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# Development of PBL-Based Interactive LKPD to Improve Elementary Students' Critical Thinking Skills in Science Learning

**Suradi[1]*, Srihandono Budi Prastowo[2], Moh. Sutomo[3]**
[1]*Basic Education, Postgraduate Programs, Universitas Terbuka, Indonesia.
[2]Physics Education Study Program, FKIP, Universitas Jember, Indonesia.
[3]Tadris IPS Study Program, FTIK, UIN Kiai Haji Achmad Siddiq Jember, Indonesia.
*Corresponding Author. Email: suradisrs@gmail.com

**Abstract:** This research aims to develop PBL-based interactive worksheets that can improve the critical thinking skills of elementary school students in science learning that are valid, practical and effective when used. This research used the Design and Development (D&D) method using the ADDIE model, which consists of five stages consisting of analysis, design, development, implementation and evaluation. The research subjects for the limited test were 30 students in class VI at SDN 3 Rogojampi. In the broad test, there were 42 students in class VI at SDN 1 Pengatigan and 32 students in class VI at SDN 2 Rogojampi. The instruments used consisted of 1) an RPP validation sheet, 2) an LKPD validation sheet, 3) a teacher response questionnaire sheet, and 4) student pretest-posttest questions to assess the effectiveness of the LKPD. The data analysis technique used was data analysis of the validity, effectiveness and practicality of the product being developed. The results of the validation by the material expert validator were 93%, the media expert validator was 91%, and the language expert validator was 91%. The results of the effectiveness of using interactive LKPD based on the N-gain score in the three institutions obtained an average score of 0.69, which is in the medium category. Practical results based on the implementation of the use of interactive worksheets obtained an average of 90% and, based on teacher responses, obtained an average of 91% in the very practical category. This study concludes that PBL-based interactive worksheets are valid, very practical and moderately effective for improving the thinking skills of sixth-grade elementary school students in science learning.

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## Introduction

Natural Science (IPA), which is known as science, is knowledge, ideas and concepts resulting from human activities organized logistically and systematically regarding the natural environment obtained based on experience through a series of scientific processes starting from the results of observation, then investigating, Announcing the hypothesis, ending by testing the idea (Nasution, 2006). Saido believes that the main aim of education in the field of science (science) is to help students develop high-level thinking abilities, such as critical thinking skills, reflective reasoning, and skills in the scientific process. It is done through learning activities which are considered important capital to face various challenges in everyday life (Nugraha et al., 2017). So, one of the main goals of science education is to train students to train and develop high-level thinking skills, including critical thinking skills.

Critical thinking skills are abilities that students must master because this ability is very important. Mastery of critical thinking skills is very necessary for students so that they are able to be more skilled in formulating arguments, evaluating the credibility of information

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sources, and making the right decisions. According to Macpherson & Stanovich, as quoted in (Eggen & Kauchak, 2012), humans naturally tend not to think critically. Therefore, schools as formal educational institutions must be able to use various methods and approaches in learning activities in order to realize the hopes and demands of changing times (Lieung, 2019).

Based on the literature study data, it shows that students' critical thinking abilities are included in the unsatisfactory category. Referring to the results of studies from several research titles in Indonesia, it was found that the critical thinking abilities of elementary school students are still very low. It is proven by the large number of studies that attempt to improve critical thinking skills for students at the elementary school level (Lieung, 2019). Apart from that, the achievement of science achievements in 2015 based on the Trends in Mathematics and Science Study (TIMSS) survey by The International Association for the Evaluation of Educational Achievement (IEA) ranked Indonesia in 44th position with an average score of 397 from 47 participating countries (IEA, 2016).

The increasingly low scientific abilities of Indonesian students are also visible in the International Program for International Student Assessment (PISA) study conducted by the Organization for Economic Cooperation and Development (OECD). Based on the results of the 2018 PISA survey published in 2019, Indonesian students' scientific literacy was ranked 70th out of 78 participating countries. In the 2018 survey results, the average scientific literacy ability score of Indonesian students was 396, far from the average PISA score of 500 (Sutrisna, 2021).

Based on the results of an interview with one of the teachers at SDN 1 Pengatigan, Rogojampi District, he said that critical thinking skills for class VI at SD 1 Pengatigan had been developed, but still a small part was not all as expected. Likewise, the results of an interview with one of the teachers at SDN 2 Rogojampi, Rogojampi District, stated that it was difficult to train and develop high-level thinking, in this case, developing students' critical thinking skills. Teachers are still lacking in developing learning models that train students to think critically. Students are given more independent assignments. Teachers also do not develop learning resources, do not utilize various sources of information and tend to only use LKPD as a learning resource. Meanwhile, the LKPD used is LKPD published by a third party, not self-made, and in terms of the material, it is not necessarily in accordance with the competencies and learning objectives of the local elementary school. Likewise, the work steps on the LKPD and the practice questions do not train students to develop critical thinking skills.

The application of this alternative learning is based on the results of research conducted (Munawaroh, 2022), namely the development of PBL-based interactive LKPD, and the results show that the use of PBL-based LKPD through interactive videos assisted by Google sites can stimulate students' critical thinking skills. It is supported by research (Nuryoko, 2022), which shows that the use of interactive E-LKPD with the PBL model can improve students' critical thinking skills with the criteria for high critical thinking improvement. Previous research concluded that the use of problem-based learning LKPD can increase students' critical thinking skills with an N-gain of 0.47, which is categorized as effective (Ningsyih et al., 2018).

Similar research conducted by (Syaifi & Murwitaningsih, 2022) concluded that the application of a problem-based learning model with the help of website-based wordwall media was able to encourage students to be more active and think critically and independently. PBL-based LKPD-thinking map strategies are suitable for use in mathematics

  

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learning and are quite effective in improving elementary school students' critical thinking skills (Alben Ambarita et al., 2020). The use of PBL-based LKPD has high effectiveness in improving students' critical thinking skills by achieving an N-Gain value of 0.758(Herawati, 2022). The use of LPKD with PBL assisted by Google Classrooms affects students' critical thinking skills (Erlangga et al., 2021). Likewise, the use of Android-based E-LKPD with a PBL model can improve students' critical thinking skills with moderate criteria (Fitriyah & Ghofur, 2021). The development of PBL-based e-LKPD on human heredity material, which is used as teaching material in learning, is stated to be valid, practical, effective and able to train critical thinking skills (Nurjanah & Trimulyono, 2022).

Based on the results of observations in the field, teachers are still lacking in developing learning models that train students to think critically. Students are given more independent assignments. Teachers also do not develop learning resources and do not utilize various sources of information. Teachers tend to only use LKPD as a learning resource. Meanwhile, the LKPD used is an LKPD published by a third party, not a self-made LKPD. In terms of material, the LKPD is different from the competencies and learning objectives at the local elementary school. Likewise, the work steps on the LKPD and the practice questions do not train students to develop critical thinking skills. In terms of LKPD material published by other publishers, there are many shortcomings, especially not supporting students to be able to learn independently, so that the knowledge students gain is only from the reading texts listed in the LKPD. In terms of appearance, the published LKPD is also less attractive. The paper used is opaque paper, with black and white illustrations. Many questions still use multiple choice and short descriptions, so students are not trained enough to do reasoning. With the unattractive appearance of the LKPD, of course, naturally, students are less interested in reading it. With so many shortcomings, students get little benefit when using the LKPD. Based on the background of this problem, this research aims to conduct research on the development of interactive student worksheets (LKPD) based on Problem Based Learning (PBL) to improve the critical thinking skills of elementary school students in science learning.

## Research Method

The method used was research and development. The research and development method is a method used to create certain products and test their level of effectiveness (Sugiyono, 2019). This type of research and development is used with the aim of producing interactive LKPD, which can improve students' critical thinking skills. This research and development used the ADDIE (Analysis, Design, Development, Implementation and Evaluation) development model developed by Robert Maribe Branch (Sugiyono, 2019). The subjects in this research were 42 students in class VI at SD Negeri 1 Pengatigan, at SD Negeri 2 Rogojampi as many as 32 students and at SD Negeri 3 Rogojampi as many as 30 students, a total of 104 students.

The data analysis techniques used were validity data analysis to measure the extent of the validity of the product being developed, effectiveness data analysis to test the effectiveness of using the LKPD, and practicality data analysis to test the practicality level of the product being developed. The Data analysis technique used to translate research data and answer research questions or formulate research problems is:

### Analyze the validity of interactive LKPD

The data analysis technique to measure the validity of the developed product is through validation conducted by expert validators. The validation sheet uses a likert scale with scores

  

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ranging from 1 to 4, where each score represents an assessment of excellent, good, fair, or poor Riduwan in (Dinantia et al., 2017). Product validity is calculated by finding the average of all assessment aspects contained in each validation sheet with the formula: *Valpro* = $\frac{Srt\ Srt}{MrtMrt}$ x 100% where *Valpro* is product validation, *Srt* is real score achieved and *Mrt* is maximum score that can be achieved (Masyhud, 2021). The results of the product validation calculations are then translated into the following product validity criteria scale:

**Table 1. Criteria for Product Validation Results**

| Value | Description |
|---|---|
| 80% < V ≤ 100% | Excellent |
| 60% < V ≤ 79% | Good |
| 50% < V ≤ 60% | Fair |
| V ≤ 50% | Poor (Replaced) |

(Riduwan in Dinantia et al., 2017)

**Analyze the effectiveness of interactive LKPD**

The technique is to consider the results of the pretest and posttest. Based on the pretest and posttest score data, it can be seen that there is an increase in student learning outcomes (*N-Gain*). The following is the formula used to calculate the *N-gain* score and the criteria scale (Hake, 1998). $N-Gain\ (g) = \frac{Posttest\ Value - Pretest\ Value}{100 - Pretest\ Value}\ \frac{Posttest\ Value - Pretest\ Value}{100 - Pretest\ Value}$.

The criteria scale used for product effectiveness is according to the following table: $\frac{Nilai\ Posttest - Nilai\ Pretest}{100 - Nilai\ Pretest}$

**Table 2. Categories of Students' Critical Thinking Skills**

| No | Value | Description |
|---|---|---|
| 1 | 0,7 ≤ g | High |
| 2 | 0,3 ≤ g < 0,7 | Middle |
| 3 | g < 0,3 | Low |

(Hake, 1998)

**Analyze the practicality of interactive LKPD**

Data analysis techniques for the practicality of PBL-based interactive LKPD are based on the implementation of LKPD in learning (Rejeki et al., 2022) and teacher response questionnaires to PBL-based interactive LKPD (Astuti et al., 2018). The product practicality value is calculated by adding up all learning implementation scores divided by the maximum score achieved then multiplied by 100% according to the formula:

Practical value = $\frac{total\ score\ obtained}{maximum\ score}\ \frac{total\ score\ obtained}{maximum\ score}$ x 100%

Another supporting analysis of product practicality is using a teacher response questionnaire sheet. The product practicality value is calculated by adding up all teacher response scores divided by the maximum score that can be achieved then multiplied by 100% according to the formula :

Practical value = $\frac{total\ score\ obtained}{maximum\ score}\ \frac{total\ score\ obtained}{maximum\ score}$ x 100%

Next, determine the results of the practical analysis based on the modified criteria from Purwanto in (Lestari et al., 2018) according to the following table:

**Table 3. Practical Criteria for Interactive LKPD**

| No | Value | Description |
|---|---|---|
| 1 | 86% < NK ≤ 100% | Very practical |
| 2 | 76% < NK ≤ 86% | Practical |

  

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| | | |
|---|---|---|
| 3 | 60% < NK ≤ 76% | Quite practical |
| 4 | ≤ 54% | Very impractical |

(Lestari et al., 2018)

**Results and Discussion**

The development of interactive LKPD based on Problem Based Learning using the ADDIE model development consists of five stages, namely Analysis, Design, Development, Implementation and Evaluation.

Analysis stage, at the stage of carrying out two analyses namely needs analysis and curriculum and material analysis. Based on the needs analysis, the conclusion is that teaching materials are needed that can improve and develop students' critical thinking skills, namely interactive LKPD based on Problem Based Learning. In the analysis of the curriculum and materials, it was concluded that the development of interactive LKPD based on Problem Based Learning refers to the 2013 Curriculum according to the curriculum used in all schools in Rogojampi District and the basic competency to be achieved is comparing the methods of reproduction of plants and animals with material on the reproduction of plants.

Design stage, at this stage the product design is developed starting from the syllabus, RPP, interactive LKPD, pretest-posttest questions and other research instruments. The interactive LKPD design developed includes a home page, foreword, instructions for using the interactive LKPD, basic competencies, introduction to material and activity sheets, all in word form.

Development stage, at this stage the interactive LKPD which was originally in word form was then converted into an interactive LKPD using the liveworksheet application. The results are in the link (https://www.liveworksheets.com/2-jm1340574vz) (Suradi, 2023). After that, the developed product is validated by expert validators. The interactive LKPD based on Problem Based Learning was validated by three experts, namely material experts, media experts and language experts. A summary of the validation results of the three interactive LKPD validators is shown in table 4 below:

**Table 4. Summary of Validation Results of the Three Interactive LKPD Validator**

| VALIDATOR | SRT | SMT | VALPRO (%) |
|---|---|---|---|
| MATERIAL EXPERT VALIDATOR | 89 | 96 | 93 |
| MEDIA EXPERT VALIDATOR | 84 | 92 | 91 |
| LANGUAGE EXPERT VALIDATOR | 40 | 44 | 91 |
| INTERACTIVE LKPD VALIDATION RESULTS | **213** | **232** | **92** |

Based on table 4, the average value of the interactive LKPD validation results from the three validators is 92%. A percentage of 92% is included in the validity criteria in the good or appropriate category. Thus, the interactive LKPD in this development research is "good or suitable" for use.

Implementation stage: At this stage, product development that has been validated and then revised is then applied to students in the learning process. The process of implementing product development that is tested in the field (field trials) goes through two stages, namely limited trials and extensive trials. A limited trial was carried out on class VI students at SD Negeri 3 Rogojampi on test subjects of 30 students. The data produced in the limited test is in the form of scores from pretest-posttest activities, scores for implementation of LKPD in learning and scores for teacher responses. The results of this limited test became introduced and improved for the extensive test. Extensive trials were carried out on class VI students at

  

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SD Negeri 1 Pengatigan and SD Negeri 2 Rogojampi, Rogojampi District, Banyuwangi Regency. The test subjects at SD Negeri 1 Pengatigan were 42 students, and at SD Negeri 2 Rogojampi, there were 32 students, and at each institution were accompanied by three teachers as observers.

Data from pretest-posttest activities is the basis for determining the effectiveness of PBL-based interactive LKPD. Data from pretest-posttest scores were processed and then analyzed using N-Gain. The results of the pretest-posttest activities in the limited test and extensive test are shown in Table 5 below:

**Table 5. Results of N-Gain Analysis of Critical Thinking Skills in three institution**

| Institution Name | Critical Thinking Skills Indicator | | | | | |
|---|---|---|---|---|---|---|
| | Elementary clarification | Basic Support | Inference | Advanced Clarification | Strategy and tactics | Critical Thinking Skills |
| **SD NEGERI 3 ROGOJAMPI** | 0,77 | 0,66 | 0,66 | 0,86 | 0,59 | 0,70 |
| **SD NEGERI 1 PENGATIGAN** | 0,60 | 0,65 | 0,56 | 0,80 | 0,61 | 0,64 |
| **SD NEGERI 2 ROGOJAMPI** | 0,67 | 0,80 | 0,54 | 0,83 | 0,73 | 0,72 |
| **AVERAGE *N-GAIN*** | **0,68** | **0,70** | **0,59** | **0,83** | **0,64** | **0,69** |
| **CATEGORY** | **Medium** | **High** | **Medium** | **High** | **Medium** | **Medium** |

The results of the N-Gain limited test and broad test for indicators of critical thinking skills are presented in the bar chart as follows:


**Figure 1. N-Gain Bar Diagram of Critical Thinking Skills Indicator**

The average N-Gain scores of the three institutions are presented in the bar chart as follows:

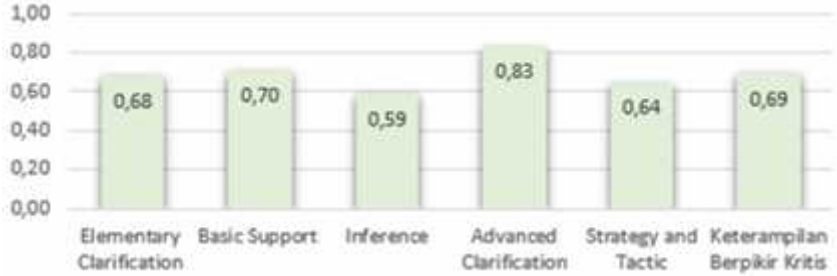


**Figure 2. Bar Diagram of Average N-Gain for Three Institutions**

The practicality of PBL-based interactive LKPD is based on data on the implementation of interactive LKPD use in learning and supporting data in the form of teacher responses to the

  

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use of interactive LKPD in the learning process. Implementation data and teacher responses to the use of interactive LKPD when carrying out limited tests and during extensive tests are presented as follows:

**Table 6. Average Results of LKPD Implementation in Three Institutions**

| Observed aspects | Meeting to- | | | Average | Category |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | | |
| **Introduction** | 89,4% | 88,9% | 89,4% | 89,2% | Very practical |
| **Core** | 88,5% | 88,1% | 90,0% | 88,9% | Very practical |
| **Closing** | 90,3% | 90,3% | 92,4% | 91,0% | Very practical |
| **Average** | 89,4% | 89,1% | 90,6% | 89,7% | |
| **Average percentage** | | | | 89,7%% | |
| **Score Criteria** | | | | Very practical | |

Teacher responses to assess the practicality of using PBL-based interactive LKPD in learning are needed as data to support the practicality of the product being developed. Apart from providing an assessment of the implementation of the learning during the process, at the end of the learning the teacher/observer is asked for feedback on the use of the development product. The results of teacher responses at the three institutions are presented as follows:

**Table 7. Results of Average Teacher Responses in the Three Institution**

| RATED ASPECT | OBSERVER | | | AMOUNT | PERCENTAGE (%) |
|---|---|---|---|---|---|
| | 3 RGJ | 1 PGN | 2 RGJ | | |
| **Contents** | 18 | 17,3 | 18,7 | 54,0 | 90,0 |
| **Presentation** | 18,7 | 18 | 18,7 | 55,3 | 92,2 |
| **Benefit** | 22 | 21 | 21,3 | 64,3 | 89,4 |
| **Language** | 15 | 14,3 | 14,3 | 43,7 | 91,0 |
| **Amount** | 73,7 | 70,7 | 73 | 217,3 | 90,6 |
| **Percentage (%)** | 92,1 | 88,3 | 91,3 | 90,6 | |
| **Total score achieved** | | | | **217,3** | **90,6** |
| **Score Criteria** | | | | | **Very practical** |

Evaluation stage, this stage aims to assess the quality of the learning product and learning process both before and after the implementation stage (Branch, 2009). The evaluation stage includes two things, namely formative evaluation and summative evaluation. Formative evaluation is an evaluation carried out during the interactive LKPD development process with the aim of improving the quality of the development product. Formative evaluation related to product validity carried out by experts, limited tests and extensive tests to improve the products produced. Summative evaluation is carried out to assess the effectiveness of using development products on the results of the learning process by conducting analysis using the normalized gain (N-gain) technique.

## Discussion

### Validity of PBL-based interactive LKPD

The interactive LKPD was validated by three validators, namely material expert validators, media experts and language experts. In the validation of interactive LKPD by material experts, there are two main aspects assessed, namely the material aspect and the presentation aspect. The assessment of the interactive LKPD by material experts was 93%,

  

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meaning that the components in the material aspect, including objectives, material, presentation techniques and presentation support, were appropriate. Validation of interactive LKPD by media experts validates seven aspects, namely: first the size aspect of the LKPD, second the layout aspect of the LKPD, third the illustration aspect of the LKPD content, fourth aspect of the didactic requirements of the LKPD, fifth aspect of the construction requirements of the LKPD. The sixth aspect is the technical requirements/design of the LKPD, which includes writing, drawing, coloring and appearance of the LKPD, and the seventh aspect of LKPD interaction. The interactive LKPD assessment by media experts was 91%, meaning that, in general, the components in the media aspect were appropriate. Validation of interactive LKPD by linguists validates five aspects, namely: first, the straightforward aspect of language, second, the aspect of interactive dialogic use of language, third, the aspect of suitability to student development, fourth, the aspect of conformity to language rules, and fifth, the aspect of the use of terms, symbols or icons. Linguists rated the LKPD at 91%, this means that the components in the linguistic aspect of the LKPD were considered appropriate. Based on the assessment of the three experts, the overall assessment of the PBL-based interactive LKPD was an average of 92%. A score of 90% in the validity criteria is in the good/decent/valid category. The validation results of this research are in line with the results of research conducted by NF et al., (2022) where the validity results for interactive LKPD according to material experts, the results obtained were 91% and the media expert's assessment was 90%. In this way, the interactive LKPD resulting from this development is "valid" for use in learning.

**Effectiveness of PBL-based interactive LKPD**

The effectiveness of using PBL-based interactive LKPD is based on the Normalization Gain (N-Gain) test. N-Gain is obtained from the posttest minus pretest score divided by (100 minus pretest). Figure 1 shows that the critical thinking skills indicator scores at the three institutions are very varied. An N-Gain score of less than 0.3 means low effectiveness, between 0.3 and below 0.7 means medium, and a score equal to or more than 0.7 means high effectiveness (Hake, 1998). Indicators of critical thinking skills from the three institutions show that there are 9 indicators whose N-Gain is in the medium category because it is between 0.3 and below 0.7 and there are 6 indicators whose N-Gain is in the high category because the score is equal to or more than 0.7.

Figure 2 shows the average N-Gain scores at the three institutions. Based on the picture, it appears that indicators of critical thinking skills such as providing simple explanations (elementary clarification), concluding (inference), and developing strategies and tactics (strategy and tactics) are in the medium category (N-Gain value between 0.3 and below 0 .7). This means that the use of interactive LKPD in learning is moderately effective in improving the three indicators of critical thinking skills. Meanwhile, the indicators for basic skills (basic support) and further explanation (advanced clarification) are in the high category (N-Gain score equal to or more than 0.7). It means that the use of interactive LKPD in learning has a high category of effectiveness in improving these two indicators of critical thinking skills.

Overall, the average N-Gain score for students' critical thinking skills from the three institutions was 0.69 or in the medium category. The results of the effectiveness of this research are in line with the results of research conducted by Wahono et al., (2022) where the results of the effectiveness of the use of E-LKPD to improve students' critical thinking skills carried out in three elementary schools based on n-gain results obtained results of 0.68 to 0.87 with the criteria medium and high, so that the E-LKPD developed is able to improve

  

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students' critical thinking skills. Thus, it can be concluded that the effectiveness of using PBL-based interactive LKPD development products is in the "medium" category for improving students' critical thinking skills in learning.

**Practicality of PBL-based interactive LKPD**

The practicality of PBL-based interactive LKPD is based on data on the implementation of the use of interactive LKPD in learning and supporting data in the form of teacher responses to the use of interactive LKPD. Table 6 shows that the average results of learning implementation at the first meeting in the three institutions were 89.4%. At the second meeting the average score for implementing learning was 89.1% and at the third meeting the implementation of using interactive LKPD in learning was 90.6%. The average value of implementing the use of interactive LKPD in learning at each meeting at the three institutions reached 90%. When viewed from the activity aspect, the implementation of learning shows that the average value for the preliminary activities during the three meetings was 89.2%. In the core activities the implementation value during the three meetings averaged 88.9% and in the closing activities the learning implementation value was 91.0%. By paying attention to the implementation value of interactive LKPD in learning which reached 90%, it indicates that the use of interactive LKPD in learning is going well. If the implementation value is converted to a criteria scale, it falls into the very practical category.

The practicality of PBL-based interactive LKPD from the aspect of teacher responses is shown in Table 7. Based on table 7 shows that the average value of teacher responses to the content of interactive LKPD is 90.0%. It means that the teachers assess that the content of the interactive LKPD from the activity aspect is in line with KD, indicators, learning objectives, and PBL syntax. In the presentation aspect, the teacher's response was assessed as 92.2%. It means that teachers assess that the presentation of interactive LKPD, which contains interactive LKPD displays, is attractive, easy to operate, fun, and has a systematic appearance, which is considered very suitable. In terms of the benefits of interactive LKPD, the average value is 89.4%; this means that interactive LKPD benefits make it easier to understand the material, its use makes it more effective, there are no space and time limitations, and it improves students' critical thinking skills. It is also considered very suitable. In the language aspect, the interactive LKPD achieved an average score of 91%; this means that the interactive LKPD, from the aspect of language use, complies with correct spelling rules, is appropriate to the students' development, the language is communicative and does not have double meaning. Overall, teachers' responses to the use of interactive LKPD in learning averaged 91%.

Based on the workability value of using interactive LKPD of 90% and the teacher's response to the use of interactive LKPD of 91%, an average score of 90.5% was obtained. If this value is rounded up, it becomes 91%, and if this value is included in the criteria scale, it falls into the "very practical" category. The practical results of this research are in line with the results of research conducted by Muchlis (2021), where the practical results of the use of problem-based learning LKPD obtained very practical results with a gain percentage of 97.11%; this is because there is active student involvement so that learning can be maximized. Thus, it can be concluded that the use of interactive LKPD based on Problem Based Learning is considered "very practical" to improve students' critical thinking abilities.

Interactive LKPD based on problem based learning can be used in learning at other schools in the same class and material. Teachers should first read the instructions for use and pay attention to the conditions of the school where they will apply it. To improve critical thinking skills, this has not yet reached the distribution stage. If there is a desire to spread it to

  

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other schools, it is necessary to pay attention to the characteristics of the school and adjustments to its use. For other researchers who wish to carry out research and development on the same study, the facilities and infrastructure should be prepared as well as possible in order to obtain maximum results when carrying out research.

## Conclusion

This research and development produced the following conclusions: 1) The results of the validity test of interactive LKPD based on Problem Based Learning to improve students' critical thinking skills in class VI elementary science learning based on the assessment of material experts, media experts and language experts averaged 92%. Thus, this LKPD is declared "valid" and suitable for use. 2) Test results of the effectiveness of interactive LKPD based on Problem Based Learning to improve the critical thinking skills of class VI students based on the results of limited tests and broad tests with an average N-Gain value of 0.69. Thus, the effectiveness of using interactive LKPD is in the "medium category" for improving students' critical thinking skills. 3) The results of the practicality test of interactive LKPD based on Problem Based Learning based on an assessment of the implementation of LKPD in learning and teacher responses to the use of LKPD in the three institutions reached 90%, indicating that the use of interactive LKPD is "very practical" to be used to improve student's critical thinking skills.

## Recommendation

Based on the results of research and development of interactive LKPD based on Problem-Based Learning, several suggestions can be conveyed: 1) Interactive LKPD based on problem-based learning can be used in learning at other schools in the same class and material. Teachers should first read the instructions for use and pay attention to the conditions of the school where they will apply it. 2) The development of interactive LKPD based on problem-based learning to improve critical thinking skills has not yet reached the dissemination stage. If there is a desire to spread it to other schools, it is necessary to pay attention to the characteristics of the school and adjustments to its use. 3) This research and development product has gone through a long process with several revisions. However, to improve the quality of the interactive LKPD, if there is a desire for further research, the content of the interactive LKPD can be made more varied, both in terms of appearance and the addition of more interesting animations. 4) For other researchers who wish to carry out research and development on the same study, the facilities and infrastructure should be prepared as well as possible in order to obtain maximum results when carrying out research.

## References

Alben Ambarita, A., Dewi, R., Caswita, C., Arwin Subakti, A. S., & Wahyudi, A. (2020). THE DEVELOPMENT OF WORKSHEET BASED ON PROBLEM BASED LEARNING–THINKING MAPS STRATEGY TO INCREASE THE CRITICAL THINKING OF PRIMARY STUDENTS. *International Journal of Psychosocial Rehabilitation*, *24*(6), 7251–7262.

Astuti, S., Danial, M., & Anwar, M. (2018). Pengembangan LKPD berbasis PBL (problem based learning) untuk meningkatkan keterampilan berpikir kritis peserta didik pada materi kesetimbangan kimia. *Chemistry Education Review (CER)*, *1*(2), 90–114.

Branch, R. M. (2009). *Instructional design: The ADDIE approach* (Vol. 722). Springer.

  

Dinantia, A., Amran, E. Y., & Rini, R. (2017). *Pengembangan Lembar Kegiatan Peserta Didik (Lkpd) Berbasis Hierarki Konsep pada Pokok Bahasan Kelarutan dan Hasil Kali Kelarutan*. Riau University.

Eggen, P., & Kauchak, D. (2012). Strategi dan model pembelajaran. *Jakarta: Indeks*.

Erlangga, S. Y., Nadhiroh, N., & Wingsih, P. H. (2021). The Effective of Using Worksheet with the Problem-Based Learning (PBL) Through Google Classrooms to Improve Critical Thinking Skills During the Covid-19 Pandemic. *6th International Seminar on Science Education (ISSE 2020)*, 427–433.

Fitriyah, I. M. N., & Ghofur, M. A. (2021). Pengembangan E-LKPD berbasis android dengan model pembelajaran problem based learning (PBL) untuk Meningkatkan Berpikir Kritis Peserta Didik. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(5), 1957–1970.

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, *66*(1), 64–74.

Herawati, H. (2022). PENGEMBANGAN LEMBAR KERJA PESERTA DIDIK (LKPD) BERBASIS PROBLEM BASED LEARNING (PBL) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS PESERTA DIDIK SMA. *Jurnal Muara Pendidikan*, *7*(2), 165–177. https://doi.org/10.52060/mp.v7i2.944

Lestari, L., Alberida, H., & Rahmi, Y. L. (2018). Validitas dan praktikalitas lembar kerja peserta didik (LKPD) materi kingdom plantae berbasis pendekatan saintifik untuk peserta didik kelas X SMA/MA. *Jurnal Eksakta Pendidikan (JEP)*, *2*(2), 170–177.

Lieung, K. W. (2019). Pengaruh Model Discovery Learning terhadap Keterampilan Berpikir Kritis Siswa Sekolah Dasar. *Musamus Journal of Primary Education*, *1*(2), 73–82.

Masyhud, S. (2021). *Metode Penelitian Pendidikan*. Lembaga Pengembangan Manjemen dan Profesi Kependidikan.

Muchlis, M. (2021). Pengembangan LKPD Berbasis Problem Based Learning untuk Melatihkan Keterampilan Berpikir Kritis pada Materi Larutan Penyangga. *UNESA Journal of Chemical Education*, *10*(2), 195–204.

Munawaroh, N. (2022). Pengembangan LKPD Berbasis Problem Based Learning Melalui Video Interaktif Berbantuan Google Site Untuk Menstimulasi Kemampuan Berpikir Kritis. *Jurnal Ecogen*, *5*(2), 167–182.

Nasution, N. dkk. (2006). *Pendidikan IPA di SD*. Universitas Terbuka.

NF, I. A., Roesminingsih, M. V., & Yani, M. T. (2022). Pengembangan LKPD Interaktif Berbasis Liveworksheet untuk Meningkatankan Hasil Belajar IPS Sekolah Dasar. *Jurnal Basicedu*, *6*(5), 8153–8162.

Ningsyih, S., Andayani, Y., & Hakim, A. (2018). THE EFFECTIVENESS OF PROBLEM BASED WORKSHEET TO IMPROVE SENIOR HIGH SCHOOL STUDENTSâ€™ CRITICAL THINKING SKILLS. *Unnes Science Education Journal*, *7*(3).

Nugraha, A. J., Suyitno, H., & Susilaningsih, E. (2017). Analisis kemampuan berpikir kritis ditinjau dari keterampilan proses sains dan motivasi belajar melalui model pbl. *Journal of Primary Education*, *6*(1), 35–43.

Nurjanah, N., & Trimulyono, G. (2022). Pengembangan E-LKPD berbasis problem based learning untuk melatihkan keterampilan berpikir kritis pada materi hereditas manusia. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, *11*(3), 765–774.

Nuryoko, A. (2022). *Pengembangan e-lkpd interaktif dengan model pembelajaran problem based learning (pbl) untuk meningkatkan kemampuan berpikir kritis siswa pada*

  

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*mata pelajaran perencanaan bisnis kelas x bdp di SMK Islam Batu*. Universitas Negeri Malang.

Rejeki, S., Adnan, A., & Azis, A. A. (2022). Uji Kepraktisan LKPD Berorientasi HOTS Pada Materi Biologi Semester Genap Kelas X di SMA Kristen Rantepao. *Bioma: Jurnal Biologi Dan Pembelajaran Biologi*, *7*(2), 218–231.

Sugiyono. (2019). *Metode penelitian pendidikan* (A. Nuryanto (ed.); 3rd ed.). Alfabeta.

Suradi, S. (2023). *LKPD INTERAKTIF*.

Sutrisna, N. (2021). Analisis kemampuan literasi sains peserta didik SMA di Kota Sungai Penuh. *Jurnal Inovasi Penelitian*, *1*(12), 2683–2694.

Syaifi, A. C., & Murwitaningsih, S. (2022). Analysis of the Influence of Problem Based Learning Models Assisted by Wordwall Media on Science Learning Outcomes of Primary School Students. *Jurnal Paedagogy*, *9*(4), 754–762.

Wahono, R. H. J., Supeno, S., & Sutomo, M. (2022). Pengembangan E-LKPD dengan Pendekatan Saintifik untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Sekolah Dasar dalam Pembelajaran IPA. *Jurnal Basicedu*, *6*(5), 8331–8340.

  