

Development of Assessment-Oriented E-LKPD Media for Learning to Train Mathematical Problem-Solving Skills

Dadan Ramdani, Vepi Apiati , Depi Ardian Nugraha 

How to cite: Ramdani, D., Apiati, V., & Nugraha, D. A. (2026). Development of Assessment-Oriented E-LKPD Media for Learning to Train Mathematical Problem-Solving Skills. *Kognitif: Jurnal Riset HOTS Pendidikan Matematika*, 6(1), 401–419. <https://doi.org/10.51574/kognitif.v6i1.3617>

To link to this article: <https://doi.org/10.51574/kognitif.v6i1.3617>



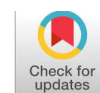
Opened Access Article



Published Online on 17 March 2026



Submit your paper to this journal



Development of Assessment-Oriented E-LKPD Media for Learning to Train Mathematical Problem-Solving Skills

Dadan Ramdani^{1*}, Vepi Apiati¹ , Depi Ardian Nugraha¹ 

¹Department of Mathematics Education, Faculty of Teacher Training and Education, Universitas Siliwangi

Article Info

Article history:

Received Jul 11, 2025

Accepted Mar 08, 2026

Published Online Mar 17, 2026

Keywords:

Assessment for Learning
Media for Learning
Mathematical Problem-Solving
Assessment-Oriented E-LKPD

ABSTRACT

Students limited mathematical problem-solving ability is often related to the lack of learning media that can provide continuous feedback throughout the thinking process. This study addresses that gap by developing an electronic student worksheet (E-LKPD) based on Assessment for Learning (AfL) for one-variable linear inequalities. The novelty of this study lies in integrating AfL principles with an automated feedback system that supports reflection, enables students to identify errors, and helps them overcome difficulties independently. This feature distinguishes the product from conventional E-LKPDs, which generally do not provide structured and continuous feedback. The study used a research and development approach with the PPE model, consisting of Planning, Production, and Evaluation. Planning involved needs and curriculum analysis, Production covered storyboard design and product development using wizer.me, and Evaluation included expert validation and field trials. The participants in the implementation stage were 30 eighth-grade students of SMPN 4 Tasikmalaya. The instruments included validation questionnaires, student response questionnaires to assess practicality, and a test of mathematical problem-solving ability to measure effectiveness. Data were analyzed quantitatively and qualitatively using Aiken's V, percentages, mean scores, N-gain, and Cohen's d. The results showed that the developed E-LKPD was valid, with Aiken's V scores of 0.91 from media experts and 0.92 from material experts. The media was also effective in improving students' mathematical problem-solving ability, as indicated by a medium N-gain of 0.35 and a large effect size of 3.63. These findings indicate that AfL-based E-LKPD is feasible, practical, and effective for supporting mathematics learning in digital environments.



This is an open access under the CC-BY-SA licence



Corresponding Author:

Dadan Ramdani,
Department of Mathematics Education,
Faculty of Teacher Training and Education,
Universitas Siliwangi
Jl. Siliwangi No. 24, Kahuripan, Tawang District, Tasikmalaya City, West Java, 46115, Indonesia
Email: 212151057@student.unsil.ac.id

Introduction

The development of Science and Technology (IPTEK) goes hand in hand with the contribution of mathematics as the basis of its thinking. Mathematics is one of the main factors that support the progress of science and technology (Siregar, 2021). The statement emphasized that mathematics plays a significant role in supporting the progress of science and technology. Therefore, mathematical problem-solving skills are one of the important competencies that must be possessed to face various challenges in the modern era of Pratiwi et al. (2023) states that these abilities involve complex cognitive processes, in which students are required to solve problems using appropriate strategies in line with Polya's theory (1973) which divides the problem-solving process into four main stages, namely identifying and understanding the problem, devising a plan, implementing the strategy that has been designed (carrying out the plan), and evaluating or reviewing the results obtained (looking back). The importance of mastering these skills is also emphasized by Wilson in the framework of the National Council of Teachers of Mathematics (NCTM), which states that the fundamental goal of mathematics learning is to shape students to be able to face and solve complex problems (Muthia et al., 2024).

Mathematical problem-solving skills are fundamental competencies that students need to possess in order to be able to implement mathematical concepts systematically and applicatively in real-life contexts. However, based on the results of interviews with grade VIII mathematics teachers at SMPN 4 Tasikmalaya, it was found that at the stage of understanding problems, there were still students who had difficulty identifying known and questioned information, although some others had shown quite good comprehension skills. At the completion planning stage, a number of students have not been able to formulate the right strategies or steps to solve the given problems. The inability to prepare the plan has an impact on the implementation stage, where some students are unable to implement the strategy optimally. This condition generally occurs due to a lack of precision in designing the solution at the previous stage, thus affecting the success of the next stage. Furthermore, at the review stage, students tend to only write the final conclusion without carrying out a verification process or re-checking the answers through alternative methods of completion.

Although many studies have developed electronic-based E-LKPD, it only has a function as task processing without any counter-interaction that leads to students' thinking guidance when facing cognitive constraints. Previous research that also corroborates these findings is Aulia & Hidayati (2023) shows that the proportion of students with a high level of ability is only 27%. Meanwhile, students in the medium category reached 33%, and the low category dominated with a percentage of 40%. Other research by Somatanaya & Nugraha (2018) showed that the ability of junior high school students in Tasikmalaya to solve mathematical problems only received an average score of 45.39 with a poor category. Research Elma & Munandar (2023), Agustami, Aprida, & Pramita (2021), and Fauziah et al. (2022) It also states that in general, students experience obstacles from the stage of developing a solution strategy to the process of reviewing the answers. This situation shows the need for a solution in developing students' mathematical problem-solving skills, namely through the process of training this ability. This results in a very crucial space and is overcome through the development of more flexible and responsive learning media.

A number of previous studies have focused on efforts to improve mathematical problem-solving skills through the use of various learning media. One of the media that is considered appropriate to support this goal is the Electronic Student Worksheet (E-LKPD. Hanum & Amini (2023) explained that E-LKPD is considered an interactive guide that can be accessed through

digital devices and is able to present videos, animations, and automatic feedback that support students' understanding in more depth. Several studies have proven its effectiveness, such as [Sarman et al. \(2023\)](#) developed E-LKPD based on Polya's steps, and showed that the media was able to gradually improve students' ability to solve mathematical problems. Research by [Panjaitan et al., \(2023\)](#) shows that the use of problem-solving-based E-LKPD can increase the effectiveness of defense through validated and easy-to-apply strategies. Similarly, [Ristiani & Loviana \(2023\)](#) reported that E-LKPD based on a problem-solving approach is very helpful for students in understanding each stage of problem-solving strategies. In its implementation, some of these E-LKPDs allow students to think independently, receive feedback, and reflect on their answers. However, most of these E-LKPDs have not been able to conduct an in-depth analysis of students' work, even though each individual may use a variety of completion strategies. Therefore, an E-LKPD is needed that is not only able to train students' abilities gradually, but also allows teachers to provide direct feedback on students' thinking processes. One approach that supports this is assessment for learning, which has been shown to encourage active involvement in the learning process.

Assessment for learning as explained by Reform Group assessment in [Kurniawan \(2020\)](#) It is an approach that involves collecting and interpreting evidence that is used by teachers and students in deciding the best way to achieve learning. Through the application assessment for learning, Students not only solve problems, but also get the opportunity to rethink, evaluate the process, and improve their completion strategies based on the feedback provided. Although there have been many studies explaining the development of E-LKP-based problem-solving, such as works [Choirudin et al. \(2021\)](#) that emphasizes the Problem-solving in general. This conventional media focuses more on the limitations experienced in terms of interactivity that can provide independent guidance when students experience difficulties. The novelty of this research lies in the implementation of assessment for learning through the features found on the Wizer.me platform that can be used in combination with deliberative learning strategies. Unlike ordinary E-LKPD, this product can provide automatic corrections when students fail at a stage. The system will automatically provide constructive feedback and guide them to a page explaining the completion stages in the form of a video tutorial.

Therefore, the development of E-LKPD which refers to the assessment for learning approach is seen as more suitable to train mathematical problem-solving skills systematically and gradually. In this study, the E-LKPD media is designed by adopting the principles of assessment for learning in each component. Therefore, the application of the principle of assessment for learning in the development of E-LKPD is an effective strategy to overcome various existing limitations. To answer existing problems, this study developed E-LKPD media with an assessment for learning orientation which is designed to be feasible in practicing mathematical problem-solving skills. Viewed from the theoretical side, the principle of assessment for learning in digital media will strengthen the concept of formative assessment as a learning resource that is not only an evaluation of learning outcomes. Viewed from a practical perspective, the results of this digital media present an innovative alternative in digital learning that allows an educator to provide guidance personally but does not need to be face-to-face, especially in helping students improve the accuracy of re-examining their work with systematic direction. Therefore, the development of assessment-oriented E-LKPD for learning is considered a more appropriate and relevant approach to train mathematical problem-solving skills in a gradual and structured manner.

In this study, the E-LKPD developed integrates the principles of assessment for learning. Thus, integrating the principle of assessment for learning into the development of E-LKPD media is a strategic step that can overcome these limitations. To answer existing problems, this study developed E-LKPD media with an assessment for learning orientation which is designed

to be feasible in practicing mathematical problem-solving skills. The development of E-LKPD media based *on* assessment for learning uses the PPE (Planning, Production, Evaluation) model because of its practicality and efficiency in producing learning media that requires continuous evaluation at every stage of its development. The selection of this model is to ensure that the resulting assessment for learning features have passed strict validation before being widely piloted. Based on this background, this study aims to produce valid, practical, and effective assessment-based E-LKPD media to train students' mathematical problem-solving skills on single-variable linear inequalities material.

Method

Types of Research

This research uses the Research and Development (R&D) method, which is an approach that focuses on the product development process as well as evaluating the level of effectiveness of its use (Setyosari 2015). In its implementation, the development approach applied is PPE (Planning, Production, Evaluation). This approach model was adopted from Richey's research Richey & Klein (2007). The selection of the PPE model is based on its characteristics that emphasize the process, from the planning stage to the evaluation, and this development is analytical from start to finish. In addition, the PPE model is considered to be relatively shorter and more efficient in its use compared to the ADDIE or Borg & Gall models. This model is also very suitable for developing technology-based learning media that requires continuous evaluation cycles at each stage of production without having to go through too complex analysis stages at the beginning.

Subject

This research involves several subjects, namely experts, teachers, and students. The expert group consists of two media experts who are lecturers in Informatics Engineering, who are tasked with assessing product quality from technical aspects and visual appearance. In addition, there are two material experts, namely Mathematics Education lecturers and partner teachers, who evaluate the suitability of the content of the material and the use of language in the product. The user subjects in this study are students of class VIII E SMP Negeri 4 Tasikmalaya. The students participated in two stages of the trial, namely a small-scale trial involving 10 people to identify initial obstacles, and a large-scale trial involving 30 people to assess the level of practicality and effectiveness of the developed product

Instruments

Data was obtained through three main types of instruments that have been adjusted to the quality criteria of learning media according to Nieveen in the book (Akker et al., 2012). The main instruments include validation sheets for experts, student response questionnaires, and mathematical problem-solving ability tests. The test instruments are arranged based on a grid that refers to four rare problem-solving according to Polya (1973). Before being used to collect data, this test instrument has been tested for the validity of its content by experts to ensure that each question item can accurately measure the indicator of problem-solving ability. This validity test is carried out face-to-face and in consultation with experts.

First, the validity of E-LKPD media is measured using expert validation sheets. Media experts who will assess the content and technical aspects. Evaluation by media experts is carried

out by examining the quality of the E-LKPD software that has gone through the development and adjustment process of [Sholehah et al. \(2021\)](#). The grid of media validity that is a reference for assessment by media experts is presented as follows.

Table 1. The Grid of Media Validity

Aspects	Statement
Servings	1,2
Graphics	3,4,5
Figures and illustrations	6,7
Software Engineering	8
Aspects	
Quantity	8

Furthermore, the subject matter expert will conduct an assessment on the subject matter expert's validation sheet to assess in terms of the process including content components and linguistic aspects. The validation instrument by subject matter experts was prepared referring to the assessment criteria for the E-LKPD that had undergone modifications from [Ainiy & Wiguna \(2020\)](#). The grid of subject matter experts that will be assessed by subject matter experts is presented as follows.

Table 2. Material Validity Grid

Aspects	Statement
Contents components	1,2,3,4,5
Language	6,7,8
Quantity	8

Second, the practicality of E-LKPD media is obtained through the distribution of questionnaires to students. The questionnaire used is the result of modifications of user response instruments that have been designed and developed by previous researchers by [Alda et al. \(2021\)](#). The questionnaire grid used to measure student responses is presented as follows.

Table 3. Student Response Questionnaire Grid

Aspects	Statement
Use of E-LKPD	1,2
Reaction to use	3,4,5,6
Benefits of E-LKPD	7,8,9
Quantity	9

Third, the mathematical problem-solving ability test is designed using the form of description questions, which are arranged according to the reference of mathematical problem-solving ability indicators according to Polya. The value of students' abilities is obtained from the results of working on the questions.

Procedure

The development of E-LKPD media based on assessment for learning in this study applies the PPE (Planning, Production, Evaluation) model as stated by Richey and Klein ([Rusdianti, 2021](#)). The model includes three main stages. The first stage is *planning*, in which the researcher performs crucial steps including needs analysis, curriculum analysis, and literature study which will later be designed in a formative feedback mechanism and integrated in the Wizer.me platform. At this stage, the researcher conducted an in-depth interview with the mathematics teacher of grade VIII SMPN 4 Tasikmalaya to obtain information related to the

needs of students, obstacles they experience in learning, and the needs of teachers. This step aims to make the products developed relevant and able to answer problems found in the field. The next stage is production, which includes the process of designing, developing products, and preparing research instruments. Production activities began with the preparation of a design in the form of a storyboard as a development reference. Furthermore, product development in the form of E-LKPD was carried out. To optimize its use in training students' abilities, E-LKPD is equipped with supporting elements such as pictures and videos that function to help understand the material and solve the problems presented. After the development process is completed, the researcher compiles a research instrument consisting of a validation sheet for experts and a test device used to measure the ability of the learners. However, major revisions were also made at this stage that came from the input of validator experts to improve the order of content, as well as the clarity of the audio-visual media.

The final stage is Evaluation (evaluation), a validation mechanism is carried out by two expert validators face-to-face through the digital instrument platform. Then, learning is carried out through a Wizer.me platform that can be accessed by students with *Smartphone* each in the classroom. After that, a post-test is carried out to measure students' ability to solve mathematical problems. In this stage, the effectiveness of the E-LKPD was also tested based on filling out the response questionnaire. The researcher provides digital access for validators in E-LKPD as well as providing physical instruments or digital forms as an in-depth assessment and revision suggestion. After the validation process is declared feasible by way of revision, the effectiveness process is used by implementing it in the learning process in the classroom. Each student is required to access E-LKPD independently through their smartphone. This procedure is used to observe the effectiveness of the automatic feedback feature on Wizer.me platform.

Data Analysis

This study applies quantitative descriptive data analysis techniques. The validity test is carried out using the Aiken's V index to determine the level of suitability of the instrument. The level of practicality of the media is determined based on the average percentage of scores obtained from the student response questionnaire. Meanwhile, the effectiveness of the media was analyzed through a comparison of the average pretest and post-test scores, N-gain calculations, and effect measures using Cohen's d. The data analysis aims to identify the tendency to increase learning outcomes and the magnitude of the effect of treatment on limited trial subjects. Therefore, this study has not involved inferential statistical testing to generalize to a wider population.

The data analysis in this study refers to the use of the Likert scale as a basis in the scoring process. The scoring conditions are arranged based on the categories that have been determined referring to Priambodo & Nuryanto (2020) and are presented as follows.

Table 4. Scoring Guidelines

Selected Captions	Criteria
Excellent	5
Good	4
Enough	3
Less	2
Very Less	1

This guideline is carried out to assess the validity aspects carried out by experts as well as practical aspects based on student responses. The scores obtained from the experts were then

analyzed by applying the Aiken's V index to determine the validity of the E-LKPD (Retnawati, 2016). The formula used is as follows.

$$V = \frac{\sum s}{n(c - 1)}$$

Description:

V = The value of the content validity index in each statement item.

s = The difference between the score given by the validator and the lowest score in the range of the scoring categories.

n = The number of expert validators involved in the assessment process.

c = The number of scoring categories or scales provided for expert validators.

In assessing the validity of the E-LKPD media, the average Aiken V index score obtained is then interpreted as follows.

Table 5. Media Validity Level

Aiken V Index Value	Categories
$V > 0,8$	Highly Valid
$0,4 < V \leq 0,8$	Valid
$V \leq 0,4$	Invalid

In assessing the practicality of E-LKPD media, the score obtained is then converted into a percentage to determine the practicality of E-LKPD (Dewi & Izzati, 2020). The formula used is as follows.

$$V = \frac{\sum X}{N} \times 100\%$$

Description:

V = Percentage Value

$\sum X$ = Total score obtained

N = maximum value obtained

Furthermore, the percentage results are interpreted into the following practicality criteria.

Table 6. Media Practicality Level

Rating	Categories
$80\% < x \leq 100\%$	Very Practical
$60\% < x \leq 80\%$	Practical
$40\% < x \leq 60\%$	Quite Practical
$20\% < x \leq 40\%$	Impractical
$0\% < x \leq 20\%$	Very Impractical

To measure the effectiveness of E-LKPD media from the results of students' ability tests, calculations were carried out to find out the percentage of students who were able to complete the test questions well. Students are declared complete if the score obtained reaches or exceeds the set classical completeness limit, which is 78%. The percentage is calculated using the following formula.

$$p = \frac{\text{Total amount}}{\text{All students}} \times 100\%$$

The percentage of completeness obtained is then converted into the effectiveness category shown in the following table.

Table 7. Media Effectiveness Rate

Percentage (%)	Categories
$85 < x \leq 100$	Highly Effective
$65 < x \leq 85$	Effective
$50 < x \leq 65$	Quite Effective
$35 < x \leq 50$	Less Effective
$20 < x \leq 35$	Highly Ineffective

The relationship of the three analyses cumulatively determines the feasibility status of a product, namely the media is declared viable if it meets three minimum criteria including Valid, Practical, and Effective. Thus, the media can be an innovative alternative for teachers in carrying out digital formative assessments.

Research Findings

The results of this study explain the process of developing E-LKPD-based media *assessment for learning* which is designed to train mathematical problem-solving skills until an E-LKPD product that is declared suitable for use is obtained. The eligibility, according to [Nieveen \(1999\)](#), The feasibility of a product is determined through three main aspects, namely validity, practicality, and effectiveness. The development process is carried out through three main stages, namely planning, production, and evaluation. The following is the results of the research that has been carried out.

Planning

The initial stage in the development of E-LKPD media is the planning phase which includes needs analysis, curriculum studies, and literature review. Based on the results of the interviews, information was obtained that some students still had difficulties in solving mathematical problems. In addition, the learning tools used so far are still limited to print media, such as teaching materials and LKPD in physical form. Students also show higher enthusiasm when the learning process involves the use of technology. The results of the curriculum analysis through interviews show that SMPN 4 Tasikmalaya has implemented the Independent Curriculum. The curriculum emphasizes student-centered learning with a more flexible approach and is oriented towards developing essential competencies that are relevant to daily life. The assessment for learning approach is considered to be in line with the principles of the Independent Curriculum because it both places students at the center of the learning process. [Safithri & Muchlis \(2022\)](#) reveals that the application of learning that uses assessment for learning effectively able to improve students' learning achievements. In line with the research, [Yusron & Sudiyatno \(2021\)](#) states that learning that uses assessment for learning in learning is able to strengthen understanding of concepts and critical thinking skills. Various efforts have been made to develop students' mathematical problem-solving skills, one of which is the development of more varied E-LKPD, as conveyed by [Husna et al. \(2022\)](#). In addition, research conducted by [Setyawardani & Edy \(2024\)](#) It is one of the tangible proofs that technology can be effectively integrated in mathematics learning.

Production

The production stage includes the design process, development of E-LKPD media, and the preparation of research instruments. In the design phase, the researcher compiled a navigation structure and flowchart as a guide in the E-LKPD development process. In addition,

a storyboard was also designed that served as a frame of reference in realizing the media to be developed. At the development stage, the first step is to create a learning video that aims to support students' understanding. The video was designed with the help of the Canva and Adobe Express apps. Furthermore, the various components that have been prepared are integrated into the predetermined technology platform to produce a complete E-LKPD product. In this study, the researcher used a digital platform called wizer.me. According to Sobri et al. (2022), Wizer.me is a technology-based media that facilitates the creation of student worksheets online and is equipped with an evaluation system to support the assessment process.

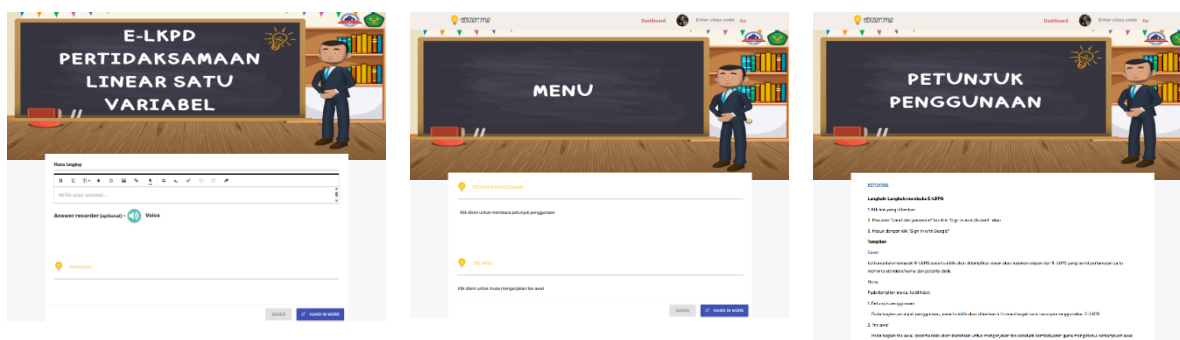


Figure 1 E-LKPD Development Plan

The E-LKPD design snippet in the Figure shows the navigation flow arranged from left to right. The display starts with the *cover* page, then continues to the main menu that contains links to the user instructions and initial test pages. In the instructions for use section, the procedure for using E-LKPD is explained along with a description of the function of the symbols used. Meanwhile, the initial test contains a number of questions that students work on to identify their initial abilities. The series of learning activities starts from the material page that must be studied first by the students. After understanding the material, students are directed to solve the first problem by following the problem-solving stage, starting from the stage of understanding the problem, then planning the solution, implementing the plan, to the stage of re-examination. If students have difficulties, there is a link that leads to the next problem so that they can start again from the first stage. This process continues until students are able to solve problems appropriately.

After the answer is declared correct by the teacher, students proceed to the review page. In this section, students are given reflective questions related to readiness before taking the final test. Next, students take the final test to find out their ability achievements after participating in learning. In an effort to train mathematical problem-solving skills, researchers compile instructions that function as *systematic treatments* or directions for students. In addition, the concept of *deliberate practice* is also applied through the provision of several variations of problems. This strategy allows students who have difficulty in the first question to practice again through the next question. The e-LKPD developed is also oriented to the principle of *assessment for learning*, so that each stage is designed to provide feedback that supports the learning process. The E-LKPD display used to train these skills is presented as follows. The instructions used are shown as follows.

Petunjuk

Carilah kata kunci seperti angka, istilah, atau informasi penting!

Figure 2. Clues to Understanding the Problem

First, understand the problem. Students are guided to identify essential information contained in the problem, such as numbers, important terms, and relevant data. Students are directed to mark or underline the keywords found to facilitate the analysis process. In addition, students are also asked to determine the information that is known and questioned, and to rewrite it in their own sentences so that their understanding of the problem becomes clearer. This step aims to reduce misinterpretation and help students build a more structured representation of the problem before entering the resolution planning stage.

Petunjuk

Buatlah peta konsep mulai dari jenis masalah, strategi, sampai langkah solusi!

Figure 3. Planning Completion Instructions

Second, at the stage of planning the solution, students are guided to compile a concept map as a framework for thinking in solving problems. The preparation of the concept map begins by identifying the types of problems faced, then formulating the appropriate strategy, and ending by determining the solution steps to be implemented in the next stage.

Petunjuk

Untuk menentukan banyaknya buku yang mungkin dipinjamkan, gunakanlah langkah solusi yang telah dibuat sebelumnya!

Figure 4. Instructions for Implementing the Plan

Third, in the stage of implementing the plan, students are directed to apply the completion steps that have been formulated previously in solving the given questions. This process requires students to systematically implement strategies in accordance with the planning that has been prepared in the previous stage.

Petunjuk

Periksa kembali pekerjaanmu dengan cara lain!

Kamu boleh pilih cara substitusi, grafik, tabel nilai atau cara lain!

Figure 5. Check-Back Instructions

Fourth, In the re-examination stage, students are directed to review the results of the completion using alternative methods or approaches. This step aims to ensure the accuracy of the answers while strengthening the understanding of the concepts used. In the E-LKPD developed, the researcher also applies the principle of deliberate practice as a form of structured exercise to improve students' abilities. The implementation of the deliberative exercise is shown as follows.

Pada suatu hari yang cerah, Tina dan Riko sedang asyik membaca buku di rumah mereka. Maya, seorang teman baik mereka, datang berkunjung dengan tujuan meminjam beberapa buku untuk tugas sekolahnya. Tina dan Riko sepakat untuk meminjamkan buku kepada Maya, tetapi mereka ingin membagi jumlah buku secara adil. Tina memiliki 20 buku, sedangkan Riko memiliki 50 buku. Setelah berdiskusi, mereka sepakat untuk meminjamkan jumlah buku yang sama kepada Maya. Namun, mereka juga ingin memastikan bahwa setelah buku dipinjamkan, jumlah buku yang dimiliki Riko sekarang kurangnya empat kali lipat dari jumlah buku yang tersisa pada Tina. Berapa jumlah buku yang dapat dipinjamkan Maya?



Problem 1

Pada suatu sore yang cerah di pantai, Doni, Eko dan Fajar sedang bermain. Sembari menikmati pemandangan Doni dan Eko ingin memakan permen. Doni membawa 90 permen, Eko membawa 70 permen, sedangkan Fajar tidak membawa permen sama sekali. Kemudian, Doni dan Eko memberikan permen kepada Fajar dengan jumlah yang sama. Setelah berbagi, jumlah permen Eko kurang dari jumlah permen Doni. Berapa jumlah maksimal permen yang dapat diterima Fajar?



Problem 3

Pada suatu pagi, Rina dan Sista sedang membantu membersihkan halaman rumah. Mereka membutuhkan air untuk mengisi ember besar yang akan digunakan mencuci peralatan taman. Rina memiliki 15 liter air dan Sista memiliki 25 liter air di wadahnya. Kemudian, mereka menuangkan air dengan jumlah yang sama ke dalam ember. Jika jumlah air yang tersisa pada Sista paling banyak tiga kali jumlah air yang tersisa pada Rina, berapa total maksimal air yang dituangkan ke ember?



Problem 2

Pada suatu hari, Alya, Budi, dan Citra sedang berkumpul di kebun. Alya membawa 9 apel, sedangkan Budi membawa 5 apel. Namun, Citra tidak membawa apel sama sekali. Alya dan Budi sepakat untuk berbagi apel dengan jumlah yang sama kepada Citra. Namun, Alya mengatakan bahwa setelah memberikan apel, jumlah apel yang dimiliki Alya harus lebih banyak dari Citra. Berapa jumlah maksimal apel yang dapat diterima Citra?



Problem 4

Figure 6. Problems

First, the repetition of the poems is not monotonous, but is presented in the form of variations of the questions. With several different problems, students can rework the exercise to deepen their understanding of the concept or solution steps that still need to be strengthened.



Mengalami kesulitan

Figure 7. Link to Next Issue

Second, focus on improving weaknesses. In the E-LKPD developed, the researcher uses links to connect from the problem being worked on to the next problem. This link is used when students have difficulties when working on problems.

The E-LKPD developed in this study is *oriented to assessment for learning*, in this case the researcher uses the principles of *assessment for learning*, the principles are displayed as follows.

Capaian Pembelajaran

Peserta didik dapat menyelesaikan persamaan dan pertidaksamaan linear satu variabel

Tujuan Pembelajaran

- Peserta didik dapat menjelaskan konsep pertidaksamaan linear satu variabel
- Peserta didik dapat menentukan penyelesaian pertidaksamaan linear satu variabel menggunakan penjumlahan dan pengurangan
- Peserta didik dapat menentukan penyelesaian pertidaksamaan linear satu variabel menggunakan perkalian dan pembagian

Figure 8. Learning Outcomes and Learning Objectives

First, determine the goals and criteria for success. E-LKPD is designed to include learning outcomes and learning objectives.

Petunjuk

Carilah kata kunci seperti angka, istilah, atau informasi penting!

Figure 9. Instructions

Second, efforts to strengthen understanding are carried out through learning activities that are designed in a directed manner. In the E-LKPD, a guide is included that directs students to follow the steps that have been set. This approach encourages students to reflect on their thinking process so that they are able to determine the appropriate answers conceptually and procedurally.

Add a comment

Kata kunci yang kamu temukan sudah benar
Kamu menuliskan semua kata kunci yang terdapat dalam soal dengan lengkap dan jelas

Apa saja kata kunci yang ditemukan?



Correct answer

Add a comment

Kata kunci yang kamu temukan belum semua, masih ada informasi penting yang terlewat
Namun, kamu telah menulis kata kunci dengan benar dan jelas
Periksa kembali soal agar kamu mengetahui kata kunci yang terlewat tersebut

Apa saja kata kunci yang ditemukan?



Incorrect answer

Figure 10. Feedback

Third, the implementation of constructive feedback is also one of the focuses in the development of E-LKPD. This media is designed using a platform that is able to support direct feedback. Through this system, researchers can submit responses to the results of students' work

immediately, so that they can find out the right parts and aspects that still need to be improved. After the E-LKPD development process is completed, the next stage is the preparation of research instruments. The instruments designed include validation sheets, student response questionnaires, and test devices to measure ability. The validation sheet was given to four validators, consisting of two media experts and two material experts. The results of the assessment from the validators are presented in the following table.

Table 8. Media Expert Validation Results

Aspects	V1	V2	Aiken V Index	Categories
Presentation	8	10	0,87	Highly Valid
Graphic	14	14	0,91	Highly Valid
Figures and illustrations	9	9	0,87	Highly Valid
Aspects of software engineering	5	5	1	Highly Valid
Quantity	35	35	3.65	Highly Valid

Table 9. Material Expert Validation Results

Aspects	V1	V2	Aiken V Index	Categories
Contents components	24	25	0,97	Highly Valid
Language	13	14	0,87	Highly Valid
Quantity	37	39	1,84	Highly Valid

The results of the evaluation conducted by media experts and material experts show that the E-LKPD based on assessment for learning obtained the title of "very valid". Both validators stated that the media has met the eligibility criteria and can be used without the need for revision. Thus, after being declared very valid and feasible, the development process is continued to the next stage.

Evaluation

At this stage, the E-LKPD media is evaluated to determine the level of practicality based on the results of the student response questionnaire and the achievement of the ability test. The product trial was carried out to 30 students. In addition, an ability test was also given to 30 students in class VIII E SMPN 4 Tasikmalaya. The results of the trial are presented in the following table.

Table 10. Student Response Results

Aspects	Score	Max Score	%	Categories
Use of E-LKPD	247	300	82,3%	Very Practical
Reaction to use	540	600	90%	Very Practical
Benefits of E-LKPD	407	450	90,4%	Very Practical
Quantity	1221	1350	90,4%	Very Practical

Based on the results of the student response questionnaire at the trial stage, the assessment-for-learning based E-LKPD obtained a consistent category in each aspect of the assessment, namely "very practical". Ability measurement is carried out through two stages, namely the initial test (pretest) and the final test (post-test). The initial test aims to identify the initial ability of students before being given treatment, while the final test is carried out to determine the improvement of ability after the use of E-LKPD as well as assess the level of

effectiveness of the developed media. The results of the students' ability test are presented as follows.

Table 11. Ability Test Results

Remarks	Initial Tests	Final Test
Conclusion	14	27
Incomplete	16	3
Quantity	30	30
Average Score (Mean)	74,03	83,17
Standard Deviation	7,29	5,70

The researcher calculated the results to measure the effectiveness of E-LKPD using the classical completeness formula as follows.

$$p = \frac{\text{Total amount}}{\text{All students}} \times 100\%$$

Initial test results.

$$p = \frac{14}{30} \times 100\%$$

$$p = 46,66\%$$

Pass the final test.

$$p = \frac{27}{30} \times 100\%$$

$$p = 90\%$$

Based on the calculation results, the percentage of completeness in the initial test reached 46.66%, while 53.34% of other students did not meet the completeness criteria. In the implementation of the final test aimed at assessing the effectiveness of the E-LKPD, the completeness level increased to 90%, with 10% of students still not reaching the limit of completeness. With this achievement, the E-LKPD developed is included in the category of "very effective". These findings show that the application of E-LKPD based on assessment for learning has a very strong influence on improving students' mathematical problem-solving skills. The researcher calculated Cohen's d (effect size) value to find out the magnitude of the difference in improvement between pretest and post-test scores in standard deviation units. The calculation is carried out using the following formula.

$$SD \text{ pooled} = \sqrt{\frac{(SD_1^2) + (SD_2^2)}{2}}$$

$$SD \text{ pooled} = \sqrt{\frac{(7,29^2) + (5,70)^2}{2}}$$

$$SD \text{ pooled} \approx 6.54$$

$$d = \frac{\text{Mean posttest} - \text{Mean pretest}}{SD \text{ pooled}}$$

$$d = \frac{83,17 - 74,03}{6.54}$$

$$d = 1,4$$

Based on the results of the analysis using Cohen's d, a value of 1.4 was obtained which shows that the development of E-LKPD has a very large influence on improving students' problem-solving skills. In addition, the researcher also calculated the N-gain value to assess the

level of treatment effectiveness by comparing the actual score increase obtained by the students to the maximum potential improvement.

$$g = \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum score} - \text{Pretest score}}$$

$$g = \frac{83,17 - 74,03}{100 - 74,03}$$

$$g = 0,35$$

The N-gain value obtained is 0.35. Based on the N-gain classification criteria, the value is in the medium category. Thus, it can be concluded that the implementation of E-LKPD based on assessment for learning is quite effective in improving students' mathematical problem-solving skills. The Paired Sample t-test is used to determine whether there is a statistically significant difference between pretest and post-test scores. Based on the results of the analysis using SPSS, a significance value (2-tailed) of less than 0.001 was obtained. These results show that there is a significant increase in students' mathematical problem-solving ability after the use of assessment-for-learning based E-LKPD.

Discussion

Based on the results of the study, the development of E-LKPD is oriented assessment for learning. This has been proven to provide a solution to the problem of students' low mathematical problem-solving skills. This condition is in line with the initial findings, where students have not been fully able to apply problem-solving procedures according to [Polya \(1973\)](#), especially at the planning stage to re-check. Unlike previous research that was limited to the development of E-LKPD-based Problem solving or the Polya step without the integration of formative assessment, this study specifically incorporates the principles of assessment for learning in every stage of problem-solving. The training process in E-LKPD is packaged in the form of deliberative exercises and instructions designed according to each step of Polya. This provides a more structured and adaptive learning experience to the needs of students. Theoretical realization of assessment for learning is manifested in the form of two main mechanisms, namely Feedback for learning and Student self-monitoring ([Kurniawan, 2020](#)). By utilizing Wizer.me platform, this automated feedback not only serves as a provider of true or false justification, but rather in cognitive cues that will appear instantly when learners encounter difficulties in the Polya problem-solving stage. This allows dialogue to occur in students to improve the logical flow in themselves. In addition, the existence of post-work scores will trigger metacognitive awareness from students through independent activities in monitoring students' learning progress, so that they can identify one-variable linear inequality material more deeply.

The high validity value of media experts (0.91) and material experts (0.92) shows that the E-LKPD meets the criteria of being very feasible to use. These findings are in line with [Sarman et al., \(2023\)](#) and [Panjaitan et al., \(2023\)](#) which shows that E-LKPD that is systematically designed and based on strong theory is able to produce a valid learning media that is worthy of testing. In addition, the positive response from students in large-scale trials (90%) showed that E-LKPD had a high level of practicality. These findings reinforce the results [Ristiani & Loviana \(2023\)](#) which emphasizes the importance of interactive elements in E-LKPD to increase learning engagement. In this study, practicality is also reflected in the students' enthusiasm for illustration, video and feedback features that help them.

The results of the student ability test showed that there was a significant increase in the level of completeness. Judging from the results of the pretest, as many as 14 students completed out of 30 students with an average score of 74.03. After the implementation of interactive E-LKPD, the post-test results showed an increase in results where as many as 27 students completed with an average score of 83.17. The calculation of the effectiveness of the E-LKPD learning media obtained an N-gain score of 0.35, which is included in the medium category. It can be said that E-LKPD is effective enough to help students master concepts that are important to apply in daily life. This is proven by Cohen's *d* value of 1.4 and is included in the very large category. This figure also shows that there are significant differences in ability before and after using E-LKPD media.

From a theoretical perspective, the success of the research contributes to the development of assessment-based learning theory. E-LKPD clearly emphasizes that assessment for learning is not just a testing tool at the end of learning, but also functions as a cognitive catalyst through feedback mechanisms with formative properties. Because it integrates interactive features in the form of video tutorials as instructions for working step by step according to Polya's steps. E-LKPD media also automatically performs scaffolding functions which are in line with the main focus of mathematics which is complex problem solving. The benefit of this media for students is to build independence in thinking in solving mathematical problems. Conceptually, this E-LKPD is a bridge to active learning through a work-value-fix cycle that occurs in real-time on digital platforms.

The analysis of contradictions and critical reflection of this study provides room for a broader view than previous research. In general, the learning improvements achieved are often identified as the main effects of media use. However, this study shows that the duration of repetitive exercises that are deliberately planned and directed through E-LKPD plays a crucial role. On the other hand, researchers found potential contradictions to fully automated ideas. This can be seen that even though digital feedback is very sophisticated, the role of "expert commentators" in the form of teachers is still very necessary (Hanum & Amini, 2023; Elma & Munandar, 2023); Agustami, Aprida, & Pramita, 2021); Fauziah et al., 2022). This automated post-feedback discussion facility that is not yet available causes students to tend to get stuck in a pattern of trial and error without understanding the concept of mathematical problem solving. Thus, digital innovation must be seen as a partner of teachers, not as a substitute for the instructional role of teachers in the classroom.

The innovative contribution of E-LKPD media based on assessment for learning can be seen through the assessment of the Technological Pedagogical Content Knowledge framework along with the SAMR model. This E-LKPD displays the synergy between technology, namely Wizer.me and pedagogy, namely assessment for learning and mathematical content in the form of one-variable linear inequality material. If reviewed through the framework of the SAMR teaching instruction model, namely Substitution, Augmentation, Modification, Redefinition, the development of E-LKPD media has been in the Modification window (Hanum & Amini, 2023; Elma & Munandar, 2023); Agustami, Aprida, & Pramita, 2021); Fauziah et al., 2022). E-LKPD does not just convert paper worksheets into digital format but presents a completely re-engineered learning assignment design with dynamic feedback features in accordance with Polya's problem-solving steps as a modification of teaching instructions that are not easily replicated by traditional print media. In addition, this E-LKPD provides a more transformative learning experience for students in understanding and mastering mathematical problem-solving skills.

However, the main advantage of this E-LKPD media lies in the novelty of the form of feedback given. Unlike previous media that only provided automatic feedback and must be in accordance with keywords or choices, this E-LKPD allows teachers to comment based on

students' work. This makes the feedback process more personal and meaningful, as emphasized in the theory assessment for learning by Kurniawan (2020). Students also stated that the feedback was very helpful for them to understand mistakes and correct them, which was at the heart of this learning. A significant increase can be seen from the learning outcomes of students, where 90% achieve classical completeness. This reinforces previous findings that the assessment for learning can improve learning outcomes (Sudarsono & Muchlis, 2023). However, this research makes a new contribution, namely integration assessment for learning into digital media. Thus, this research not only develops valid and practical E-LKPD, but also brings innovations in the use of digital technology to train mathematical problem-solving skills effectively.

Conclusion

This study shows that the development of assessment-oriented E-LKPD media is suitable for use to train mathematical problem-solving skills. The integration of assessment for learning principles in Polya's measures results in valid, practical, and effective E-LKPD. The validity of the E-LKPD media is shown through a proactive assessment from media and material experts with an average validation of 0.91 and 0.92. The practicality of E-LKPD media is reflected in the excellent response given by students with an average percentage of 90%. Viewed from the quantitative side, the increase in classical completeness of the product can be reviewed through an increase in student completeness from 14 students during the pretest to 27 students after the post-test. The increase in completeness was also supported by a significant increase in the mean from 42.50 to 82.15 and an N-gain value of 0.69 which was included in the medium category. In addition, Cohen's calculation of d of 3.63 indicates that this media has a huge effect on student learning outcomes.

Theoretically, the novelty of E-LKPD research lies in the concept of formative assessment in digital media. The e-LKPD developed is not only able to provide an interactive and reflective learning experience, but also allows teachers to provide more meaningful feedback based on students' thinking processes. This situation has a positive influence on their engagement and learning achievements. This is proven by 90% of students who have achieved classical completeness on the ability test. The E-LKPD media developed contributes to integrating the principles of assessment for learning with problem-solving approaches in Wizer.me-based digital media, which have not been found in previous research. Innovatively, this research stands out through the incorporation of automated feedback features that are made constructive that are often overlooked in conventional E-LKPDs. In terms of theory, the contribution of this research is in the development of a digital scaffolding mechanism that can help students solve problems with the steps proposed by Polya. The use of assessment for learning theory functions as an assessment tool and a learning tool that guides children to recognize their own mistakes independently to enrich the literature on adaptive learning in the digital era.

However, the study has limitations, especially in terms of attachment to turnaround time and feedback features that still depend on the platform's ability to provide manual comments. In addition, this research is only focused on one material, namely one-variable linear inequality and is carried out on a limited scale. The high dependence on the stability of the internet network to be able to carry out interactive functions optimally. This research is only focused on one material, namely the linear inequality of one variable and is carried out on a limited scale. The methodological limitation in this study is that it has not measured the long-term impact of the use of E-LKPD on students' problem-solving abilities. This study also did not involve a control group as a comparison of the effectiveness of the use of E-LKPD. Based on these results and

limitations, further research is recommended to develop E-LKPD media on different materials and levels, as well as optimize other features of the Wizer.me to improve feedback efficiency. In addition, empirically, cross-school replication with a purely experimental quantitative design is needed to strengthen the generalization of the findings of this study. This is done in order to review the long-term impact on students' reflective thinking skills in the context of digital learning to ensure the sustainability of the benefits of this assessment-based E-LKPD.

Conflict of Interest

The author declares no conflict of interest.

Authors' Contributions

The first author, D.R., understood the research concept presented and collected the data, prepared the research instruments and methodology, organized and analyzed the data, and discussed the results. The other two authors, V.A. and D.A.N., served as research advisors for this study and actively participated in the development of the theory and methodology, the organization and analysis of the data, the discussion of the results, and the approval of the final version of the manuscript. All authors confirm that the final version of this paper has been read and approved. The total percentage of contribution to the conceptualization, drafting, and revision of this paper is as follows: D.R.: 40%, V.A.: 30%, and D.A.N.: 30%.

Data Availability Statement

The authors state that data supporting the findings of this study will be provided by the corresponding author, [D.R.], upon reasonable request.




References

- Agustami, A., Aprida, V., & Pramita, A. (2021). Analysis of Students' Mathematical Problem-Solving Ability in Solving Circle Material Problems. *Journal of Mathematics Education (JPMM)*, 3(1), 224–231. <https://doi.org/10.36765/jp3m.v6i2.631>
- Ainiy, E. N., & Wiguna, Y. M. (2020). Development of LKPD Based on Discovery Learning of Class XI Linear Program Materials. *National Seminar on Mathematics Education*, 1(1), 73–82.
- Alda, S., Marlina, C., & Junita, S. (2021). Development of Digital-Based LKPD on History Materials in Grade IV SD SDN 72 Banda Aceh. *Student Scientific Journal*, 2(2). <https://jim.bbg.ac.id/pendidikan/article/download/631/290>
- Aulia, Z., & Hidayati, N. (2023). Analysis of Mathematical Problem-Solving Ability with Set Materials in Junior High School Students. *Didactical Mathematics*, 5(2), 580–590. <https://doi.org/10.31949/dm.v5i2.5728>
- Dewi, M. D., & Izzati, N. (2020). Development of Interactive PowerPoint Learning Media Based on RME Algebra Materials for Junior High School Class VII. *Delta: Scientific Journal of Mathematics Education*, 8(2), 217–226. <https://doi.org/10.31941/delta.v8i2.1039>
- Elma, E., & Munandar, D. R. (2023). Mathematical problem-solving ability of junior high school students in grade VII based on Polya steps. *Journal of Educatio FKIP UNMA*, 9(2), 1040–1050. <https://doi.org/10.31949/educatio.v9i2.5003>
- Fauziah, N., Roza, Y., & Maimunah, M. (2022). Mathematical Ability to Solve Students' Problems in Solving AKM Numeracy Type Problems. *Journal of Scholars: Journal of*

- Mathematics Education*, 6(3), 3241–3250. <https://doi.org/10.31004/cendekia.v6i3.1471>
- Hanum, L., & Amini, R. (2023). Development of Problem-Based Learning Based E-LKPD Using the Book Creator Application in Grade III Elementary School. *Journal of Elementary Education*, 6(4), 2183–2194. <https://doi.org/10.31949/jee.v6i4.7963>
- Husna, N. H., Marzal, J., & Yantoro, Y. (2022). Development of Problem-Based Learning Based E-LKPD to improve students' mathematical problem-solving skills. *AXIOM: Journal of the Mathematics Education Study Program*, 11(3), 2085–2095. <https://doi.org/10.24127/ajpm.v11i3.4914>
- Kurniawan, D. (2020). *AFL Assessment For Learning in Mathematics Education*. Deepublish. <https://bintangpusnas.perpusnas.go.id/konten/BK16837/assessment-for-learning-afl-dalam-pendidikan-matematika>
- Muthia, S. N., Sugandi, A. I., & Setiawan, W. (2024). Improving the mathematical problem-solving skills of 7th grade junior high school students through a problem-based learning model. *Journal of Innovative Mathematical Learning*, 7(3), 535–544. <https://doi.org/10.22460/jpmi.v7i3.23532>
- Nieveen, N. (1999). Prototyping to Reach Product Quality. *Design Approaches and Tools in Education and Training*, 125–135. https://doi.org/10.1007/978-94-011-4255-7_10
- Panjaitan, S. N., Mansyur, A., & Syahputra, H. (2023). Development of Problem-Based Electronic LKPD (E-LKPD) to Improve Mathematical Problem-Solving Ability and Learning Independence of SMP IT Indah Medan Students. *Journal of Scholars: Journal of Mathematics Education*, 7(2), 1890–1901. <https://doi.org/10.31004/cendekia.v7i2.2341>
- Polya, G. (1973). *How To Solve It*. Princeton: Princeton University Press.
- Pratiwi, G. A., Nugroho, A. A., & Ngatmini, N. (2023). Development of PBL-based e-lkpd to improve the mathematical problem-solving ability of grade V elementary school students. *Didactic : PGSD Scientific Journal STKIP Subang*, 9(1), 670–683. <https://doi.org/10.36989/didaktik.v9i1.727>
- Priambodo, E., & Nuryanto, A. (2020). Development of Edmodo Assisted Teaching Materials on the Subject of Manufacturing Engineering Drawings for Vocational Schools. *Journal of Vocational Dynamics of Mechanical Engineering*, 5(2), 145–153. <https://doi.org/10.21831/dinamika.v5i2.34803>
- Retnawati, H. (2016). *Quantitative Analysis of Research Instruments*. Parama Publishing.
- Ristiani, L., & Loviana, S. (2023). Development of e-lkpd with a problem-solving approach on the material of a two-variable linear equation system. *Journal of Mathematics Education*, 4(2), 104–115.
- Safithri, D. L., & Muchlis, M. (2022). Implementation of Assessment for Learning Based Learning to Improve Student Learning Outcomes on Reaction Rate Materials. *PENDIPA Journal of Science Education*, 6(2), 547–555. <https://doi.org/10.33369/pendipa.6.2.547-555>
- Sarman, A. A., Suastika, I. K., & Murniasih, T. R. (2023). Development of E-LKPD to Improve Students' Mathematical Problem-Solving Skills in Curved Side Spaces Building Materials. *Journal of Mathematical Studies*, 6(1), 49–66. <https://doi.org/10.21274/jtm.2023.6.1.49-66>
- Setyawardani, I. F., & Edy, S. (2024). Effect of Problem-Based Learning Assisted By E-LKPD Wizer.me On Students Mathematical Literacy Skills. *Mathline: Journal of Mathematics and Mathematics Education*, 9(2), 433–446. <https://doi.org/10.31943/mathline.v9i2.611>
- Setyosari, P. (2015). *Research Method: Research and Development*. Jakarta: Prenadamedia Group.

- Sholehah, F., Sunarto, S., & Gazali, M. (2021). *Development of Contextual-Based E-LKPD Using Liveworksheets in Social Arithmetic Material for Class VII of Junior High School Ahmad Dahlan, Jambi City.*
- Siregar, N. F. (2021). Understanding of Mathematics Concepts for Junior High School Students through the Realistic Mathematics Education approach. *Journal of Scholars: Journal of Mathematics Education*, 5(2), 1919–1927. <https://doi.org/10.31004/cendekia.v5i2.635>
- Sobri, M., Indraswati, D., Rahmatih, A. N., Fauzi, A., & Amrullah, L. W. Z. (2022). Training on making interactive worksheets with Wizer.Me to optimize learning at SD Negeri 26 Mataram. *Journal of Village News (JWD)*, 4(2), 118–124. <https://doi.org/10.29303/jwd.v4i2.189>
- Somatanaya, A. G., & Nugraha, D. A. (2018). Mathematical High Order Mapping of Junior High School Students in Tasikmalaya City. *THEOREM : Mathematical Theory and Research*, 3(2), 187. <https://doi.org/10.25157/teorema.v3i2.1170>
- Sudarsono, G. T. A., & Muchlis. (2023). The Feasibility of Assessment for Learning (AFL) Oriented LKPD to Improve Student Learning Outcomes in Buffer Solution Materials. *Journal of Chemistry Education FKIP Halu Oleo University*, 8(2), 95–108. <https://doi.org/10.36709/jpkim.v8i2.27>
- Yusron, E., & Sudiyatno, S. (2021). How is the impact of Assessment for Learning (AfL) on mathematics learning in elementary schools? *Journal of Prima Edukasia*, 9(1), 75–84. <https://doi.org/10.21831/jpe.v9i1.34865>

Author Biographies

	<p>Dadan Ramdani completed his undergraduate study in the Mathematics Education Study Program, Faculty of Teacher Training and Education, Universitas Siliwangi. He successfully defended his undergraduate thesis entitled <i>Development of an Assessment for Learning-Oriented E-LKPD to Foster Students' Mathematical Problem-Solving Ability</i> and was declared to have graduated from the program. His academic work reflects an interest in the development of digital learning media and mathematics learning assessment. He can be contacted via email at 212151057@student.unsil.ac.id</p>
	<p>Vepi Apiati is a lecturer in the Department of Mathematics Education, Faculty of Teacher Training and Education, Universitas Siliwangi. She is actively involved in teaching and academic activities in mathematics and mathematics education. The courses she teaches include Group Theory, Ring Theory, Economic Mathematics, Complex Analysis, and Seminar in Mathematics Education. Her academic work reflects a strong commitment to strengthening students' understanding of both pure mathematics and mathematics education. She can be contacted via email at vepiapiati@unsil.ac.id</p>
	<p>Depi Ardian Nugraha, is a lecturer in the Department of Mathematics Education, Faculty of Teacher Training and Education, Universitas Siliwangi. He is actively engaged in teaching and academic development in the areas of mathematics education, instructional media, and educational technology. The courses he teaches include Microteaching, Computer Applications in Mathematics, Development and Production of Mathematics Learning Media, Mathematical Modeling, ICT and Mathematics Learning Media, and Inferential Statistics. His academic work reflects a strong interest in integrating technology and innovative media into mathematics learning. He can be contacted via email at depi@unsil.ac.id.</p>