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DEVELOPMENT OF AL-MASTER MODEL-BASED LKPD TO IMPROVE CRITICAL THINKING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS

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Abstract

This study aims to develop and review the effectiveness of learning LKPD based on the AL-MASTER model to improve students' critical thinking skills. The research was conducted at SMP Negeri 1 Purbolinggo. This type of research is research and development or Research and Development (R&D). The research and development process includes four stages: defining, planning, developing, and disseminating. The analysis included (1) data analysis of questionnaire validation of teaching materials and respondents and (2) analysis of critical thinking ability test data. The results of the analysis show that after using the AL-MASTER Model-based LKPD, it can be concluded that (1) The average results of expert assessment of the feasibility level of product development are in the feasible category, (2) The results of product trials and reviewing students' critical thinking skills show an increase in the Pre-Test average and the Post-Test average in class VIII.1 and the results of the N-gain percentage for that class were 68.74% with quite effective criteria, (3) Learning showed that time efficiency in class VIII.1 was quite efficient and the percentage of completeness in the experimental class was 74.17% or 26 students complete while the percentage of completeness, and (4) the response of teachers and students in the category was exciting.

Keywords: AL-Master models; Critical Thinking Ability; LKPD

Abstrak

Penelitian ini bertujuan untuk mengembangkan dan meninjau efektifitas pembelajaran LKPD berbasis model AL-MASTER untuk meningkatkan kemampuan berpikir kritis peserta didik. Penelitian dilaksanakan di SMP Negeri 1 Purbolinggo. Jenis penelitian ini merupakan penelitian dan pengembangan atau Research and Development (R&D). Proses penelitian dan pengembangan meliputi empat tahapan yaitu: pendefinisian, perencanaan, pengembangan, penyebaran. Analisis yang dilakukan mmeliputi (1) analisis data lembar angket validasi bahan ajar dan responden, dan (2) analisis data tes kemampuan berpikir kritis. Hasil analisis menunjukkan bahwa setelah penggunaan LKPD berbasis Model AL-MASTER diperoleh simpulan bahwa (1) Hasil rerata penilaian ahli terhadap produk pengembangan tingkat kelayakan dalam kategori layak, (2) Hasil ujicoba produk dan meninjau kemampuan berpikir krtisi peserta didik terdapat peningkatan rerata Pre-Test dan rerata postest pada kelas VIII.1 dan hasil persentase N-gain untuk kelas tersebut sebesar 68,74% dengan kriteria cukup efektif, (3) Pembelajaran menunjukan bahwa efisiensi waktu pada kelas VIII.1 cukup efisien dan persentase ketuntasan kelas eksperimen sebesar 74,17% atau 26 peserta didik tuntas sedangkan persentase ketuntasan, dan (4) Respon guru dan peserta didik daam kategori sangat menarik

***Kata kunci**: Kemampuan Berpikir Kritis; LKPD; Model AL-Master*

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INTRODUCTION

Learning mathematics is not just memorizing formulas; students must think critically about how to get answers according to concepts and steps. Looking at critical thinking skills, Wang (2021) suggests activities identify problems, explore information relationships, determine alternative priorities, and integrate strategies. In addition, Critical thinking skills are critical because they aim to find relevant and reliable knowledge relationships with life (Ainin et al., 2020; Güner & Gökçe, 2021; Maryati et al., 2020). (Alpusari et al., 2020) that critical thinking skills are applied in the study of mathematics, both studying procedural knowledge so that the facts contained in each stage are easy to understand, as well as conceptual knowledge, which requires high-level thinking that connects existing facts so that concepts can be conveyed.

Learning devices play an essential role in learning activities because they are guidelines, a measure of learning success and a means of achieving learning goals. Efforts to improve critical thinking are designed as the best learning tools possible through scientific method-based learning. One important learning tool to develop is the Student Activity Sheet. Worksheets can help teachers focus students' attention on finding concepts through group activities (Darmayanti et al., 2022). Other components of the worksheet are (1) subjects, semesters, and places, (2) learning instructions, (3) competency objectives, (4) indicators, (5) supporting information, (6) tasks and work steps; and (7) assessment.

Based on the results of observations at Purbolingo 1 Public Middle School by reviewing student learning outcomes on the scope of mathematics material. It showed that student learning outcomes on geometry material, Pythagorean material, circles and geometric shapes still need to be improved.

The interview results with the mathematics teacher, namely Mr Abdul Rahman, S.Pd., related to the learning process carried out, obtained the conclusions (1) the teacher has implemented a learning model based on a scientific approach, that is, seen from the lesson plan document (RPP) made; (2) the direct observation results by reviewing the learning implementation found that the learning implementation carried out was not by design made in the lesson plan; (3) Learning only uses textbooks and worksheets taken from the internet without being developed according to the needs of students at school; and (4) the questions given as the final assessment did not emphasize students' high-level abilities, especially critical thinking skills. In addition, the student worksheet used by the teacher was taken from the internet with the writer Kholis Husniati, so the teacher did not know what the writer wrote about the skill goals of the student worksheet. In addition, the student worksheet only contained learning activities that asked students to look for material, sample, and practice questions. There are still several elements, components and principles of student worksheet PD that do not yet exist in the student worksheet.

Efforts to develop optimal students' critical thinking skills require interactive classes, students are seen as thinkers, not as teachers, and teachers act as mediators, facilitators and motivators who help students learn (Mahur et al., 2019; Maksum et al., 2020). Given that each student has different comprehension abilities and difficulties solving problems given by

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the teacher, it is hoped that the teacher will be able to master subjects by the educational goals to be achieved.

The use of exciting worksheets in classroom learning activities can direct students to discuss with group mates and exchange opinions with each other. student worksheet is one of the tools to facilitate the learning process to form more active interactions between teachers and students and can improve student learning achievement. The student worksheet existence makes learning directed by the learning objectives to be achieved. The teacher designs student worksheet for students in sheets containing instructions and steps for solving problems in student worksheet in groups or independently.

Applying a learning model that needs to be developed is expected to improve student learning outcomes by working together to solve problems to develop critical thinking skills, find something for themselves and discuss these problems with their friends applying the AL-MASTER learning model. The AL model is a learning model that involves active students in solving a problem and asking why the problem arises. Where in terms of terminology is a pattern used in learning that is designed in such a way as to arouse students' learning abilities, make learning more fun and faster, as well as critical thinking skills (Arisoy & Aybek, 2021; Bulu & Tanggur, 2021; Janah et al., 2021).

AL is a learning model where students are both subjects and objects and is done fun. Thus, it can accelerate students' understanding, acceptance and master lessons to improve learning achievement. AL (accelerated learning) aims to improve students' learning abilities, make learning fun and satisfying, and provide competence, intelligence, and success as human beings (Safitri et al., 2019). The AL model consists of six steps abbreviated as MASTER (Mind, Acquire, Search Out, Trigger, Exhibit, and Reflect). (Tuhuteru et al., 2023) explain the AL teaching planning framework with the MASTER, including activities (1) *motivating your mind*, (2) *acquiring the information*, (3) investigating the meaning, (4) *triggering memory*, at this stage repetition of material is very important, (5) *exhibiting what you know*, (6) *reflecting how you've learned*.

Previous research has also shown the success of implementing the AL model and concluded that the reasoning and students' mathematical communication abilities who received AL learning were better than conventional learning. Through such activities, students' reasoning and communication skills will develop well. (Saenab et al., 2020) Concluded that the AL learning model with the MASTER type increased students' critical thinking skills from before the action until the action was completed. This shows that the AL learning model is fun and can improve students' thinking skills, making learning in the classroom more meaningful. Putra et al. (2023) stated that students need critical thinking to think at a higher level in problem-solving, such as analyzing, drawing conclusions, connecting, synthesizing, criticizing, creating, evaluating, and rethinking.

METHODS

The research was conducted at SMP Negeri 1 Purbolingo. This research type is Research and Development (R&D), which aims to conduct activities series in developing, testing validity, testing practicality and testing the products resulting

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effectiveness from the development process. The product produced in this study is an AL-MASTER model-based worksheet to improve students' critical thinking skills equipped with a Learning Implementation Plan (lpd), syllabus and critical thinking ability test instruments. Developing student worksheets based on the AL-MASTER model to improve students' critical thinking skills uses the 4-D development model. The research and development process includes four stages: define, design, develop, disseminate or adapt to the 4-P model, namely definition, design, development and deployment.

The variables to be measured in this study consist of students' critical thinking skills. Critical thinking ability that is measured is the ability to solve problems in the form of the description given by reviewing critical thinking skills indicators according to Nur'azizah et al. (2021), namely (1) being able to understand logical relationships between ideas; (2) Able to formulate ideas concisely and precisely; (3) Be able to identify, construct, and evaluate arguments; (4) Able to evaluate decisions; (5) evaluating evidence and hypotheses capable; (6) Be able to detect inconsistencies and common errors in reasoning; (7) Able to analyze problems systematically; (8) Be able to identify the relevance and importance of ideas; (9) Being able to assess one's beliefs and values; and (10) Being able to evaluate a person's thinking ability.

Meanwhile, this study's subjects were divided into product validation and product trial research subjects. The product validation research subjects comprised three material, media and language experts, two respondents and nine class IX students. The subjects of this study were FKIP UNILA lecturers, mathematics teachers and students at SMP Negeri 1 Purbolingo. In comparison, the subject of the limited trial research was conducted in class VIII. A is an experimental class that will be given a learning process using student worksheet based on the AL-MASTER model, and class VIII.B is a control class without student worksheet based on the AL-MASTER model. The sampling technique used was a simple random sampling technique because of the method of randomly taking samples from the population according to research needs. Determination of the sample using random selection and discussion with the teacher according to the class taught at SMP Negeri 1 Purbolinggo. The research design used in product trials is the Pre-Test-Posttes Control Group Design (Sugiyono, 2017) in Table 1.

Table 1. Research Design

Group	Pre-Test	Treatment	Post-Test
Experiment	O_1	X	O_2
Control	O_1	-	O_2

Data analysis is used to process predetermined research data. Data analysis carried out includes:

1. Data Analysis Questionnaire Sheet Validation of Teaching Materials and Respondents

Questionnaire sheet data validation analysis of teaching materials and respondents was conducted to review the product's validity and practicality. The formula (1) used in determining the value (N) of the questionnaire validation results of teaching materials and respondents:

$$N = \frac{S-m}{M-m} x\ 100\% \quad (1)$$

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Information:
N = Value
S = Number of scores obtained (validators and respondents)
M = Maximum total score
m = Sum of minimum scores

The way to provide an interpretation of the value obtained is by determining the product assessment criteria to give meaning or meaning to the value obtained on valid criteria and practical criteria.

Table 2. Criteria Valid and Practical

Score (%)	Valid Criteria	Practical Criteria
0 ≤ N ≤ 20	Very Invalid	Very Less Practical
20 < N ≤ 40	Less valid	Less Practical
40 < N ≤ 60	Pretty valid	Pretty Practical
60 < N ≤ 80	Valid	Practical
80 < N ≤ 100	Very valid	Very Practical

Based on Table 2, the development product will end when the valid criteria and practical criteria for product development meet the valid criteria if the category is valid, while the practical criteria if the category is efficient and practical.

2. Data Analysis Critical Thinking Ability Test

Analysis of critical thinking ability test data was carried out to determine the effectiveness of learning. Applying the AL-MASTER model-based student worksheet to improve students' critical thinking skills. There were differences in students' critical thinking abilities from two different learning groups. Before testing the hypothesis, a prerequisite test will be carried out first, namely the normality test and homogeneity test. This prerequisite test is carried out to determine whether the sample data comes from population data that is normally distributed and has a homogeneous variance.

1) Normality test

The data normality test was conducted to determine whether the research sample came from a normally distributed population or vice versa. The Normality test in this study uses the Chi-Square test.

With a significant level α = 0.05 and the statistical test that will be used, namely statistics according (Sudjana, 2016), is the normality test calculated by the chi-square test. (χ^2):

$$\chi^2{}_{hitung} = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \quad \ldots (2)$$

Information
E_i = Expected frequency
k = Number of observations.

2) Homogeneity Test

The variance homogeneity test was carried out to determine whether the two groups of data, namely the score data on the increase in critical thinking skills of students who took part in problem-based learning and those who took part in conventional learning, had a homogeneous or non-homogeneous variance. According to Sudjana (2016: 249).

3) Hypothesis testing

Hypothesis testing was carried out to find out whether there was a difference in the increase in critical thinking skills following learning using the AL-MASTER model-based student worksheet, which was higher than the increase in critical thinking skills of

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students who took learning without the AL-MASTER model-based LK student worksheet PD. After carrying out the prerequisite tests, namely the normality test and data homogeneity test, there are three possibilities, namely if the data from the two groups come from populations that are normally distributed and have the same variance if the data from the two groups come from populations that are normally distributed and have unequal variances, and if the data is not normally distributed. If the data is normally distributed and the variance is the same, then the similarity test of the two means is carried out using the t-test. The t-test used is the Paired Sample T-Test with the SPSS application.

RESULTS AND DISCUSSION

Results

Based on the development of the 4D development model, it was found that the product resulting from the development was a worksheet based on the AL-MASTER model to improve students' critical thinking skills. After the product is designed, testing is carried out on product validation and product trial research subjects. Product trials were conducted on two lecturers and one subject teacher, including material experts, teaching materials experts and language experts. Product validation results obtained data presented in Figure 1.

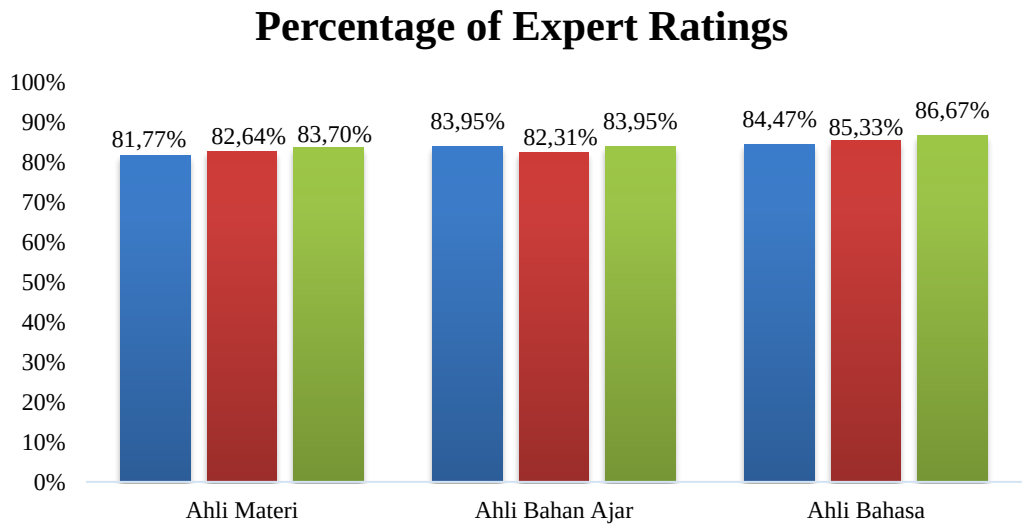

Figure 1. Expert Validation Percentage

Figure 2 shows the percentage scores of the three experts covering material, teaching materials and language, with each expert in the percentage range of 81% < N ≤100%. The expert's assessment average result towards the product development level eligibility in the feasible category.

Product trials were conducted to review the effectiveness, efficiency and attractiveness of using the AL-MASTER model-based LKPD to improve students' critical thinking skills. Product trials are essential to development research after design revisions are complete. Product trials are intended to collect data that can be used to determine the feasibility and attractiveness of the resulting product.

1. Learning Effectiveness

The product's effectiveness developed in mathematics subjects includes testing students' critical

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thinking skills, which are applied to product development results, namely worksheets based on the AL-MASTER model to improve students' critical thinking skills by reviewing data on the student's critical thinking skills test results in class VIII. The research was conducted in four meetings where the first meeting provided a design of the learning process to be carried out as well as a Pre-Test, the second to the third meeting provided learning according to the AL-MASTER model-based LKPD design to improve students' critical thinking skills which were developed, the fourth meeting provided post-test. The analysis was carried out to review the learning effectiveness of using the AL-MASTER model-based LKPD to improve students' critical thinking skills by reviewing the students' critical thinking skills results in tests after learning was carried out. The analysis reviews the Pre-Test data given before learning using the developed product and the Post-Test given after learning using the developed product. The Pre and Post-Test results are presented in Table 3.

Table 3. Pre-Test and Post-Test Results

Class	Information	Maximum Value	Min Value	Average
VIII.1	Pre-Test	56,18	0.00	37,13
	Postets	92.32	32,19	78,11

Table 3 shows an increase in the average Pre-Test and average Post-Test in both classes VIII.1. Furthermore, the data were analyzed using the N-Gain formula, and the percentage of N-gain for this class was 68.74% with sufficiently effective criteria.

2. Learning Efficiency

Efficiency in using products developed in the learning includes (1) time efficiency and (2) student learning efficiency. The analysis was carried out on observation sheets and questionnaires. The analysis results are presented in Table 4.

Table 4. Product Efficiency Analysis Results

Class Group	Time efficiency	Learning Efficiency
VIII.1	1,090	74.17%

Based on Table 4, it is found that from time efficiency in class VIII. One, it is pretty efficient; it only takes 110 minutes from the predetermined time of 120 minutes. In addition, from the student's learning efficiency of the learning completeness of students, it was found that the completeness percentage in the experimental class was 74.17% or 26 students completed while the completeness percentage was.

3. The Interests of Learning

The product's attractiveness is reviewed based on the teacher's opinions and class VIII-1 students regarding the products developed for the learning provided.

The teacher responded to one mathematics teacher who taught class VIII by assessing the resulting product development. Practitioner results obtained an average of 89.29 which indicates the eligibility criteria, namely "very interesting".

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Student responses were made to 34 students in class VIII.1 and obtained an average of 92.07, which both values indicate the eligibility criteria, namely "very interesting".

Discussion

Learning process activities with the MASTER model can strengthen students' cognitive structure when studying the subject matter. Students support this statement. After all the AL-MASTER stages have been carried out and based on the results of observations, it shows that the teacher has carried out all the learning stages activities: *motivating your mind*, *acquiring the information*, *searching out the meaning*, *triggering the memory*, *exhibiting what you know*, and *reflecting on how you have learned*. All stages of the learning process aim to focus on student learning activities to be more active, creative and innovative to make the learning atmosphere in class more effective. Before the closing of the learning process, the teacher delivers assignments to students.

At *the motivating your mind stage*, communication images are given in the form of comics and videos that have focused students' minds on building a desire to learn, impressions and messages, and discovering the benefits of learning. However, an obstacle at this stage: the lack of LCD projector facilities in schools. This makes it difficult to arouse students' enthusiasm for learning. The second stage of *acquiring* (*obtaining information*) allows students to obtain information about the subject matter concept by explaining the learning material concept clearly so that students easily understand it. At this stage, students can collect all the material to be understood and applied to the next stage. The observations results, students gave a good response. Students' enthusiasm in asking questions about the material being taught after receiving information. However, at this stage, the lack of learning resources (no manuals) used by students, so students only got the information provided and conveyed. It is challenging to allocate time to present information because this stage sometimes exceeds the specified time limit.

Searching out the meaning stage, students are allowed to apply the results of understanding obtained, and the teacher guides individual investigations to understand and find the problems presented. This stage is carried out by answering various questions listed in the LKPD. This is done so that students are actively involved in interpreting the learning process, making it easier to solve questions about the subject matter. The questions that have been prepared also aim to train students to explore information that has been obtained after the teacher's explanation. In practice, this stage is carried out individually. However, students can discuss with other friends, from the observations of active students working on LKPD, and some students ask regarding the difficulties encountered in understanding the questions with their curiosity about the material.

After students explore information and find material concepts well, students enter the *triggering memory* stage. At this stage, students are directed to answer short questions in LKPD, which aim to utilize the brain's work in storing and remembering all the material that has been studied so that students more easily remember and understand material concepts. When this learning stage occurred, no

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obstacles because all students seemed enthusiastic to answer the quiz questions submitted at the allotted time. From the stage results, the extent to which students' understanding is in the cognitive aspect.

In the next stage, students enter the *exhibiting what you know* stage, where at this stage students are allowed to practice and test their understanding by taking random questions given by the teacher and then presenting the work results on filling out their LKPD in front of the class represented by several people individually. Take turns. At this stage, students are randomly selected by the teacher, and the teacher arranges for other students to listen carefully and respond to the deficiencies or the presentations advantages that have been delivered. At this stage, some students made presentations that exceeded the specified time limit. However, at this stage, other students' enthusiasm in discussing the presenter. So that other students also listen during the presentation process.

The final stage is *reflecting on your learning* in the core activities. At this stage, students individually complete the reflection questions that have been provided. This is done to provide opportunities for students to know the extent to which the advantages and disadvantages of the activities in the learning process achievement have been going on. Unlike the AL-MASTER learning stages, the control class works in groups in each learning process. During the discussion, the students seemed used to scientific learning because the previous learning process also carried out group investigations after the teacher explained the material. Here it can be seen that some students rely on their group mates. Based on the description above, it can be seen that the learning process in the experimental class looks quite enthusiastic compared to the control class. This is because there are demands on each student to work individually, not relying on other friends.

Educators, as an essential element in teaching, are required to carry out a massive migration that has never happened before from traditional face-to-face education to online or distance education (Bao, 2020). As the industrial revolution 5.0 develops, it supports distance learning. It can solve the problem of delays in students gaining knowledge through face-to-face learning (Suroyo et al., 2021). (Sahari et al., 2022) it argued that students experience boredom and do not understand the material continuously when online learning is carried out. Learning media supports the effective transfer of material to students. Learning requires student independence and teacher support of learning media to help students achieve better learning outcomes (Darmayanti et al., 2022; Hasanah et al., 2023).

Along with the technological era development and the distance learning conditions, one the learning media that can be used is learning media, an adaptive form of ordinary learning media used during direct learning. Learning media can control students' learning content because the teacher designs it to adapt to the planned curriculum (Bümen & Holmqvist, 2022; Lin et al., 2018). With the LKPD based on the AL-MASTER model, it is hoped that it will make it easier to facilitate students who are slow to absorb lessons because it can provide an atmosphere that feels more effective and interesting.

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CONCLUSIONS AND SUGGESTIONS

The analysis results show that after using the AL-MASTER Model-based LKPD, it is concluded that (1) The average expert's assessment result towards the product development level eligibility in the feasible category, (2) The product trial results and reviewing students' critical thinking skills showed an increase in the Pre-Test average and Post-Test average in class VIII.1 with criteria quite effective, (3) Learning shows that time efficiency in class VIII.1 is quite efficient and (4) The teacher's response and students in exciting categories. This study has several feedbacks, including the following: (1) This study focuses on the students' cognitive abilities so that interactions between other students cannot be measured optimally, and (2) This study only tests students' critical thinking skills on the concept of Pythagorean material.

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