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DEVELOPMENT OF STUDENT WORKSHEETS BASED ON PROJECT BASED LEARNING (PJBL) ON THE TOPIC OF BIODIVERSITY FOR CLASS X

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ABSTRACT

This research focuses on the development of Learner Worksheets (LKPD) based on interviews with biology teachers and observations of student needs. It was found that the use of LKPD is still rare, some have never used it, and the existing LKPD is not project-based. Therefore, LKPD is needed that can increase student creativity through project activities. The purpose of this study was to develop the LKPD, assess its feasibility (by material experts, learning experts, and design experts), and evaluate teacher and student responses, as well as its effectiveness on learning outcomes and student creativity. The development model used is the 4D model (Define, Design, Develop, Disseminate). LKPD is designed according to the needs of students and prepared based on LKPD preparation guidelines. The feasibility of LKPD was tested by material experts (87.14%), learning experts (97.33%), and design experts (77.33%) with very feasible and feasible categories. Teacher (97.33%) and student (92.96%) responses were also very positive. The LKPD was then tested on the experimental class X-A. Effectiveness was tested through pretest and posttest results which showed significant differences between experimental and control classes.

Keywords : LKPD Feasibility, N-gain Learning Outcomes, Project Based Learning, Student Worksheets .

INTRODUCTION

In the curriculum merdeka, a teaching material is needed that can implement the dimensions located in the curriculum itself and implement the existing dimensions, the teaching material is also expected to support students in their learning activities and the achievement of learning activity goals. one of them is student worksheets. The use of interesting student worksheets in learning that applies to an independent curriculum is considered capable of supporting the achievement of learning objectives (Bailey et al., 2016). Students can carry out their learning tasks through activities they are interested in, diagnostic assessments carried out before learning can be used as guidelines in compiling activities on student worksheets (Hernawan et al., 2012). In addition, student worksheets are also needed to ensure the achievement of competencies to be achieved by students. For this reason, interesting student worksheets are needed and in accordance with the curriculum so that students are more active and understand more about learning, especially biology learning that will be taught.

One of the biology learning materials in the kurikulum merdeka in class X is biodiversity material. Biodiversity material is a complex material because it studies the diversity of gene levels, types, and ecosystems. Based on the results of a questionnaire that researcher distributed, in learning biology students think that biology lessons are lessons that are classified in the moderate to difficult category, this is what causes students to tend to be less active. this is because biological material contains a lot of reading and has a lot to do with Latin which is difficult to remember. besides that, from the results of direct researcher observations of teaching materials used, namely the package books used at this time, the student worksheets in it mostly solve problems where the problem is told in the form of dense paragraph writing. In addition, the existing student worksheets are only sourced from textbooks and are only used when giving homework. Therefore, the material was chosen as the material in the student worksheet that the researcher will develop. In addition, biodiversity material is directly related to the environment, so that the knowledge gained through this learning can improve learning outcomes and foster students' environmental awareness.

Researcher found that the use of student worksheets as teaching materials for biology learning, especially biodiversity material, is still rarely used, especially those based on Project Based Learning (PjBL). The student worksheets used are mostly only in the form of student worksheets in the form of homework in the book and do not have an attractive design and do not guide students in finding and understanding the concept of biodiversity. In addition, the existing student worksheets also do not provide learning experiences for students to freely experiment and explore the potential they have to create because most of the worksheets in the book are only based on problem solving without creating a project that can make students understand more and be more creative. For this reason, it is necessary to develop student worksheets based on Project Based Learning (PjBL) so that students become more active, creative, and innovative with the Basic Competencies of Analyzing various levels of biodiversity in Indonesia along with threats and conservation and being able to present the results of observations of various levels of biodiversity in Indonesia and proposals for its conservation. The purpose of this study was to develop the LKPD, assess its feasibility (by material experts, learning experts, and design experts), and evaluate teacher and student responses, as well as its effectiveness on learning outcomes and student creativity.

RESEARCH METHODS

Research Design

This research used Thiagarajan's 4D development model as a model for developing student worksheets.The stages in the 4D development model include defining, designing, developing, and disseminating.The revised student worksheets have been validated based on experts and then given to teachers and students to ask for teacher and student responses during the learning activities. After this stage is complete, the student worksheets are disseminated and tested for their effectiveness on student learning outcomes.

Subject and Object

In this development research, several research subjects were used. The research subjects were biology teachers and students of class X-A as many as 36 people. The object of this development research is a Project Based Learning (PjBL) based student worksheet on the topic of biodiversity. To determine the effectiveness of student worksheets by involving 72 students, namely classes X-A and X-G

Instrument

In this instrument, the aspects that will be assessed by material expert are the feasibility of the identity of student worksheets, presentation of material and use of language (Table 1.).

Table 1. Instrument Grid of Material Expert Validation

No	Indicator	Item Number
1	Identity student worksheets	1,2,3,4
2	Material serving eligibility	5,6,7,8,9,10,11,12
3	Language	13,14,15

In this student worksheets feasibility instrument, the aspects that will be assessed by learning experts are aspects of the feasibility of content and presentation of Project-Based Learning (Table 2.).

Table 2. Instrument Grid of Learning Expert Validation

No	Indicator	Item Number
1	Fill Eligibility	1,2,3,4,5,6
2	Presentation of project-based learning	7,8,9,10,11,12,13,14,15

In this student worksheets feasibility instrument, aspects that will be assessed by design experts are in terms of format, cover design and content design of the student worksheets created.

Table 3. Instrument Grid of Design Expert Validation

No	Indicator	Item Number
1	Format student worksheets	1,2,3
2	Cover design student worksheets	5,6,7,8,9,10
3	Content design student worksheets	11,12,13,14,15

In this student worksheets feasibility instrument, the aspects that will be assessed by biology teachers are the display of student worksheets, content feasibility, presentation feasibility, and language.

Table 4. Instrument Grid of Biology Teacher Validation

No	Indicator	Item Number
1	Student worksheet's view	1,2,3
2	Fill eligibility	4,5,6
3	Serving eligibility	7,8,9,10,11,12
4	Language	13,14,15

In this instrument, the aspects that will be assessed by students are the attractiveness of the design of student worksheets in terms of student interest in reading and working on them, the presentation of student worksheets, project-based learning-based learning components, and Language.

Table 5. Instrument Grid of the Response of students to the Student worksheet

No	Indicator	Item Number
1	Design student worksheets	1
2	Presentation of student worksheets	2,3,4,5,6,7
3	Project-based learning components	8,9,10,11,12,13
4	Language	14,15

Procedure

The development model refers to the 4D model (Define, Design, Develop, and Disseminate) according to Thiagarajan et al (1974). The 4D procedure is described as follows. The first stage is define, which is to conduct a needs analysis and curriculum analysis. The second stage is design where the student worksheets are designed in accordance with the guidelines for developing student worksheets. The third stage is the validation stage of student worksheets based on material experts, design experts and design experts and learning experts as well as teacher responses and student responses to the attractiveness of the student worksheets. In the last stage, namely disseminate, student worksheets that have been validated and revised are disseminated to determine the effectiveness of student worksheets.

Data Analysis Techniques

The results of questionnaires from material experts, learning experts, design experts and the responses of biology teachers will be analyzed using the Likert scale (Table 6.).

Table 6. Answer criteria validation instrument item with likert scale

Answer	score
Very decent	5
Proper	4
Pretty decent	3
Not worth it	2
Very decent	1

(Sugiyono, 2017)

To calculate the feasibility rate by using the formula:

$$P = \frac{\Sigma}{N} \text{ X } 100\%\text{Information:}$$

P = Percentage of Categories

∑ = Number of answers score of selected categories

N = Total skor ideal

The product will be said to be effective if there is a significant difference between the prestest and posttest scores obtained by students. To determine the level of effectiveness of product use, N-Gain analysis is carried out using the formula:

$$< g > = \frac{\% \left(s_f\right) - \% \left(s_i\right)}{100 - \%\left(s_f\right)}$$

Information:

$< g >$ = Score of N-Gain

s_f =Average of Posstest score

s_i = Average of Posstest score

The interpretation of the values of the N-Gain score analysis results is shown in Table 7.

Table 7. Categorize of N-Gain Score

Interval	**Category**
(<g>) < 0.3	Low
0.3 ≤ (<g>) < 0.7	Keep
(<g>) ≥ 0.7	Tall

(Hake, 1998).

RESULT AND DISCUSSION

Feasibility of Project-Based Learning Student Worksheets on Biodiversity Material

In the material expert assessment, there are three aspects that are assessed including the identity of the LKPD, the feasibility of presenting the material, and the language. The three aspects are further divided into several indicators with the number of description items that must be assessed as many as 14 items. The assessment of the material expert obtained an average of 87.14% with the criteria “very feasible”.

In the learning expert assessment, there are two aspects that are assessed including the feasibility of content and the feasibility of presenting project-based learning. Both aspects are further divided into several indicators with the number of description items that must be assessed as many as 15 items. The assessment from the material expert obtained an average of 97.33% with the criteria of “very feasible”.

In the assessment of design experts, there are three aspects that are assessed, namely the LKPD format, LKPD cover design, and LKPD content design. The three aspects are then divided into several indicators with the number of description items that must be assessed as many as 15 items. The assessment from the material expert obtained an average of 77.33% with the criteria of "feasible".

The validated student worksheets are then given to teachers and students to be responded to. The aspects assessed by the teacher consist of three aspects, namely the appearance of the LKPD, the appropriateness of the content and presentation and language. The average percentage of assessment from teacher responses is 97.33% with very appropriate criteria. Meanwhile, student responses consist of four aspects, namely LKPD design, LKPD presentation, project-based learning components, and language. The average percentage of assessment from teacher responses is 92.96% with very appropriate criteria.

Based on teacher responses to student worksheets, it is known that this student worksheet is suitable for use with an attractive appearance and appropriateness of content and presentation and language that meets. Likewise, with student responses, it is known that the booklet has met the aspects of an attractive LKPD design, an attractive and appropriate LKPD presentation, contains project-based learning components and the language used is easy to understand. This is in line with the opinions of experts who state that a learning resource is effective and can be used in learning if it meets the aspects of appropriateness of content, presentation, language and design (Ramda, 2017).

Effectiveness of Using Student Worksheets Based On Project Based Learning On The Topic Of Biodiversity

This study aims to evaluate the feasibility and effectiveness of using Project-Based Learning (PJBL) Student Worksheets (LKPD) in teaching biodiversity to high school students. The study involved two classes at SMA N 1 Sumbul: class X-A (experimental class) using LKPD and class X-G (control class) using only textbooks. Both classes took a pretest on biodiversity to assess their initial knowledge, with the experimental class scoring an average of 37.86 and the control class scoring 47.3.

After learning the same material (biodiversity) with different methods, both classes took a posttest. The data from the pretest and posttest were analyzed using an independent sample t-

test, which showed a significant difference in the posttest scores between the experimental and control classes, indicating that the experimental class performed better.

Further analysis with the N-Gain test revealed that 31 students in the experimental class had a high improvement in learning outcomes, while only 5 students in the control class had similar improvement. The average N-Gain for the experimental class was 0.79, indicating high effectiveness.

T hese findings support the use of PJBL-based LKPD in enhancing student learning outcomes, as also evidenced by previous studies. Therefore, the PJBL-based LKPD is deemed effective and feasible for use in biology education.

CONCLUSION

Based on the results of the research on the development of student worksheets (LKPD) based on project-based learning, it can be concluded that:

1. The feasibility of student worksheets (LKPD) based on project-based learning on the topic of biodiversity according to material experts, learning experts and design experts is in the very feasible category.
2. The response of biology teachers to student worksheets (LKPD) based on project-based learning on the topic of biodiversity is very feasible.
3. Student responses to student worksheets (LKPD) based on project-based learning on the topic of biodiversity are in the very interesting category.
4. Student worksheets (LKPD) based on project-based learning on the topic of biodiversity are very effective in improving student learning outcomes, this can be seen from the N-Gain value in the experimental class which has high criteria.

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