher, you must be able to understand each talent or characteristic of students. The first step that needs to be done by a teacher is to do a mapping referring to one of the theories of the diversity of students' characters. There are four theories that understand the characteristics of

students which consist of ecological systems theory, multiple intelligences theory, Zone of Proximal Development (ZPD) theory, and finally Learning modalities.

Based on various theories behind the emergence of uniqueness for each individual, it affects the learning styles of students. Learning styles are accommodated with learning facilities that are in accordance with the characteristics of students so as to provide positive feedback for learning outcomes (Labu, 2021; Bire, 2014; Saputri, F, 2016). However, in application during the learning process the teacher has not accommodated the diversity of learning styles maximally. Based on the results of learning observations that have been carried out at SMAN 2 Semarang, teachers still apply conventional teacher-centered learning, as well as giving assignments that do not accommodate learning styles so that the results made by students are uniform without any product variations. As a result students who have other interest tendencies such as making interactive PPT, video editing, narration and so on cannot be facilitated. The existence of assignment instructions in the form of one type of product including the causes of students' creativity cannot develop optimally (Hanafi, 2019; Safarati, N., & Zuhra, F., 2023; Herwina, 2021). Therefore, teachers need to understand the diversity of student characteristics so that the planning and learning process are in accordance with the needs and characteristics of students.

The diversity of student characteristics is often encountered by teachers in schools. The teacher as a facilitator needs to accommodate the characteristics of students by using student-centered learning strategies (Tarihoran, 2019). The recommended learning method is differentiation learning. Differentiated learning is an effort made in a series of lessons paying attention to the needs of students in terms of learning readiness, learning profile, interests and talents (Aprima & Sari, 2022). The form of accommodation that needs to be prepared by the teacher to use differentiated learning requires four main things, namely content, process, product and environment differentiation (Hasanah et.al, 2023).

Differentiated learning is very appropriate to be used in the learning process in the independent curriculum in order to provide freedom for teachers to arrange learning and assessments that are suitable for students, so that the goals that are assessed are appropriate and according to the characteristics of students. The use of this independent curriculum can accommodate the demands of the 21st century which require Human Resources (HR) to have communication, collaboration, critical thinking, and creativity skills (Abaniel, 2021; Jufriadi et.al, 2022).

Creativity is one aspect of assessment in the learning process. Therefore it needs to be honed through education. Education has an important role in changing patterns and developing the skills, talents and interests of students in accordance with the goals of 21st century education, namely to form quality human resources (Hasibuan, 2019). The impact of implementing differentiated learning for learning based on the results of previous research is being able to help students achieve optimal learning results, because the products produced are in accordance with their interests (Handiyani & Muhtar, 2022; Herwani, 2021). This shows that there is a growing creativity for students because students are not limited in producing works. Therefore the use of differentiated learning aspects that are in line with the creativity of students is product differentiation.

Based on the background that has been reviewed, it is necessary to have research that aims to measure the level of creativity of class X students of SMAN 2 Semarang after receiving learning with a differentiated learning method through problem based learning. The aspect of differentiation that is used as a reference for this research is product differentiation.

METHOD

This research was conducted at SMAN 2 Semarang with 36 class X-4 students as research subjects. It will be carried out in March 2023. This type of research is descriptive quantitative to describe data on the ability of the level of creativity of students in biology subjects on ecosystem material and their interactions. The data collection technique in this study is the acquisition of value from the compilation of various product assessment results or product differentiation limited to the material content section based on aspects of creativity according to Torrance in Edi (2016) in Table 1.

Table 1. Aspects of Creativity

Aspect	Indicator
Fluency of thinking	• Generate problem solving ideas • Formulate answers to problem analysis results • Provide many suggestions in solving problems
Flexibility	• Generate ideas, varied answers • Can see a problem from a different perspective • Looking for alternatives or different directions to solve problems
Flexibility	• Enrich and develop problem solving ideas • Detailing the details of the problem solving plan • Unique problem solving ideas that attract attention
Originality	• Ability to spark original ideas for problem solving • Thinking of unusual ways of solving problems • Able to combine unusual ways of solving problems

Then the final value is calculated by analyzing it using the Riduwan formula (2010)

$$NA = \frac{s}{SM} x\ 100\% \qquad (1)$$

Based on the final score obtained, it can then be categorized according to the level of creativity, as shown in Table 2.

Table 2. Product Assessment Categories

Achievement Rate (%)	Criteria
90 -100	Very high
80-89	Tall
67-79	Currently
55-64	Low
0-54	Very low

RESULTS AND DISCUSSION

The level of creativity possessed by students is represented through the products produced as final assignments in the form of infographics, Power Point and videos. The product prepared by the students has a title, name and group member components, the results of the analysis are based on the issues raised about "Semarang City Flood Disaster in early 2023" the form of analysis of the news broadcast is the impact of flooding on ecosystem components, causes of flooding, initiatives

proposed by students based on the roles that have been divided from each team, then a real action plan to prevent or avoid a flood disaster. The results of the analysis that have been planned by students are projected to become various products based on the expertise possessed and mastered by students. Following are the results of the analysis of the level of creativity of students in Figure 1.

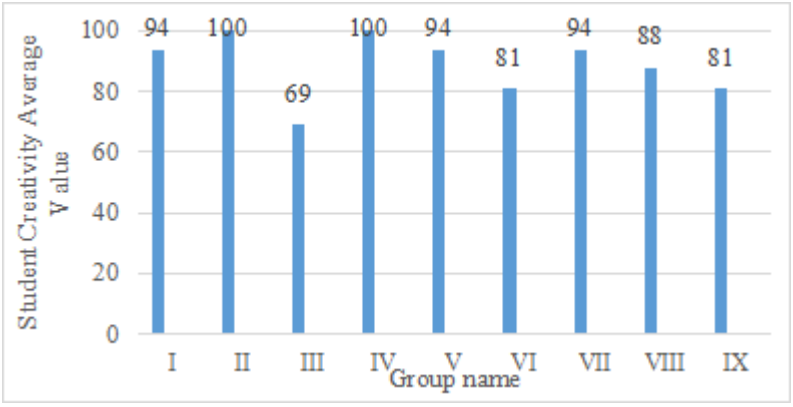

Figure 1. The results of obtaining student creativity scores in 9 groups in Class X4

Figure 1 shows the results of the acquisition of students' creativity values in each group. There were 2 groups with a final score of 100, 3 groups with a final score of 94, 1 group with a final score of 88, 2 groups with a final score of 81, and 1 group with a final score of 69. The frequency of categories for obtaining students' creativity levels can be seen in Table 1.

Table 1. The frequency of categories for obtaining the level of creativity of students

Category	Frequency
Very high	5
Tall	3
Currently	1
Low	0

Table 1 shows the frequency of categories for obtaining the level of creativity of students with the acquisition of very high categories, there are 5 groups, there are 3 groups for high, and there is 1 group.

This acquisition was obtained from the results of calculations on the product assessment sheet based on the level of creativity of students. The final value of the calculation results is then adjusted to the table of categories for assessing students' creativity to determine the categories obtained in each group for the products that have been made. Based on these data, 5 groups have a very high category in group 2, 4 with a score of 100; groups 1, 5 and 7 obtained a score of 94. Then three groups had a high category in group 8 obtaining a value of 88, groups 6 and 9 obtaining a value of 81. Finally there was one group which had a moderate category in group 3 obtaining a value of 69.

The assessment is obtained from a compilation of product ratings based on the level of creativity. This creativity is driven by problems that need to be solved in groups. Each group is given a different role so that students can formulate flood problems from the point of view of the roles they get. As for the form of role that is obtained by each group starting from the local government, local residents, youth, contractors or developers and cleaning forces in the city of Semarang. The form of problem analysis relates to the impact of flooding on the ecosystem, students formulate ideas or ideas that are varied to prevent or reduce the occurrence of flooding in the city of Semarang, finally

students formulate a real action plan by referring to ideas that have been prepared and then explained in technical detail implementation.

Group 2 and group 4 get a score of 100 with the product made in power point. The role of group 2 is as local government, while group 4 is as citizens. The 4 aspects of creativity from each group get a maximum score of 4. This happens because these two groups have heterogeneous teams that complement each other between students who have visual, audio, and kinesthetic characters. They cooperate with each other in digging up information, analyzing pictures, and formulating ideas and ideas that are detailed in detail.

The creative aspect of the fluency of thinking of the two groups was able to provide answers to the impact of flooding which was focused on the damage experienced by ecosystem components, then students generated problem solving ideas as government and citizens. This aspect of fluency in thinking is a form of critical thinking ability to analyze problems and possible ideas that can be used to unravel the source of the problem, so that towards creativity students are taught to hone critical thinking skills (Minarti et.al, 2022; Fatmawati, 2023)

The existence of problems raised from real problems directly experienced by students can provide a stimulus to plan solutions that can be carried out with the aim of making the area where they live not experience another disaster. This is in accordance with the results of research conducted by experts who state that real problem-based learning can spur students' motivation to increase critical thinking activities and cognitive abilities in analyzing problems and stimulate the emergence of creativity to produce ideas that are used as problem solving, the higher the creativity, the more high problem-solving abilities (Sambada, 2012; Ardiyanto, 2013; Arafani et.al, 2019; Zubaidah, 2017; Mauludah, et.al, 2018)

The aspect of flexibility that is assessed from the products that have been made is to provide answers to the analysis of the main problem sources of flooding from the point of view of different problem sources, group 2 describes the main sources of problems from upstream to downstream by showing the change in function of the river, while group 4 looks at the problem flooding from the behavior of people in the city of Semarang. Then both of them can provide diverse or varied ideas and ideas according to their respective roles. Group 2 provides ideas for solving problems from the government's point of view with a wider reach to planning regional regulations for fines for destroying natural ecosystems while group 4 proposes routine program ideas to keep the environment clean in which they live.

In the aspect of elaboration creativity, students detail ideas by providing detailed procedures or planning concrete actions in carrying out ideas / ideas that have been formulated to solve problems. The two groups were able to detail the procedures that were used to carry out the initiatives or ideas that had been developed to solve the problem.

In the aspect of originality creativity, students are able to provide original ideas or ideas from their own thoughts, and are able to come up with ideas or ideas that are not commonly used in general and have not even been carried out by the current government. These two groups are able to provide ideas, ideas, and original problem-solving solutions to the thinking of students that are adapted to the roles of each team.

Group 3 gets a score of 69 in the medium category of creativity. The product produced is in the form of an infographic with the role that group 3 gets as a janitor. The four aspects of creativity that have the maximum score are only on the aspect of flexibility, while the other aspects do not get the maximum score. This happened because the flexibility aspect of the plans and ideas compiled by this team was able to provide a variety of problem solving ideas. However, the aspect of fluency of thinking does not provide results of analysis of the main problems associated with ecosystems, the elaboration aspect does not describe or detail the implementation or planning of concrete actions to be carried out for the implementation of the initiatives of each idea. The originality aspect of the ideas and ideas given varies, but the ideas conveyed are common or commonly practiced, so the indicators for solving unusual problems and combining unusual problem solving have not been fulfilled. This happens because of the influence of the characteristics of diverse or heterogeneous groups, this group tends to be visual. Because seen from the results of the work that gives an overview of the problem in the form of points and the formulation of ideas in the form of points without any broader explanation, it should be an audio child who captures information using the senses of the listener and takes notes in written form. According to Hamalik (2001) in Roshandi (2016) states that the learning activities of students with visual modality have the character of reading, viewing pictures, observing experiments, demonstrations, exhibitions, and observing other people work and play so that in the process of capturing information it is written in the form of important points that cover the entire information or just an outline.

Overall the level of creativity in class X4 is in the Very High category as seen from the number of groups that have a score of 90-100 consisting of 5 groups with 4 members in each group. This shows that problem-based learning or problem-based learning is able to increase the creativity of students. This is in line with the results of Zeng et al. al (2011) the process of creativity can emerge through the stages of analyzing problems, finding solutions, evaluating and implementing them. This process can be facilitated by a problem-based learning model or problem-based learning. The results of the problem solving discussion are presented in the form of product differentiation. Product differentiation as a form of freedom to express students' expertise to present the results of their discussions with various products provides experience for students to explore more deeply the skills they have.

CONCLUSION

Based on the results of the research and discussion that has been presented in the research discussion, the results obtained show that the level of creativity of students at SMAN 2 Semarang class X is in the very high category with a maximum final score of 100 with 5 groups included in that category. This shows that problem-based learning with presentation results projected onto various products or product differentiation can accommodate students' skills to increase the creativity that is in them. Suggestions for following up on this research are expected to be able to develop other forms of creativity in the future and also develop assessment rubrics for students.

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