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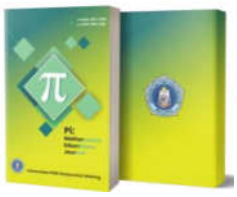

The Development of Interactive E-LKPD Using Wizer.Me On Polyhedron For The Eighth Grade Students

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ABSTRACT
This research aims to develop an Electronic Student Worksheet (E-LKPD) using the Wizer.Me platform for teaching polyhedron material that meets the criteria of validity, practicality, and effectiveness. The study employed a Research and Development (R&D) approach with the ADDIE model. The E-LKPD was designed based on a guided discovery learning model to help students better understand polyhedron concepts, their interconnections, and applications. Learning activities include matching polyhedron shapes with their names and discovering formulas through the "fill on image" feature in exploration tasks. The research was conducted at SMPN 1 Ledokombo, Jember, involving eighth-grade students as participants. Validation results show that the E-LKPD achieved a validity score (Va) of 3.84, indicating a valid category. The practicality level reached 82%, as evidenced by student response questionnaires, reflecting positive usability and engagement. Furthermore, the E-LKPD demonstrated effectiveness, with 34 out of 43 students achieving classical mastery, meaning more than 75% met the minimum learning standard. These findings indicate that the developed E-LKPD using Wizer.Me effectively supports students' conceptual understanding and learning outcomes in polyhedron material, providing a valid, practical, and efficient digital learning tool for mathematics education.

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1. Introduction

The education in Indonesia is now developing rapidly through the development of technology, information, and communication. Teachers have made many efforts by utilizing technology in learning activities. The use of technology requires creativity on the part of teachers, with a variety of new ideas in learning [1], [2]. Learning is a stage of activity where teachers and students interact in a learning environment [3]. The stages include design, implementation, and evaluation to assist in achieving learning activities. Learning activities can be achieved effectively with the presence of teachers who prepare the learning plans.

A well-organized learning plan is the initial step in formalizing and determining the learning objectives, determining the appropriate teaching strategy, developing the teaching materials, and formulating the evaluation tools to achieve the learning objectives set by the teachers [4]. One of the learning plans that must be prepared is creating the learning tools that function as the guidelines for the learning activities. The learning material is one of the tools. From one of the existing learning materials, the researcher creates the Electronic Student Worksheets (E-LKPD) that can support the learning activities through electronic software or using an internet connection. It contains a summary of the materials and practice exercises for students [5], [6]. The E-LKPD can bring innovation to learning in class by utilizing technology and providing an attractive interface [7], [8].

One of the online platforms that can be used to create the E-LKPD is Wizer.Me. According to [9], Wizer.Me is a free online platform, easy to operate, and it can create an interactive worksheet easily by using various available features. Through the platform, teachers can create an interactive E-LKPD based on their creativity, for instance, adding an illustration and automatically providing scores for students. One of the features available on Wizer.Me is the 'create new worksheets' feature. The feature enables teachers to create worksheets that meet the desired requirements. Users can add descriptions and assignment titles, categorize the worksheets, specify the desired question types, and upload documents in a PDF format that will be converted automatically by Wizer.Me. The advantages of learning materials development are to motivate students to be more interactive in learning activities, to help teachers save time, and to reduce paper usage for the environment [10]. The use of the E-LKPD using Wizer.Me platform with a guided discovery learning model enables students to comprehend the polyhedron concept more easily, understand the interconnected concepts, and apply the concept in solving questions. The disadvantages of using Wizer.Me are that it requires an internet connection, so an internet package or Wi-Fi is needed to run the platform, and it can cause eye fatigue due to staring at a computer, laptop, or smartphone for long periods.

This study is using the subject of polyhedron as the main focus of the materials. According to [11], a geometric solid is defined as a three-dimensional shape that has characteristics such as height and thickness and is formed through a polygonal area known as face. There are two types of geometric solids, polyhedron and curved solids. Polyhedron is a solid whose all faces are flat, such as a prism, cuboid, cube, and pyramid. This study focuses on the surface area and volume of polyhedron, including prism, cuboid, cube, and pyramid. According to [12], the materials of polyhedron should not be difficult to understand. However, in reality, there are still students who struggle to complete the material when working on the assignments. One of the reasons is a lack of conceptual understanding. According to [13], students tend to apply formulas without understanding how they were derived, thereby neglecting their understanding of basic concepts. Therefore, mathematical conceptual understanding is expected to help students comprehend the polyhedron concept they are learning, the interconnectedness between concepts, and their application in solving questions [14]. Conceptual understanding must be achieved as a basic competency that is essential in mathematics learning.

Based on observation and interviews with one of the mathematics teachers at SMPN 1 Ledokombo, it is found that the application of teaching materials on mathematics learning still relies on the use of textbooks. Mathematics learning should be adjusted with the help of technology in the form of innovation in learning activities to enhance learning qualities, such as developing electronic-based teaching materials. Besides, mathematics learning activities in SMPN 1 Ledokombo are still teacher-centered. This impacts students being passive in learning activities because they lack of courage to state their ideas [15], [16].

Addressing to this, the researcher develops electronic teaching materials known the E-LKPD with a guided discovery base. [17], stated that a guided discovery model requires students to be more active in finding the concepts through the activities in the E-LKPD. Students are expected to understand the concept better since they are actively involved in discovering it. Through guided discovery in this study, students will engage in discovering a formula following the given instructions. Teachers will provide the activity guidelines in the worksheets for students to solve the problems as directed in the E-LKPD. This research aims to describe the process and results of the development using Wizer.Me on polyhedron for the eighth grade students is valid, practical, and effective.

2. Methods

This study employed the Research and Development (*R&D*) method to validate and develop a product [18]. Additionally, the researcher used the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). Figure 1 below shows the stages of the ADDIE model.

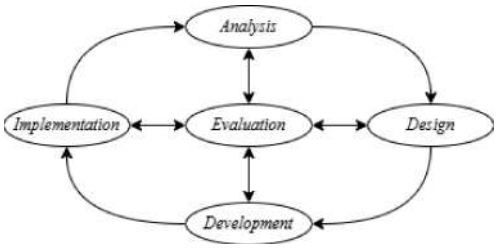

Figure 1. ADDIE Model

This study covers several categories that must be fulfilled in the teaching materials development. The categories include validity, practicality, and effectiveness. To fulfill those categories, research instruments consisting of validity sheets to measure the validity of the E-LKPD, questionnaires to collect students' responses, and test question sheets are required. The test questions are to measure the E-LKPD's effectiveness. Furthermore, student response questionnaires that consist of several statements related to the use of the E-LKPD using Wizer.Me platform is to measure the practicality of E-LKPD.

Analysis is the process of analyzing the problems in the research site. This study was conducted at SMPN 1 Ledokombo, and the research subjects are the eighth-grade students. The analysis stage was conducted through interviews and field observations. In this stage, the researcher analyzed the problems that became the background of product development.

Design is the stage of designing the E-LKPD as a product to develop. In this stage, the contents of the E-LKPD and test questions are designed. The E-LKPD design must follow the main formats, including the title, basic competency, indicator of competency achievement, learning objectives, and instructions for using the E-LKPD. These formats are the essential part of the worksheets. By using guided discovery in the E-LKPD, this study aims to help students comprehend the basic concept of polyhedron materials. Furthermore, the researcher also designed the test questions to measure students' ability after using the E-LKPD via Wizer.Me.

Development is the stage of realizing and testing the product. In this stage, the E-LKPD has been fully designed, then developed using Wizer.Me platform. Next, validate the E-LKPD product and instruments in the form of student response questionnaires and test questions. The validation sheet for the E-LKPD includes the aspects of format, language, and content. The validation sheet for the student response questionnaires includes the aspects of instruction, content, and language. The validation sheet for the test

questions includes the aspects of instruction, content, and language. The validation is carried out by two Mathematics Education lecturers and a mathematics teacher to determine whether or not the E-LKPD is valid. The E-LKPD that is not valid must be revised until it is valid. If the research instruments have been valid, the researcher can proceed to the next stage. The following are the validity categories as shown in Table 1.

Table 1. Categories of Instrument and Media Validity

Score Range of V_a	Validity Level
$1 \leq V_a < 2$	Not Valid
$2 \leq V_a < 3$	Moderately Valid
$3 \leq V_a \leq 4$	Valid

Source: modified from [19]

If the instruments and media have met the valid category, then the instrument is used as a tool for data acquisition in the next stage. If the instrument is not valid, it means revisions or improvements are required following the suggestions from all validators until it reaches a valid category.

Implementation is the stage of utilizing the developed E-LKPD product. In the implementation stage, two trials are carried out, namely a small-group trial and a field trial. The small-group trial is conducted on three students outside the research subjects without spesific criteria, as it could provide an initial step in using the E-LKPD product efficiently before involving more participants. The small-group trial aims to determine whether or not the E-LKPD is feasible. Students are instructed to complete the E-LKPD and the validated test questions. The indicators of the test questions include the aspects of instruction, content, and, language. Through the test questions, students are expected to be able to solve problems related to the surface area and volume of polyhedron.. After the three students work on the E-LKPD and the validated test questions, the researcher assigns scores based on their work. Then, students complete the validated response questionnaires and provide feedback on the E-LKPD as an evaluation material. Through the completion of a response questionnaire, students' responses will be measured using a Likert scale. The indicators of the response questionnaires include the aspects of instruction, content, and, language. Based on the small-group trial results, the researcher will revise the product if deficiencies are found. It can minimize errors before the product is implemented in the real class. Next, the researcher conducts testing under real classroom conditions through a field trial involving eighth-grade students at SMPN 1 Ledokombo as the research subjects. The field trial aims to determine whether the E-LKPD using Wizer.Me on the polyhedron material is effective and practical.

Evaluation is the stage of evaluating the implementation of the E-LKPD product as teaching materials. Two types of evaluation, namely formative evaluation and summative evaluation, are carried out. Formative evaluation is used for data collection that has been carried out from the previous stage to improve the E-LKPD product. Summative evaluation is a data collection to determine the E-LKPD product's effectiveness [20]. If the E-LKPD product has met the criteria for effectiveness and practicality, it can be disseminated. This stage is also used to derive conclusions from the study.

The analysis of the student response questionnaires is to measure the practicality after using the E-LKPD via Wizer.Me platform. Data processing is obtained from the student response questionnaires based on a four-point Likert scale, consisting of: strongly agree = 4, agree = 3, disagree = 2, and strongly disagree = 1. The criteria for student responses are divided into five categories, as presented in Table 2.

Table 2. Criteria for Student Response Categories

Student Response Percentage (P)	Category
$85\% \leq P \leq 100\%$	Very Good
$70\% \leq P < 85\%$	Good
$55\% \leq P < 70\%$	Fair
$40\% \leq P < 55\%$	Poor
$25\% \leq P < 40\%$	Very Poor

Source: modified from [21]

The E-LKPD is categorized as practical if the student response percentage falls within the interval $55\% \leq P < 70\%$, which is classified as the 'Fair' category.

The next analysis involves a learning outcomes test to figure out the effectiveness achieved after using the E-LKPD with the platform [22]. The following are the steps in analyzing students' learning outcome tests.

a. Recap the scores obtained by each student.
b. Group students into mastery categories based on the minimum mastery criterion (KKM) for mathematics at SMPN 1 Ledokombo, which is as follows [22]
   1) Students with scores < 75 (on a 100-point scale) are categorized as not achieving mastery.
   2) Students with scores ≥ 75 (on a 100-point scale) are categorized as achieving mastery.
c. Count the number of students who achieved mastery.
d. Determine classical mastery based on the following criteria [22]
   1) If $\geq 75\%$ of the total number of students who score ≥ 75 in the 'achieving mastery' category, the class is considered to have achieved classical mastery.
   2) If $< 75\%$ of the total number of students who score ≥ 75 in the 'achieving mastery' category, the class is considered not to have achieved classical mastery.

If students achieve classical mastery, then, based on the learning outcomes test analysis, the E-LKPD is considered feasible. However, if students do not achieve classical mastery, the E-LKPD should be revised and improved until it reaches the classical mastery category.

After analyzing the student response questionnaires, semi-structured interviews were conducted with two students to strengthen the findings. The interview questions were based on the same indicators used in the questionnaire, including satisfaction, interest and motivation, challenges faced, and suggestions for improvement. The students' responses were reduced and categorized to highlight information related to the practicality of the E-LKPD using the Wizer.Me platform. The results of the interviews were then compared and aligned with the questionnaire data. Both sources of data support the conclusion that the E-LKPD using Wizer.Me for learning polyhedron material is practical and can be effectively applied in the classroom.

3. Result and Discussion

Product development in this study consists of four E-LKPD on the subject of surface area and volume of polyhedron, namely prism, cuboid, cube, and pyramid, using Wizer.Me. The research and development type used in this study is the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The results obtained at each stage of this study are described in several stages.

Analysis is the initial stage in the product development where the researcher performs observations and interviews with one mathematics teacher at SMPN 1

Ledokombo. The purpose is to determine the school's curriculum, learning activities, teaching materials that teachers usually provide, and to know students' circumstances and characteristics in the learning process. This study found that the curriculum used by eighth-grade students at SMPN 1 Ledokombo is K13 curriculum. It is also found that teachers still rely on textbooks as teaching materials in learning mathematics. There is a need for innovation in learning activities by utilizing technology, such as developing electronic teaching materials. Besides, mathematics learning activities in SMPN 1 Ledokombo are still teacher-centered by using the lecture method. This will impact students being passive in learning activities because they lack of courage to state their ideas [15], [16]. Students also experience a lack of conceptual understanding of polyhedron on the surface area and volume sub-materials. According to [13], students tend to apply formulas without understanding how they were derived and neglect the basic concepts. Furthermore, it also found that the E-LKPD development using Wizer.Me has never been applied. The school provided positive support for the implementation of research activities, particularly in the form of the availability of facilities and infrastructure such as computer laboratory. Therefore, this study is conducted to develop the E-LKPD using Wizer.Me on the polyhedron materials, including prism, cuboid, cube, and pyramid, and with the subject of surface area and volume.

Design is the stage of designing and developing a product based on the needs analysis in the initial stage. This stage is to design the product, namely the E-LKPD and test questions. The product development is performed by designing the initial product using Microsoft Word. The researcher designs the illustration used in E-LKPD using efofex draw, which is connected in Microsoft Word. Accordingly, the researcher designs the worksheets using Canva and saves them in image or JPG format. The formats in the worksheets include the title, basic competency, indicator of competency achievement, learning objectives, and instructions for using the E-LKPD, along with the teaching materials that use a guided discovery. Worksheets are designed using a guided discovery model that consists of the stages of presenting the problem, collecting information, processing the collected information, drawing a conclusion, and test questions. Guided discovery involves students playing an active role in proving and understanding mathematical concepts by presenting materials in the teaching materials through discovery activities [17], [23]. The figure below is the stage of designing the E-LKPD using Wizer.Me.

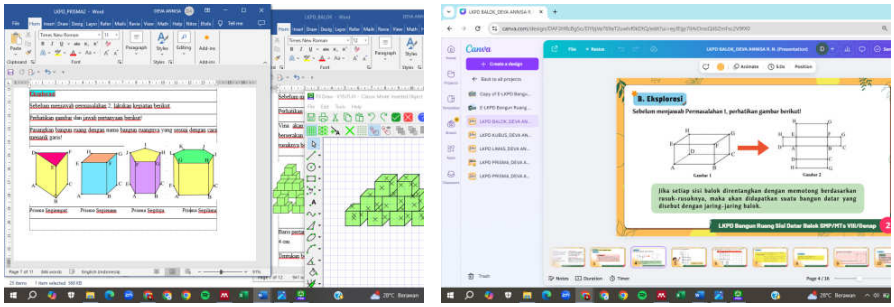

Figure 2. The E-LKPD Design Stage

The next step is designing research instruments, namely validation sheets, test questions, and a questionnaire to measure student responses. The validation sheet is needed to assess the validity of the E-LKPD using Wizer.Me. Test questions consisting of three essay questions worked on individually by students are used to evaluate the effectiveness of the E-LKPD using Wizer.Me platform. Furthermore, the practicality of using Wizer.Me is assessed from the student response questionnaires. The discussion is in line with [24],

who stated that design is the stage of designing a developed product resulting from the analysis stage.

The development stage is the realization of the design. In this stage, electronic student worksheets (E-LKPD) development is carried out using Wizer.Me platform. The following is the layout of the E-LKPD using Wizer.Me on the subject of polyhedron with surface area and volume sub-materials.

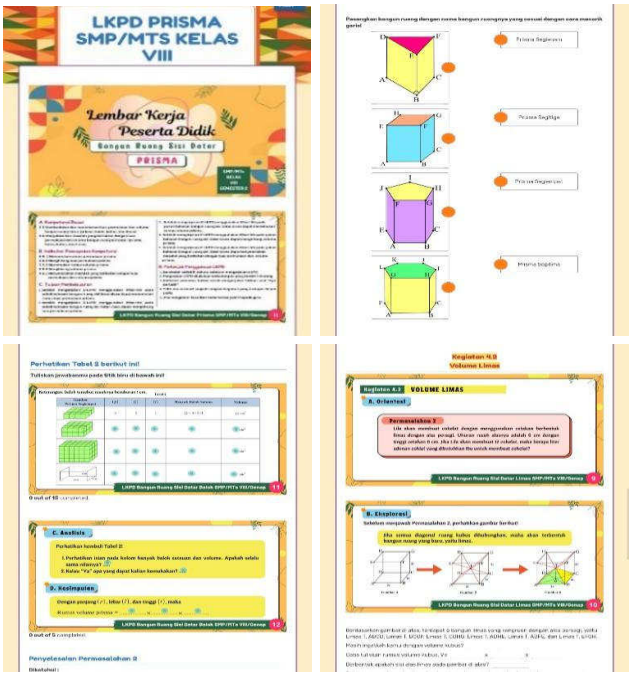

Figure 3. The E-LKPD Layout using Wizer.Me

The E-LKPD teaching materials development using Wizer.Me on the subject of polyhedron by applying a guided discovery on worksheets will encourage students to be active in learning activities. Students perform several activities in the E-LKPD worksheet using Wizer.Me platform, such as matching the shape of polyhedron with the correct name given. Moreover, students can find formulas by utilizing the 'fill on image' feature in the E-LKPD on the exploration activity in the guided discovery. Product development according to [24], is the stage when the final design is realized through the development stage, and then followed by product validation assessed by the experts.

Table 3. The Result Data of E-LKPD Validation

Component	Item	Validator 1	Validator 2	Validator 3	I_i	A_j	V_a
A. Format Aspect	1	4	4	4	4	3.78	3.84
	2	4	4	4	4		
	3	4	3	3	3.33		
B. Language Aspect	1	4	4	4	4	3.75	
	2	3	4	4	3.67		
	3	4	4	4	4		
	4	4	3	3	3.33		
C. Content Aspect	1	4	4	4	4	4	
	2	4	4	4	4		
	3	4	4	4	4		
	4	4	4	4	4		

Table 4. The Result Data of Test Questions Validation

Component	Item	Validator 1	Validator 2	Validator 3	I_i	A_j	V_a
A. Instruction Aspect	1	4	3	3	3,33	3,67	3,76
	2	4	4	4	4		
B. Content Aspect	1	4	4	4	4	3,84	
	2	4	4	4	4		
	3	4	4	3	3,67		
	4	4	4	3	3,67		
C. Language Aspect	1	4	4	4	4	3,78	
	2	3	3	4	3,33		
	3	4	4	4	4		

Table 5. The Result Data of Student Response Questionnaire Validation

Component	Item	Validator 1	Validator 2	Validator 3	I_i	A_j	V_a
A. Instruction Aspect	1	4	4	3	3,67	3,84	3,91
	2	4	4	4	4		
B. Content Aspect	1	4	4	4	4	4	
C. Language Aspect	1	4	4	4	4	3,89	
	2	3	4	4	3,67		
	3	4	4	4	4		

Based on validation from the experts, the result of E-LKPD validation using Wizer.Me with a total average (V_a) of 3,84 falls within the valid category as shown in Table 1. Categories of Instrument and Media Validity. The next instrument is the test questions assessed and validated by the experts. Based on the calculation using the total average formula (V_a), this instrument obtained a total average score of 3,76 that falls within the valid category. The next instrument is a student response questionnaire that obtained a total average score (V_a) of 3,91 and falls within the valid category. The validation that is performed in the development stage according to [25], who stated that the validation stage aims to determine the validity of the product and to revise the product based on experts' suggestions, must be carefully considered before proceeding to the trial in the next stage.

Implementation is the stage of implementation by performing a small-group trial and a field trial. The small-group trial will determine the feasibility and minimize errors in the E-LKPD using Wizer.Me. The small-group trial was conducted on three students outside the research subjects. The scores obtained by those students are 75, 80, and 80. Furthermore, the field trial will determine the practicality and the effectiveness after students using the E-LKPD via Wizer.Me platform provided by the researcher. The field trial was participated in by 43 students during three learning session. Students are given access to the E-LKPD in the form of a website link, followed by instructions on how to access and complete the E-LKPD. Students in groups are working on E-LKPD. This activity is designed to encourage students to actively explore the material. Afterward, students are given test questions and student response questionnaires. These two instruments are needed to determine student responses to using the E-LKPD via Wizer.Me platform. The learning outcome test showed that 34 students are categorized as achieving classical mastery with a lowest score of 50 and highest score of 95. The resulting effectiveness calculation indicates 79%, which meaning that $\geq 75\%$ of the total students have successfully met the minimum mastery standard. This aligns with what was explained by [26], that the developed E-LKPD teaching materials are effective in learning. The student response questionnaires are also calculated, and the average percentage obtained

from the questionnaire responses is 82%, with the percentage of student responses for each indicator falling within the range of $70\% \leq P < 85\%$ which is categorized as "Good". This aligns with the statement from [26], that the successfully developed teaching materials are practical in learning activities.

Additionally, the results of the semi-structured interviews showed that the E-LKPD using Wizer.Me platform is accessible with a stable internet connection. The E-LKPD was also designed with an attractive interface to engage and stimulate student interest. As a result, students are not bored and feel happy learning through the E-LKPD using Wizer.Me platform. This aligns with the explanation from [27], that the attractive interface on the E-LKPD will increase students' enthusiasm. Furthermore, students found the grammar in the E-LKPD easy to understand because the language used is simple. This reflects the researcher's careful selection of the word choices that were unambiguous and easy to comprehend. This aligns with what was stated by [28]. Teaching materials implemented in learning activities must be clear and easily grasped by students.

Students' ability to comprehend the materials in the E-LKPD depends on the quality of learning provided, as demonstrated in this study through the use of the guided discovery model. The results showed that students become more active in discovering conceptual information related to the material, and they are encouraged to engage in discussions with their peers. [17], also explained that learning using the E-LKPD via Wizer.Me, on the subject of polyhedron by applying a guided discovery, can encourage students to be active in learning activities and help them discover and comprehend the mathematical concept. Learning activities using the E-LKPD via Wizer.Me platform helps students develop technological skills. This is in line with the opinion of [29], that the use of the E-LKPD can enhance the classroom learning atmosphere to reflect current technological development.

Evaluation is the stage to evaluate the implementation stage related to the E-LKPD product development using Wizer.Me. In this stage, the formative evaluation and summative evaluation are carried out. The formative evaluation is conducted based on data collected in the previous stage. The E-LKPD that has been validated by three validators falls under the valid category, as indicated by a V_a value of 3,84. Then, a practicality sheet in the form of a response questionnaire is used to collect data on student responses. The purpose of the student response questionnaire is to determine the practicality of using the E-LKPD through Wizer.Me, with the calculation as follows:

Table 6. The Result Data of Student Response Questionnaires

Item	Percentage	Average Percentage
Statement 1	79%	82%
Statement 2	88%	
Statement 3	81%	
Statement 4	81%	
Statement 5	83%	
Statement 6	78%	
Statement 7	80%	
Statement 8	80%	
Statement 9	83%	
Statement 10	85%	

Based on The Table 6. The Result Data of Student Response Questionnaires, an average percentage of an average percentage of 82%, categorized as good, with the percentage of responses for each indicator falling within the value range of $70\% \leq P < 85\%$, which falls under the "Good" category. Therefore, the use of the E-LKPD through Wizer.Me in

learning activity can be considered practical. Subsequently, the researcher carries out product revision based on various suggestions collected from student response questionnaires after using E-LKPD via Wizer.Me platform. The final revisions are carried out to ensure that the developed product is genuinely suitable for use. This is following the explanation from [30], that the formative evaluation is conducted to carry out the final evaluation of the product. Subsequently, summative evaluation was conducted by collecting data through test questions completed by the students. It measures the effectiveness of using the E-LKPD via Wizer.Me platform. The students' learning outcomes showed a lowest score of 50 and a highest score of 95. It is concluded that the learning outcomes met the classical mastery criteria, as $\geq 75\%$ of the 43 research subjects, the eighth-grade students of SMPN 1 Ledokombo, have achieved mastery. This follows the explanation from [30], [31], that the summative evaluation determines the effectiveness of E-LKPD product implementation via Wizer.Me platform.

Based on the description above, the E-LKPD teaching materials development using Wizer.Me platform on the subject of polyhedron fulfills the valid with a total average (V_a) of 3,84, practical with the average percentage obtained from the questionnaire responses is 82%, and effective with 34 students are categorized as achieving classical mastery. Thus, it proves that the E-LKPD product is effective in learning. It means that ≥75% of 43 students have successfully met the minimum mastery standard. Hence, the E-LKPD is deemed appropriate to be implemented in classroom learning activities. In addition, the implementation of the E-LKPD product using Wizer.Me platform shows that students become happier and enthusiastic, as they are motivated during the learning activities with the subject of polyhedron.

4. Conclusion

This study concludes that the development of the Electronic Student Worksheet (E-LKPD) using Wizer.Me on polyhedron material for eighth-grade students, following the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), meets valid, practical, and effective criteria. The analysis stage identified learning problems; the design stage produced the E-LKPD framework; and the development stage created and validated an interactive worksheet focusing on the surface area and volume of prisms, cuboids, cubes, and pyramids. Implementation included small-group and field trials, while evaluation involved final revisions based on feedback. The validity score (Va) of 3.84 shows that the product is valid, with practicality reaching 82% according to student responses. Effectiveness was proven by 34 of 43 students (≥75%) achieving classical mastery. Overall, the E-LKPD using Wizer.Me effectively supports polyhedron learning. Future research should explore more Wizer.Me features to enhance interactivity and learning model diversity.

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