

The Development of Student Worksheet Materials Teaching in a Project-Based Learning Approach

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ABSTRACT

This study aims to describe the development of Student Worksheet materials teaching the Project Based Learning approach at MTs An-Nashuha Kalimukti Pabedilan-Cirebon Regency in mathematics learning on opportunity material. Mathematics learning is done by applying the project-based learning approach with a sample class of 35 students. The method used is the cluster random sampling technique, which takes clusters or groups, not based on population members taken one by one or individually. The use of data is a test instrument in the form of a pretest and posttest to measure the value of student results of learning outcomes and a questionnaire to determine student responses to the use of worksheets with the Project Based Learning approach. The pretest and posttest tests show that students have increased, Normal and homogeneous distribution. Furthermore, to determine the effectiveness of teaching materials, researchers used the Paired Sample t-Test. The Paired Sample t-Test calculation results showed a significance value of 0,000. Thus the significance value is smaller than 0.05, and 10.280 is more incredible than t table 2.04. Based on the results of the calculation of $t_{count} > t_{table}$, H_0 is rejected. Because there are, there are differences in the average initial and final scores on the subject matter of opportunities and the use of Student Worksheet teaching materials as the development of materials teaching products are considered quite effective.

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1. INTRODUCTION

Various methods are used to obtain a quality education, from providing information and explaining material to practicing in the field. Human Resources is the most important thing to provide solutions for improvement, namely education. Some prominent elements in the learning process are teaching materials, learning media, teaching methods, and learning strategies [1]–[5]. In the teaching and learning process in the classroom, the role

of a teacher is significant because the teacher has a role as an educator, meaning that the teacher assists students in achieving understanding in the discussions taught to students, especially in mathematics subject matter [6].

One of the competencies that educators need to have is developing innovative learning media [7]–[10]. The development of teaching materials needs to be carried out by educators for the process of learning activities to be more effective and precise and follow the targets of the competencies to be achieved. Nevertheless, there are still many teachers whose learning process is still conventional. As a result, teachers are more dominant with less active students because learning is less varied.

They know that the teaching materials consist of printed and non-printed teaching materials. In learning activities, teaching materials are helpful for teachers and students [11], [12]. Mathematics is one of the subjects that occupy an essential role in the world of education, from kindergarten to university. Few students think mathematics is a complex subject requiring extra attention [13]–[17]. Students often experience boredom in learning, so their motivation decreases, which can also affect their learning outcomes.

Opportunity material in mathematics requires special skills, conceptual understanding, and application. Most of the students have difficulty learning this material. However, this is often overlooked by students. They assume that what they have learned before will have nothing to do with the following material. So they have difficulty in further learning activities. Teaching materials are materials or subject matter that are systematically arranged, both written and unwritten, and used by teachers in classroom learning to create an atmosphere or learning environment that allows students to be interested in learning to achieve predetermined competency standards [18].

Context or everyday language in learning opportunities cannot be separated from the sources or teaching materials used by the teacher in learning. Many appropriate learning resources can reduce students' misconceptions about opportunity material. One of the learning resources that can be used is the Student Worksheet. Teaching materials require a learning model to improve students' understanding and skills. That shows that the teaching materials prepared must be following learning models that can improve student learning outcomes in working on project assignments on these teaching materials. Besides that, they can also develop thinking skills and problem-solving skills so that students become more independent and creative. That means that students are more daring to express their opinions, appear independently in front and dare to participate with creativity in groups that have been formed in class.

The Ministry of Education and Culture [19] defines project-based learning as a learning model that uses problems to collect and integrate new knowledge based on experience in actual activities. Students' independence in learning to complete the tasks they face is the goal of Project Based Learning. However, independence in learning needs to be trained by teachers to students get used to learning when using Project Based Learning [20]–[25]. Elementary and junior high school students still need to be guided in completing project assignments, even high school students. Teacher guidance is needed to direct students so the learning process can run according to the learning flow.

Previous research related to the discussion in the current study, which Barlenti [26] wrote under the title "Development of Project-Based Learning-Based Worksheets to Improve Concept Understanding," aims to develop Project Based Learning-based worksheets to improve conceptual understanding. The research design used was one group pretest and posttest. The research was carried out using the Research And Development (R & D) method and the analysis, design, development, implementation, and evaluation (ADDIE) model. The sample of 24 students of class IX IPA 1 was selected by purposive sampling. The data collection instruments used were expert assessment sheets, questionnaires, students, and tests. The results of data analysis showed that the LKS based on Project Based Learning had met the suitable criteria. The assessment of the feasibility of the Project Based Learning-based LKS by the experts got an average score of 4.80 in the excellent category, the results of the student learning test showed an average N-Gain of 55.7 in the medium category, and student responses of 88.96% with good category. It shows that the Project Based Learning-based worksheets that have been developed are feasible to be applied to high school students.

Based on the previous research, the researcher discussed the "Development of Student Worksheet Teaching Materials on the Project Based Learning Approach. This research is in one of the private schools in Cirebon Regency. Based on preliminary research results, students at the school are less able to master mathematical concepts, especially in matters of opportunity. Students also still find it very difficult to work on the questions on this opportunity material. It is because they are less able to understand the concept of mastery of the previous material and are less able to solve mathematical problems, in this case, the material of opportunity.

2. METHOD

The research used in this research is research and development. Sugiyono [27] explains that research and development methods, or in English research and development, research methods are used to produce specific products and test the effectiveness of these products. Research design is all the processes needed in planning and carrying out research. Therefore, the research entitled: "Development of Student Worksheet Teaching Materials on the Project Based Learning Approach at MTs An-Nashuha Kalimukti, Pabedilan District, Cirebon Regency.

The first stage is to determine the research objectives and the formulation of the problem in the research. Before doing research, we must know what problems we want to find answers to through our research. Usually, individuals or organizations conduct research to influence or persuade an audience, create innovations, and understand or predict human behavior or phenomena. The second stage is to determine the research approach. At this stage, the activities include searching for the underlying theory and formulating problems and hypotheses. The approach taken in research can be different depending on the research problem. In general, there are four research approaches, namely the quantitative approach, qualitative approach, pragmatic approach, and advocacy approach.

The third stage is to formulate the research design. The research design formulation stage is still in the planning process. In this stage, we choose the research classification to

be used, make hypotheses (for quantitative research), determine data collection methods, design data collection tools and measurement scales, select and determine the number of respondents, and plan data analysis methods. The fourth stage is data collection. Data collection includes selecting work areas, conducting field staff training, supervision, data validation, and evaluation.

The fifth stage is to Prepare and analyze data. The data that has been collected is then checked or edited. Then the code is given to represent each response to the question. After that, a transcript is made and stored in storage media or inputted directly into the computer. The data that has been inputted is then processed using the software so that it can be analyzed. The sixth stage is to prepare a research report. For the results of research findings to be helpful in decision-making and can be understood by others, the research results must have a report.

Sampling in this study was obtained using the "cluster random sampling" technique, namely the sampling technique by taking clusters or groups, not based on population members taken one by one or individually. The sample in this study was class VIII B with 35 students with the following details:

Table 1. Distribution of research samples

Gender	Total Students
Man	17
Woman	18
Total	35

Data collection techniques are used in collecting data, while data collection techniques are used in research tests and questionnaires. The test was made to obtain data regarding learning outcomes by using the development of student worksheet teaching materials with a Project Based Learning approach based on pretest and posttest scores. At the same time, the Questionnaire is used to measure students' abilities and see student responses to the development of student worksheet teaching materials with a Project Based Learning approach.

3. RESULTS AND DISCUSSION

3.1. Results

1. Student responses to Student Worksheets with a Project-Based Learning approach

Student response questionnaires were also given to students after learning, which aimed to determine student responses using Student Worksheets with a Project Based Learning approach. The results of the recapitulation of student responses can be seen in table 2 below. From the data presented in table 2 below, it can be seen that students' responses to the worksheets made can be said to be good and accepted by students. Based on the response, the average obtained regarding student worksheets is 69.50, or in the strong category. The result shows that the worksheets that are created and used in learning can have a positive impact on students.

Table 2. Recapitulation of Student Worksheet Assessment Results with a Project-Based Learning approach

No	Assessment Aspect	Percentage (%)	Interpretation
1	Appearance	78,75	moderate
2	Material presentation	58,75	Strong
3	Benefit	71,00	Strong
	Average	69,50	Strong

2. Data recapitulation of student test results

The t-test used in this study aims to determine whether there is a difference in the experimental class's initial and final scores. Researchers used the SPSS version 20.0 program with the results in the following table:

Table 3. Paired Sample t - Test

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Initial score	49,50	30	12,989	2,371
	Final score	73,83	30	9,688	1,769

Table 3 above shows that the initial average value is 49.50, while the final score is 73.83. Thus there is an increase from the initial score to the end. The results in table 3 above show that student worksheets on the Project Based Learning approach can improve learning outcomes, namely providing significant motivation for students and increasing.

3.2. Discussion

1. The validity of the student worksheet teaching materials on the Project Based Learning approach in learning

Teaching materials are a set of materials that are systematically arranged, both written and unwritten, to create an environment or atmosphere that allows students to learn. Teaching materials are used in the mathematics learning process on Student Worksheets on the Project Based Learning approach in class VIII MTs An-Nahuha Kalimukti. The researcher only limits the six steps of the development procedure, namely 1) Determining the research objectives and formulating the problem in the research. Before we do research, we must know what problems we want to find answers to through our research. 2) Determining the research approach At this stage, the activities include searching for the underlying theory and formulating problems and hypotheses. Formulate research designs. 3) The research design formulation stage is still in the planning process. In this stage, we choose the research classification to be used, make hypotheses (for quantitative research), determine data collection methods, design data collection tools and measurement scales, select and determine the number of respondents, and plan data analysis methods. 4) Data collection: The process includes selecting work areas, conducting field staff training, supervision, data validation, and evaluation. 5) Prepare and analyze data; the data that has been collected is then checked or edited. 6) Prepare research reports so that research findings can be

helpful in decision-making and be understood by others; the research results must have a report.

After the Student Worksheet teaching materials on the Project Based Learning approach were compiled and made, the Student Worksheet was validated by three experts. The three validators provide an assessment by filling out the validation sheet for the Student Worksheet teaching materials the author has provided. In addition to providing an assessment of the Student Worksheet teaching materials on the Project Based Learning approach, the validator also provides several inputs so that researchers can correct the shortcomings of the Student Worksheet and make the Student Worksheet perfect. It can be explained that in the feasibility aspect of the contents of the Student Worksheet with the Project Based Learning approach, it is included in the Very Eligible category with a total score of 89% in the presentation feasibility aspect, obtaining a score of 89%, including in the Very Eligible category, in the language assessment aspect, obtaining a score of 62%, including in the Eligible category. Moreover, in the assessment aspect of Project Based Learning, a score of 83% was included in the Very Eligible category.

2. Student responses in the use of Student Worksheet teaching materials in the Project Based Learning approach

Researchers conducted questionnaires to find student responses to Student Worksheets on the Project Based Learning approach, obtaining N as the number of respondents. In general, students like the benefits of the Student Worksheet in this Project Based Learning approach because using the Student Worksheet, it is easier for students to work on the questions given by the teacher.

That can be seen from the percentage of student response indicators obtained from student assessments of 18 statement items, namely the Ease of learning indicator has an average score percentage of 78%, Interest Indicators using teaching materials Student Worksheets have an average score percentage of 77 %, Increased motivation has an average score percentage of 59%. Thus, it can be concluded that the development of Student Worksheet teaching materials on the Project Based Learning approach received a good response from students; in this project learning, students have Ease of learning, interest in using Student Worksheet teaching materials, and increased motivation. Project learning encourages students to actively participate in the learning process, including being active in project activities and group discussions to complete projects; students carry out the project by completing several instructions by seeking their knowledge.

3. Improving learning outcomes by using student worksheet teaching materials in the Project Based Learning approach

Based on the results of the SPSS output using the Kolmogorov-Smirnov test in the table, it can be seen that the significance column is 0.200; because the significance is $0.200 > 0.05$, it can be concluded that the data is normally distributed. Based on the results of the SPSS output, it can be seen that the value for the significance is 0.234; because the significance value is $0.234 > 0.05$, it can be concluded that the data value is homogeneously distributed. The researchers conducted a hypothesis prerequisite test to

determine whether the data were normally distributed and homogeneous. The results obtained, namely, the data, are normally distributed and homogeneous. To find out how effective the development of student worksheet teaching materials with the Project Based Learning approach is, calculations are carried out using the paired sample t-test. Based on the paired sample t-test above, the significance value is 0.000. thus the significant value is less than 0.05, and tcount 10.280 is more incredible than ttable 2.04. The value of ttable is obtained from the excel program by =tinv (0.05;30), then enter. Thus tcount > ttable Ho is rejected. That means that there is a difference in the average initial score and final score. That shows that student worksheets on the Project Based Learning approach can improve learning outcomes, namely providing significant motivation for students and increasing. The suitability obtained both theoretically and through research data, the researchers concluded that one way to improve learning outcomes is by using effective and efficient teaching materials, which adequate facilities and suggestions also support to create a pleasant learning atmosphere.

4. CONCLUSION

Based on the results of research, processing, and data analysis that has been carried out, researchers can conclude several things related to the development of teaching materials for Student Worksheets on the Project Based Learning Approach that has been carried out at MTs An-Nashuha Kalimukti, Pabedilan District, Cirebon Regency. Teaching Student Worksheets on the Project Based Learning approach, this development researcher produces a product in the form of Student Worksheets on the Project Based Learning approach. Based on the validity of 3 media experts with an average percentage of 80.75%, the product quality is included in the category of feasible to use in the learning process.

In addition, the results of data processing and the questionnaire analysis of student responses to the Student Worksheet teaching materials on the Project Based Learning approach showed very good criteria with an average percentage of 69.50% obtained from the percentage of each questionnaire indicator with each indicator. Namely, the display indicator has an average percentage of 78.75%, the material presentation indicator has an average percentage of 58.75%, and the benefit indicator has an average percentage of 71%. In addition, the improvement of learning outcomes in class VIII students of MTs An-Nashuha Kalimukti, Pabedilan District, Cirebon Regency, based on the results of the pretest and posttest tests, showed that students experienced an increase.

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