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Teachers' Perceptions toward Student Worksheets Based on Sugarcane Waste Treatment Projects to Improve Students' Creative Thinking Skills

Rahma Abida, Noor Fadiawati, M. Setyarini

Graduate School of Science Education, Universitas Lampung, Indonesia.

Abstract: This study aims to describe teachers' perceptions towards students' worksheets based on bagasse waste processing projects to improve students' creative thinking skills. This research was conducted in Lampung Province involving 42 junior high school science teachers. This study uses the ADDIE research and development method by Branch. At the analysis stage, performance analysis and needs analysis are carried out. At the development stage, two education experts validated the suitability of the content with project-based learning steps and indicators of creative thinking skills according to Torrance and validated the suitability of the construction with the components of the student worksheets. At the implementation stage, it will be tested in class VII at SMP Negeri 3 Kotabumi. The evaluation stage is by evaluating the results of students after the learning is carried out. The success of increasing students' creative thinking skills is seen based on the results of n-gain and effect size.

Keywords: students' worksheet, project based learning, creative thinking skills.

Abstrak: *Penelitian ini bertujuan untuk mendeskripsikan persepsi guru terhadap pengembangkan lembar kerja berbasis proyek pengolahan limbah ampas tebu untuk meningkatkan kemampuan berpikir kreatif siswa. Penelitian ini dilakukan di Provinsi Lampung dengan melibatkan 42 guru IPA SMP. Penelitian ini menggunakan metode penelitian dan pengembangan ADDIE. Pada tahap analisis dilakukan analisis kinerja dan analisis kebutuhan. Pada tahap pengembangan, dua pakar pendidikan melakukan validasi kesesuaian isi dengan langkah pembelajaran berbasis proyek dan indikator kemampuan berpikir kreatif menurut Torrance dan validasi kesesuaian konstruksi dengan komponen lembar kerja siswa. Pada tahap implementasi akan diujicobakan pada siswa kelas VII di SMP Negeri 3 Kotabumi. Tahap evaluasi yaitu dengan mengevaluasi hasil siswa setelah pembelajaran dilakukan. Keberhasilan peningkatan kemampuan berpikir kreatif siswa dilihat berdasarkan hasil n-gain dan effect size.*

Kata kunci: *lembar kerja siswa, pembelajaran berbasis proyek, keterampilan berpikir kreatif.*

▪ INTRODUCTION

The 21st century is the age of knowledge. 21st century national education aims to develop the potential of students to become capable, creative, independent, and responsible human beings. With the development of technology in the 21st century, the learning process should be knowledge-based accompanied by skills (Hidayat & Patras, 2013). Creative thinking in students must be trained according to 21st century learning. Creative thinking skills in students cannot be separated from the learning carried out by teachers in schools. According to Munandar (2012) creative behavior is the result of creative thinking, therefore the education system should be able to stimulate productive creative thinking, attitudes and behavior, in addition to logical thinking and reasoning. The indicators of creative thinking skills by Torrance in Al-Sulaeman (2009) are fluency, flexibility, originality and elaboration.

Rahma Abida

*Email: rahmaabida1995@gmail.com

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To realize learning in practicing creative thinking skills, educators need to prepare appropriate learning models. One suitable learning model to improve students' creative thinking skills is project-based learning or project-based learning (Bell, 2010). Project-based learning contains real challenges that focus on authentic problems (not simulations), not artificial and the solutions can be implemented in the field. For this reason, teachers must be able to design real learning processes, and this can be done by inviting students to learn in the real world of work. Project-based learning according to Colley in Diawati et al. (2018) consists of 6 stages of learning, namely the orientation stage, identifying and determining the project, planning the project, implementing the project, documenting and reporting the project, and evaluating and executing the project. Through project-based learning, students will be directed to join the learning process actively and independently (Kokotsaki, 2016).

This learning model provides a learning experience for students through project activities that lead to the creation of a product. The existence of project activities will support the development of the potential of each student. This project-based learning is considered as an alternative pedagogy to traditional learner-centered teaching in primary, secondary, and higher education (Chen & Yang, 2019). Learners in project-based learning usually work in small groups and collaboratively explore projects with peers (Guo Pengyue, 2021; Chen & Yang, 2019). In this case, researchers will take advantage of the potential of the area which is a real problem in the environment, so as to improve creative thinking skills.

The Performance Instrument developed was adjusted to the indicators of students' creative thinking skills in utilizing the potential of the area in North Lampung in the Bunga Mayang area. The real problem that occurs in North Lampung is the amount of bagasse waste when the sugar cane harvest season arrives. Bagasse waste is usually just burned without any processing, causing environmental pollution. Students are challenged to solve the problem of bagasse waste creatively by dipping their knowledge. The abundance of bagasse that has not been utilized by the community can be used as a learning resource to improve students' creative thinking skills. Learning resources that are needed to help students improve their creative thinking skills are student worksheets. worksheets can be done independently or in groups that contains a guide for learning activities. This worksheets aims to maximize students' understanding abilities in accordance with indicators in learning. Therefore, it is necessary to develop student worksheets based on bagasse waste processing projects.

▪ METHOD

Participants

The participants of this study consisted of 47 science teachers for the 2021/2022 academic year with science teachers at public and private junior high schools in Lampung.

Research Design and Procedures

The research method used is research and development of the ADDIE model by Branch. This model is one of the learning program design models that shows the basic stages of a simple and easy-to-learn learning system (Fadiawati & Fauzi S, 2018). The ADDIE model consists of five main stages, namely analysis, design, development,

implementation, and evaluation. This research was conducted on August 12 – September 4, 2021. Data collection was carried out using a questionnaire created through a google form and distributed online to find out the perception of teachers in schools about using students' worksheet to measure students' creative thinking skills. The results of the questionnaire were analyzed using the percentage of responses from each item submitted.

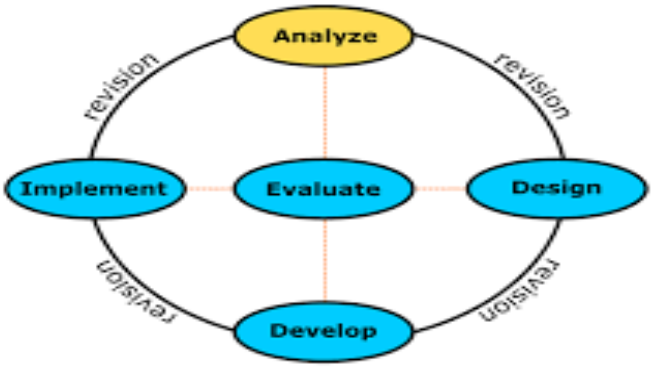

Figure 1. Stages of ADDIE development model

Instruments

The data collection instrument is a questionnaire made through google form. In the preliminary study, an instrument in the form of a teacher needs questionnaire was used to determine the learning resources used by students, a project model that could improve students' creative thinking skills. Student activities in the classroom require learning tools. The right learning tool is student worksheets using project-based learning models.

The development of student worksheets based on bagasse waste treatment projects to improve students' creative thinking skills, it is important to analyze performance and analyze needs. The needs analysis at this stage analyzes the needs of developing student worksheets based on this project shown to teachers and students regarding the learning methods used, the suitability of indicators with KD, suitability of indicators in measuring creative thinking skills. Performance analysis is an important point to find out the use of student worksheets that take advantage of regional potential in learning. This performance analysis uses a questionnaire given to teachers and students. In addition, an analysis of the indicators of creative thinking skills that produce the tasks or skills to be measured in this study was carried out.

Student worksheets are designed by determining learning objectives, and the steps in learning are in accordance with the project learning model. Next, develop student worksheets according to the designs that have been made. After the product was finished, it was then validated by 2 experts and the teacher's response to the student worksheets to 2 science teachers in North Lampung. The next stage is to apply student worksheets in learning in class VII SMP Negeri 3 Kotabumi. The last stage is evaluating

learning outcomes in order to determine the effectiveness of student worksheets. The effectiveness of student worksheets can be seen from the value of n-gain and effect size.

Data Analysis

To analyze the data collected in the study, descriptive data were used which were obtained based on a questionnaire. By analyzing the responses of 47 science teachers in Lampung Province, the results of the answers to the questionnaire were processed to obtain the overall results of the teachers' answers (respondents) which aims to see the percentage of each answer to the question so that the data obtained can be analyzed. The questionnaire uses the Guttman scale which has a choice of answers according to the content of the question, namely: "Yes" and "No" with a score of "1" and "0". The results of the questionnaire were analyzed using the percentage of responses from each item and the results of the interpretation of the presentation of respondents' answers in descriptive narrative form were categorized as very good, good, quite good and not good. The results of the questionnaire were analyzed using the percentage of responses from each item submitted. The formula used to calculate the percentage of respondents' answers to each item is as follows, adapted from Sudjana (2005):

$$\% \text{ Jin} = \frac{\Sigma Ji}{\text{N}} \times 100\%$$

Description:

$\%J_i$ = Percentage of answer choices

ΣJ_i = Number of respondents who answered answer-i

N = Jumalah seluruh responden

▪ RESULT AND DISSCUSSION

The results and discussion of the data obtained in the form of questionnaires from 47 science teachers in public and private junior high schools throughout Lampung, this study concludes that in general Project-based students' worksheet in learning activities has not been applied. Teachers tend to have not designed project learning that can improve creative thinking skills and have not designed student worksheets based on bagasse waste treatment projects to improve students' creative thinking skills, this can be seen in Table 1 and Table 2.

Tabel 1. Teacher perception questionnaire results (n=47)

Questions	Yes %	No%
Do you already know about the project based learning model or project based learning?	21	79
Have you ever implemented a project-based learning model or project-based learning?	19	81
Do you agree that in learning the teacher's job is to train the thinking skills of students?	87	13
Apakah Bapak/Ibu dalam mengajar sudah melatih peserta didik dengan keterampilan berfikir?	27	73
Have you trained students in thinking skills in teaching?	32	68

Have you ever heard/read/know about the skills of "Creative Thinking"?		
Do you think that students need to be trained to think creatively?	91	9
Do you use students' worksheet in teaching science?	93	7
In your opinion, have the students' worksheet used today trained students' creative thinking skills?	39	61
Is it necessary to develop students' worksheet whose contents can train creative thinking skills?	90	10

Based on Table 1, it can be seen that the percentage of answers "Yes" and "No" has a significant difference in each question. Only 19% of teachers have implemented project-based learning and the other 81% of teachers have only implemented learning using lecture, discussion and experimental methods. As many as 87% of teachers agree that in learning the teacher's task is to train students' thinking skills, but teachers do not apply it in class with a percentage of 73% because it is considered a new thing and is not used to applying learning strategies to train students' creative thinking.

The results of the analysis based on questionnaires that have been carried out with science teachers in Lampung show that teachers tend to have not designed project learning that can improve creative thinking skills so that learning is still not optimal and has not designed student worksheets based on bagasse waste processing projects to improve students' creative thinking skills. educate. The teacher is the dominant and influential factor in determining the quality of learning. Quality learning will certainly produce good learning outcomes (Wulandari & Surjono, 2013).

These problems need to be addressed, one way is by involving students to be more active in learning (Liliawati, 2011). To develop science learning, educators are required to design teaching materials that support learning. In this case, educators need to use learning media and relevant learning resources to achieve overall learning objectives (Development Team, 2007). This fact is supported by the results of observations in the preliminary study that the teacher agrees that the development of student worksheets whose contents train students' creative thinking skills in learning is the demand for 21st century abilities with a percentage of 90%. However, the existing student worksheets have not trained creative thinking skills as much as 76% so that even though the teacher has used the student worksheets it will not be as expected. Thus, the teacher agrees on the need to develop Project-Based Student Worksheets to Improve Creative Thinking Skills of Junior High School Students.

The research steps are based on the research flow in Figure 1 which consists of five main stages, namely:

Analysis

The analysis is carried out to find out and clarify whether the problems faced require solutions in the form of developing appropriate students' worksheet to be developed and determine the abilities or competencies that students need to learn to improve learning achievement (Fadiawati, 2018). This analysis will produce an overview of facts, expectations and alternative solutions to problems making it easier to

determine the initial steps in the preparation of students' worksheet based on the waste treatment project that will be developed. This stage analyzes basic competencies (KD), which can be learned by developing project-based students' worksheet in science learning. In addition, an analysis of the indicators of creative thinking skills that will produce the skills or skills to be achieved in this learning is carried out.

Design

This stage is to design an students' worksheet teaching material based on bagasse waste processing project used in science learning activities, which starts from setting learning objectives, designing teaching and learning activities, designing learning media and evaluating learning outcomes rubrics.

Development

This stage includes the preparation of learning activities, selection of learning media, making test instruments and skills performance instruments. Media selection is done to optimize science learning. The media used in this learning, namely student worksheets (students' worksheet). When the students' worksheet is prepared, students are directed according to project-based learning steps, namely presenting problems, making plans, arranging schedules, monitoring project creation and conducting assessments. While the learning objectives are to measure the creative thinking skills of junior high school students before and after the implementation of students' worksheet based on bagasse waste processing projects.

The stage of presenting the problem by presenting a discourse about the problems that exist in the surrounding environment related to the underutilized potential of the area. The potential area discussed is sugarcane bagasse waste, because the local community only burns it or is allowed to pile it up. In addition to the problem discourse, a picture of bagasse that was burned and piled up was also given. From the explanations and pictures of the discourse, students can identify 3 problems that occur.

The next stage is making planning and scheduling the students' worksheet given the historical root regarding previously known information and unknown information and how to find this information. After finding the information needed, the students' worksheet is given a table to plan the project to be carried out which contains the project title, project date, problem formulation, project objectives, project importance, details of tools and materials to be used, procedures, tool design drawings as well as descriptions and schedules. project implementation. At the project monitoring stage, students are given 3 weeks to carry out the project to be carried out, then students write in detail in the column on the students' worksheet about the activities carried out in the 1st to 3rd weeks and write down any obstacles encountered during project making and remain under the supervision of the teacher. The evaluation stage is carried out after the project activities are completed, in the students' worksheet there is an order that students in each group communicate the results of the project that has been carried out then by making a report according to the format that has been determined.

Implementation

The implementation of the developed product will be in real situations, namely in the classroom. This stage aims to guide students to achieve learning objectives, namely

improving the creative thinking skills of junior high school students with the occurrence of real problems in the surrounding environment, for example bagasse waste.

Evaluation

The evaluation stage is the final stage of the ADDIE development model. Evaluation is a process carried out to provide value to learning by implementing project-based worksheets that have been developed. At this stage, an evaluation is carried out on the pretest-posttest value of creative thinking skills in terms of n-gain and effect size to find out how much impact is given by implementing project-based students' worksheet to improve students' creative thinking skills.

Tabel 2. Teacher's questions and responses

Question	Teacher's Respons
What is the learning method applied in teaching environmental pollution material?	Lectures : 73.3%
	Discussion : 12.7%
	Experiment : 8%
	Experiment + Discussion :6%
What are the barriers to developing creative thinking skills in science learning?	- Do not understand creative thinking skills - Lack of student interest in developing their own competence - Limited ability of teachers in understanding thinking skills
How do you improve your creative thinking skills in science learning?	- Give questions - Discussion
What teaching materials do you usually use in science learning?	Textbook : 48%
	Module : 16%
	Lkpd : 12%
	Package Book : 24%

The results of observations made in Table 3, it turns out that teachers have not conditioned learning that allows students to get maximum creative thinking skills, this is based on the results of interviews with 42 science teachers in Lampung Province showing 73.3% of teachers carry out learning still using the lecture method, 12.7% discussion while only 8% experiment and practice creative thinking skills by giving questions taken from the student's handbook itself, but the indicators of creative thinking skills understood by the teacher are different from the indicators of creative thinking skills that should be measured.

The use of learning media will be more effective if the teacher in the learning process optimizes learning activities in the classroom by using a learning model that is in accordance with the material being studied by students (Yu, 2012). One of the science materials that is very close to the context in real life is environmental pollution because it is not enough to just teach science concepts, but science concepts must be prepared to

answer the problems of everyday life (Hendri & Defianti, 2015). Problem-based learning helps students use knowledge in understanding problems related to real life (Sanjaya, 2010). Learning with project based learning models provides opportunities for students to develop the ability to identify phenomena that exist in the surrounding environment as local areas that have the potential to be used as learning media (Vasminingtyas, 2014).

Creative thinking skills students are able to develop are influenced because in project-based learning students are encouraged and guided to think about solving life problems that exist from various perspectives of each student (Siew and Ambo, 2020). Most students also learn to use different tools and materials in different ways to create new products. According to Savery (2015) states that the environment requires an interdisciplinary approach consisting of unique expertise by immersing various disciplines to develop possible solutions. Each group in the learning, is given the freedom to express opinions in making projects. Students are also given the freedom to try new things in order to create original products, so that the latest products from each group will be created with different components of tools and materials and students are also able to create detailed performance steps so that the desired product fits . Ramani and Brownell (2014) state that children who are involved in the problem-solving process while working together in peer groups are the key to generating more new solutions to a problem.

▪ CONCLUSION

The survey results show that teachers have positive perceptions about improving students' creative thinking skills which are implemented through learning using project-based or problem-based student worksheets by processing bagasse waste. Based on the teacher's perception of the analysis that has been done, most of the teachers have not utilized the creative thinking skills of students in the learning process. This is because the models and methods are not appropriate and do not use learning tools such as student worksheets during the learning process. The challenge of a teacher is to provide an education system that connects knowledge and skills that are not yet familiar to each student so that students are more dominant by memorizing concepts rather than connecting concepts with everyday life.

Despite the challenges of teaching science in the classroom, teachers realized that they had to create a new and experiential learning environment. Based on these findings, it can be concluded that teachers need learning activities that can improve creative thinking skills. In this regard, science learning requires student worksheets based on bagasse waste treatment projects that can be used and effectively to improve students' creative thinking skills actively in the learning process.

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