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Development of Worksheet Based on Problem Based Learning (PBL) to Improve Critical Thinking Skills

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ABSTRACT

Abstract

This study develops a Problem-Based Learning (PBL)-based Student Activity Sheet (Worksheet) to enhance students' critical thinking skills. Using the Research and Development (R&D) approach with the ADDIE model (Analyze, Design, Development, Implementation, Evaluation), the research involved Grade VII students at Nurul Iman Integrated Islamic Middle School. Data collection employed validation sheets, student response questionnaires, critical thinking tests, and observation and interview guidelines, analyzed through Miles & Huberman's framework. Results indicate that the developed PBL-based Worksheet is of high quality, validated by material experts (average score: 137.5) and media experts (100.5). Student responses rated its practicality as good (score: 80). A Paired Sample T-Test showed a significant improvement in students' critical thinking skills, with a 41% increase (moderate category). Comparisons with previous studies highlight the Worksheet's novelty, while addressing limitations—such as sample size, intervention duration, and generalizability—would enhance its academic rigor. The findings suggest that integrating PBL-based Worksheets into instruction effectively supports critical thinking development. Further research should explore its applicability across different educational levels and examine the potential integration of technology.

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Introduction

This study addresses the global issue of students' low analytical reasoning abilities, which are crucial in the context of the Industrial Revolution 4.0 (Chalkiadaki, 2018). The 2015 and 2018 PISA-OECD results indicate that Indonesian students' mathematical proficiency remains significantly below the international average, ranking 62nd out of 70 countries (OECD, 2015) and 74th out of 79 countries (O.E.C.D., 2019). Similarly, the 2015 TIMSS results revealed that Indonesia ranked 44th out of 49 countries with a relatively low score (Lee, 2018), highlighting the education system's inability to optimize higher-order thinking skills.

Observations and interviews at SMP IT Nurul Iman Banjar Agung indicate that mathematics instruction remains passive, with teachers dominating lessons while students have minimal engagement in problem-solving activities. Additionally, existing teaching materials, such as student worksheets, are unappealing and not designed to foster analytical reasoning (Lindner et al., 2022) This study aims to address these challenges by developing Problem-Based Learning (PBL)-based Student Activity Sheets (Worksheets), supported by the theory that PBL enhances student engagement in problem-solving-based learning (Awang & Ramli, 2008).

Previous studies have demonstrated the effectiveness of PBL in enhancing students' reasoning skills. (Astuti, 2018) found that implementing PBL in chemistry education significantly improved students' analytical reasoning. Similar results were observed in (Rahmawati, 2022) study on fraction learning in elementary schools and Mardiana et al.'s (2023) research in social studies, both of which reported significant improvements in conceptual understanding and problem-solving abilities. Furthermore, research by (Nafiah & Suyanto, 2015) showed that applying PBL in PC repair and resetting lessons in vocational schools improved students' reasoning skills by 24.2%. However, most prior studies have primarily focused on PBL implementation without systematically designing structured teaching materials. This study addresses that gap by developing well-structured PBL-based Worksheets aimed at enhancing students' analytical reasoning in mathematical problem-solving (Munifah et al., 2019; Ulger, 2018)

The novelty of this study lies in the development of Worksheets that go beyond providing instructional content and practice exercises. They are specifically designed to guide students through analytical reasoning using the PBL approach. Constructivist theory suggests that learning is more effective when students actively discover concepts and engage in problem-solving(Monalisa et al., 2019; Rihayati, 2021; Suripah & Susanti, 2022). Additionally, this study reinforces the idea that instructional materials aligned with modern learning approaches can enhance learning effectiveness (Serevina, 2018)

Given these challenges, this study proposes the development of PBL-based Worksheets that actively engage students in analytical reasoning through structured problem-solving activities. The study aims to develop, validate, and assess the effectiveness of these materials in improving students' reasoning skills in social arithmetic at the junior high school level. Thus, this research not only produces innovative teaching materials but also evaluates their quality, practicality, and effectiveness through validation tests, usability assessments, and impact measurements (Munifah et al., 2019)

Method

The research method used in this study is Research and Development (R&D) with the ADDIE development model. The ADDIE model consists of five main stages, namely Analysis, Design, Development, Implementation, and Evaluation. This model is used to develop Student

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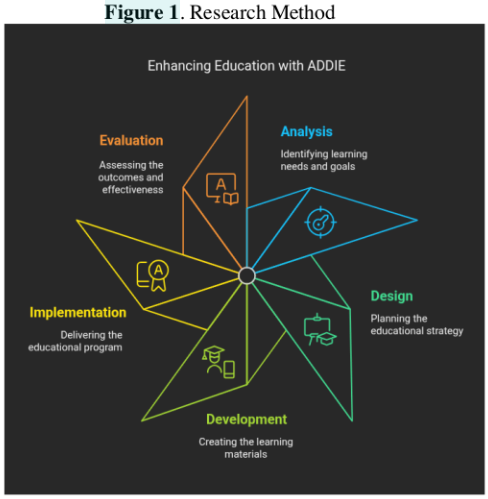
Worksheets (Worksheet) based on Problem-Based Learning (PBL) which aims to improve students' critical thinking skills.
The research method diagram can be seen in Figure 1 below:

Figure 1. Research Method



Type of Research/Design

This research is included in the category of development research which aims to produce and test the effectiveness of educational products in the form of Mathematics Worksheet. To measure the effectiveness of the developed product, this study uses the experimental design of The One Group Pretest-Posttest Design.

According to (Sugiyono, 2018), this research design involves initial measurements (pretest) before treatment is given, followed by final measurements (posttest) after treatment is given. Thus, the improvement of students' critical thinking skills can be analyzed based on the difference between the pretest and posttest results.

Subject/Population and Sample

The subjects in this study consisted of several groups, namely:

a. Material Experts: Lecturers and mathematics teachers who assess the content and substance of the developed Worksheet.
b. Media Expert: Lecturer who has expertise in mathematics learning media to assess the presentation and visual aspects of Worksheet.
c. Students: Grade VII students of SMP IT Nurul Iman Banjar Agung who will be tested on a small and large scale.

Instrument

This study uses several instruments to measure the validity, practicality, and effectiveness of Student Worksheets (Worksheet) based on Problem-Based Learning (PBL).

This instrument was developed according to the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) in Research and Development (R&D) research.

Table 1. Test Instrument

Interpretation "BARYA AMRETA" Boutique, domiciled in Lampung, has clothing sales data for October as follows: Asked: a. Which product gave the least profit in October? Give a logical reason why it sold the least in October? b. If each garment earns a profit of 15%, what is the total of all the product capital sold and store profits from various branches in October? c. Based on the results of the October sales profit analysis, which products should have their stock availability increased in November sales? Why is that? d. If you look at the target market, what products are currently in demand by consumers?
Analysis Determine what steps will be taken
Evaluation Solving problems
Conclusion (Inference) Draw conclusions from what is asked logically

Clothes	Selling price	Number of Products Sold		
		Branch A	Branch B	Branch C
Shirt	100,000	20	15	50
Skirt	100,000	25	55	25
Trousers	150,000	30	20	35
Dress	200,000	45	20	25
Shirt	120,000	30	25	45

Procedure/Data Collection

The data collection process in this study was carried out through several stages in accordance with the Research and Development (R&D) research design with the ADDIE model. The data collection techniques used consisted of tests and non-tests. The test technique was carried out through pretests and posttests to measure students' critical thinking skills before and after the use of Student Worksheets (Worksheet) based on Problem-Based Learning (PBL). Meanwhile, the non-test technique was carried out using expert validation sheets given to material experts and media experts to assess the validity of Worksheet, as well as student response questionnaires to measure the practicality of Worksheet in learning.

The following table presents the data collection techniques used in this study:

Table 4.2 Data collection technique

Data Types	Data collection technique	Instrument	Research Subject
Validity of Worksheet	Expert validation	Expert Validation Sheet	Material Expert and Media Expert
Practicality of Worksheet	Student response questionnaire	Response Questionnaire	Learners
Effectiveness of Worksheet	Pretest and Posttest	Pretest-Posttest Questions	Class VII Students

Data analysis

The data obtained were analyzed using various statistical methods to ensure the validity and effectiveness of the developed product.

Validity Test

The validity test was conducted by analyzing the validation results of material experts and media experts descriptively quantitatively using a Likert scale to assess the feasibility of the Worksheet.

Table 4.3 Expert Validation Results

Aspect	Subject Matter Expert	Category	Media Expert	Category
Content Eligibility	137.5	Very good	-	-
Presentation Eligibility	-	-	100.5	Good

Based on the validation results, material experts gave an average score of 137.5, which is included in the very good category, while media experts gave an average score of 100.5, which is included in the good category. This shows that the developed Worksheet has met the eligibility standards for use in learning.

Practicality Test

The practicality test was analyzed by calculating the average score of the student response questionnaire. The following table shows the results of the practicality test:

Table 4.4 Worksheet Practicality Test Results

Aspect	Average Score	Category
Student Response	80	Good

These results indicate that the developed Worksheet has a good level of readability and involvement in learning, so it is stated to be practical and can be used effectively.

Effectiveness Test

The effectiveness of Worksheet was analyzed using the Normality Test (Shapiro-Wilk Test) to ensure that the pretest and posttest data were normally distributed, the Paired Sample T-Test to determine significant differences between the pretest and posttest, and the Normalized Gain Test (N-Gain) to measure the increase in students' critical thinking skills.

Table 4.4 Effectiveness Test Results

Aspect	Pretest	Posttest	Improvement	Category
Average Score	62.3	78.2	41%	Currently
Sig (2-tailed)	-	0,000	-	-

Based on the results of the Paired Sample T-Test, the sig value (2-tailed) = 0.000 was obtained, which is smaller than 0.05, so it can be concluded that there is a significant difference between the pretest and posttest. In addition, the results of the Normalized Gain Test (N-Gain) showed an increase in critical thinking skills by 41%, which is in the moderate category.

Research result

The results of the study indicate that the PBL-based Worksheet is valid, practical, and effective in enhancing students' analytical reasoning skills. Validation by material experts resulted in an average score of 137.5, categorized as very good, while media experts provided a score of 100.5, classified as good. Student responses to the Worksheet's practicality were also positive, with an average score of 80, indicating good readability and engagement in learning. The effectiveness test, conducted using the Paired Sample T-Test, demonstrated a significant improvement in students' reasoning abilities, with pretest and posttest results showing an increase of 41% in the moderate category (*sig (2-tailed) = 0.000*). These findings confirm that the use of PBL-based Worksheets facilitates meaningful learning experiences and supports the development of problem-solving skills.

Based on these results, it can be concluded that PBL-based Worksheets serve as an effective alternative teaching resource for mathematics learning. Their structured problem-solving approach actively engages students in analytical reasoning and improves overall learning outcomes. Future studies may explore the implementation of these materials across different educational levels or investigate the integration of digital tools to further enhance their effectiveness.

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Discussion

The findings of this study align with previous research on the development of PBL-based Worksheets, yet certain differences in validity, practicality, and effectiveness scores highlight variations in implementation approaches. For instance, the study by Temiyati and Nuryadi (2022), which also used the ADDIE model, produced a validity score of 67.5 from material experts and 67 from media experts. Although considered practical (student response score of 80) and effective in improving posttest scores, its validity scores are relatively lower than those in this study. Meanwhile, the research by (Pitriyana & Arafatun, 2021), which developed a PBL-based Worksheet for mathematics using the ADDIE model, similarly confirmed its validity, practicality, and effectiveness, indicating that ADDIE is a suitable framework for structuring PBL-based learning materials.

When compared to other development models, variations in results emerge. The study by (Astuti, 2018), using the Hannafin & Peck model, demonstrated a highly valid, practical, and effective Worksheet in chemical equilibrium learning, suggesting that this model may be particularly well-suited for designing PBL materials in conceptual subjects. Similarly, the research by (Ritonga, 2024), which applied the Plomp model, reported very high validity (85%) and practicality (90.8%), highlighting its structured approach in PBL material development for physics education. Additionally, the study by (Masruroh & Raharjo, 2024), employing the 4D model, produced a PBL-based E-Worksheet with exceptionally high validation scores (95.6% for validity and 97.07% for practicality) and an N-gain of 0.7 in the moderate improvement category. These findings indicate that different development models may influence the extent to which PBL-based Worksheets achieve optimal instructional design and effectiveness.

Beyond numerical results, the practical implementation of these Worksheets in classrooms may present varying challenges. While the high validity and practicality scores suggest strong instructional design, factors such as teacher readiness, differences in student engagement, and classroom dynamics could affect their overall effectiveness. For example, the reliance on PBL requires educators to facilitate active learning, which may pose difficulties in traditional teacher-centered environments. Additionally, student motivation and prior knowledge could influence how effectively these Worksheets foster problem-solving skills. Thus, while this study confirms the effectiveness of PBL-based Worksheets, future research should explore contextual variables that may impact their practical application across different educational settings.

Conclusion

The findings of this study indicate that the development of Problem-Based Learning (PBL)-based Student Activity Sheets (Worksheets) significantly enhances the analytical reasoning skills of seventh-grade students in mathematics learning, particularly in Social Arithmetic. These findings align with previous research demonstrating the effectiveness of PBL in improving students' thinking skills. For example, studies by (Astuti, 2018) and (Ritonga, 2024) also confirmed that the PBL approach enhances conceptual understanding and problem-solving skills across various disciplines. However, unlike previous studies that primarily focused on implementing the PBL model, this research specifically develops systematically designed PBL-based Worksheets, contributing to the creation of more structured learning materials for PBL-based instruction.

The validity of the developed Worksheet is supported by expert validation results, indicating that it is suitable for instructional use in terms of both content quality and media

presentation. Its practicality is reinforced by student trials, which showed positive responses, marked by increased engagement and improved comprehension in mathematical problem-solving. Furthermore, the effectiveness of the Worksheet is demonstrated through a significant improvement in students' pretest and posttest scores, with a 41% increase in the moderate category. These results strengthen the findings of (Temiyati & Nuryadi, 2022), who also found that the use of PBL in mathematics instruction significantly enhances student participation and understanding.

The selection of the ADDIE model in this study is based on its advantages in developing structured and systematic instructional materials. Compared to other models such as 4D or Plomp, ADDIE allows for more comprehensive planning as it includes evaluation at each stage, making it more adaptable for iterative improvements. These findings align with the study by (Pitriyana & Arafatun, 2021), which used the ADDIE model to develop PBL-based instructional materials and found them to be valid, practical, and effective. Additionally, unlike the Hannafin & Peck model, which focuses more on technology-based development, ADDIE is better suited for designing print-based problem-solving materials such as those developed in this study.

Although this study contributes to the development of more interactive and problem-solving-oriented instructional materials, several limitations must be considered. The limited sample size, which was restricted to a single school, may affect the generalizability of the results. Furthermore, this study has not accounted for other factors such as differences in students' learning styles, teacher readiness in implementing PBL, and the influence of students' intrinsic motivation on the effectiveness of the Worksheets. Therefore, future research should expand the sample size and extend the study duration to obtain more comprehensive findings. Additionally, the development of PBL-based Worksheets can be further explored by integrating digital technology or adopting other innovative learning approaches to enhance instructional effectiveness.

Reference.

Astuti, W. (2018). *PBL-based Worksheet to improve students' critical thinking skills*.

Awang, H., & Ramli, R. (2008). *Creative thinking skills approach through problem-based learning*.

Chalkiadaki, A. (2018). Students' analytical reasoning abilities in the context of the Industrial Revolution 4.0. *Journal of Education and Technology*, *21*(3), 112–126.

Lee, J. (2018). Non-cognitive predictors of academic achievement: Evidence from TIMSS and PISA. *Learning and Individual Differences*, *65*, 50–64. https://doi.org/10.1016/j.lindif.2018.05.009

Lindner, C., Rienow, A., Otto, K.-H., & Juergens, C. (2022). Development of an App and Teaching Concept for Implementation of Hyperspectral Remote Sensing Data into School Lessons Using Augmented Reality. *Remote Sensing*, *14*(3). https://doi.org/10.3390/rs14030791

Masruroh, L., & Raharjo, T. (2024). Development of PBL-based E-Worksheet to improve critical thinking skills in the food substance sub-material. *BioEdu Journal, Surabaya State University*.

Monalisa, C., Ahda, Y., & Fitria, Y. (2019). Critical thinking skill improvement using problem based learning (pbl) model of 4th grade students of elementary school. *... Journal of Science and ...*. http://repository.unp.ac.id/21930/

Munifah, Iskandar, T., Muhamad, Y., Ninik, Z., Syamsul, H., Fitria, L., & Ali, R. (2019). Management Development of Student Worksheets to Improve Teacher Communication Skills: A Case Study Self-Efficacy and Student Achievement. *Education Journal of Gifted Young Scientists*, *7(4)*, 777–798. https://doi.org/https://doi.org/10.17478/jegys.625618

Nafiah, N., & Suyanto, S. (2015). *Application of problem-based learning in PC repair and reset learning to improve critical thinking skills of vocational high school students*.

O.E.C.D. (2019). *PISA 2018 results*.

OECD. (2015). *OECD Programme for International Student Assessment (PISA)*.

Pitriyana, R., & Arafatun, S. (2021). *Development of PBL-based Worksheet to improve critical thinking skills of grade VI elementary school students*. Jurnal Ilmiah Kependidikan.

Rahmawati, L. (2022). *The effect of implementing problem-based learning on improving students' critical thinking skills in fraction learning in elementary schools*.

Rihayati. (2021). Improving Critical Thinking Ability through Discovery Learning Model Based on Patiayam Site Ethnoscience. *Journal of Physics: Conference Series*, *1823*(1). https://doi.org/10.1088/1742-6596/1823/1/012104

Ritonga, A. (2024). *Development of PBL-based Worksheet on critical thinking skills in physics learning*. UIN Imam Bonjol Repository.

Serevina, V. (2018). *Teaching materials in problem-based learning*.

Sugiyono. (2018). *Educational research methods (quantitative, qualitative, and R&D approaches*. Alfabeta.

Suripah, S., & Susanti, W. D. (2022). Alternative learning during a pandemic: Use of the website as a mathematics learning media for student motivation. *Infinity Journal*. http://e-journal.stkipsiliwangi.ac.id/index.php/infinity/article/view/2217

Temiyati, R., & Nuryadi, R. (2022). Development of PBL-based Worksheet to improve students' critical thinking skills. *Journal of Elementary Education and Science*.

Ulger, K. (2018). The effect of problem-based learning on the creative thinking and critical thinking disposition of students in visual arts education. *Interdisciplinary Journal of Problem-Based Learning*. https://scholarworks.iu.edu/journals/index.php/ijpbl/article/view/28166

Biography

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