

Development of E-LKPD Assisted by Liveworksheets Using the PMRI Approach on the Material of Relations and Functions for Grade VIII

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ABSTRACT

The success of students in learning mathematics is an important part in supporting education as a whole, both in mathematics and specific subjects. This study aims to produce E-LKPD assisted by Liveworksheets using the PMRI approach on the material of relations and functions of class VIII that are valid, practical and have potential effects. This research is a development research using the ADDIE development model, which consists of the following stages: analysis, design, development, implementation and evaluation. Data collection techniques were carried out through interviews, observations, questionnaires, and tests, with the research subjects being class VIII students of SMP Negeri 8 Lubuklinggau totaling 6 students for the small group test and 24 students for the field test. The results of the study showed that based on the results of the data analysis, the Aiken's V value from the validation of linguists was 0.90, media experts 0.91 and material experts 0.84 with a very valid category. In the practicality test, teachers and students obtained an overall percentage of 88.76%, categorized as very practical. The results of the potential effect test, conducted by 24 students, showed that 21 students (88%) were included in the complete category, and 3 students (12%) were included in the incomplete category.

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1. INTRODUCTION

Learning is a process of interaction between students and educators and learning resources in a learning environment (Erita, 2013:1). This process aims to achieve the predetermined learning objectives. In the context of mathematics learning, the goal is to improve students' abilities to develop, starting from understanding to reasoning abilities (Indrawati, 2019:64). In other words, student success

in mathematics learning is an important part of supporting education as a whole, both in mathematics and in specific subjects.

Mathematics is taught at every level of education, from elementary school to secondary school and up to university. This is because, as a basic science, mathematics plays a role in advancing science and technology, both in terms of practical application and developing reasoning skills (Trianziani, 2020:278). As a basic science, mathematics learning in schools must maximize its function to support the growth and development of students' intelligence. Mathematics learning in schools is expected to be able to produce students who are skilled in critical, logical, and creative thinking in order to welcome all the challenges of the modern era today (Rahman, 2019:73). Mathematics learning has a unidirectional relationship with student learning outcomes (Riswandha & Sumardi, 2020).

Learning outcomes are the results of an evaluation that is appropriate to the student's abilities after undergoing the learning process (Hasanah et al., 2023:2). Learning outcomes are changes in students' abilities or skills that occur after participating in the learning process. However, according to Wardana et al. (2024:4956), learning outcomes are a problem in themselves for teachers and students, so that the learning process can be a benchmark for improving student learning outcomes.

In line with this, based on observations and interviews conducted with all eighth grade mathematics teachers at SMP Negeri 8 Lubuklinggau, several obstacles were found in the mathematics learning process which resulted in low mathematics learning outcomes with an average of 56.5 out of 201 eighth grade students at SMP Negeri 8 Lubuklinggau, so that many students experienced difficulties in solving problems that were different from the examples given, and students memorized the steps to solve without understanding the concept in depth. In line with the research Aida et al (2017:10). One of the problems students often face in learning is understanding a concept. This indicates that learning tends to be procedural, where students simply memorize steps to solve problems without understanding the essence of the concept. Furthermore, some junior high school mathematics materials, such as functional relations and statistics, require the support of relevant learning media to optimize student understanding.

According to Amalia et al. (2022:2), the use of appropriate learning media can attract students' attention and increase their concentration in learning the material. In line with Ndraha & Harefa (2023:5329), students need learning media that suits their characteristics, namely media that is interesting, interactive, and relevant to everyday life. A good learning process can also be supported by several factors, including the use of appropriate teaching materials (Friansyah & Luthfiana, 2018:84). One alternative solution that can be implemented is the use of technology-assisted teaching materials, namely Electronic Student Worksheets (E-LKPD), which are expected to improve student learning outcomes in the learning process.

Electronic Student Worksheets (E-LKPD) are an innovation of Student Worksheets (LKPD) which can be an effective medium in helping students understand the material better (Supriatna et al., (2022:4026). Unlike conventional LKPDs, which only display printed questions, E-LKPDs can also display questions in the form of videos, images, and other interactive symbols. E-LKPDs can also be used to improve student learning outcomes. Farkhati & Sumarti., 2019:2). E-LKPD is an electronic teaching material and is a multimedia technology that presents information in a more concise and dynamic format (Khotimah et al., 2022:2). In line with research Farkhati & Sumarti (2019:2) which states that E-LKPD is a worksheet containing instructions for carrying out tasks that must be completed by students in learning by referring to basic competencies through digital electronics or the internet. E-LKPD has an important role in learning so that students do not only receive material but also search

for it themselves by taking part in the learning process (Prastika & Masniladevi., 2021:2603). This E-LKPD can also be used as an effort to improve student learning outcomes (Farkhati & Sumarti., 2019:2) E-LKPD is more interactive and innovative because it utilizes platforms like LiveWorksheets to support its creation. LiveWorksheets is a platform that can help design engaging and interactive digital-based learning materials and student worksheets (Rohmah, 2022:17).

Liveworksheets is an electronic media which contains text, images, animations and videos which are more effective so that students don't get bored quickly (Khikmiyah, 2021:4). This application can help teachers easily transform traditional worksheets into more engaging online worksheets that can be accessed via (document, PDF, JPG, or PNG). Furthermore, according to Putri et al (2023:175), liveworksheets has several advantages, including: (1) the learning media produced can be accessed via PC, laptop, and smartphone, (2) the form of questions that can be created is very varied, such as multiple choice, short answer, choosing true and false, matching and so on; (3) can display video, sound, powerpoint, and images. Through these various advantages, learning media is not only an innovative learning media, but also plays a role in helping students actively participate in the learning process.

However, to further optimize student learning outcomes, learning methods are also needed that can support increased student understanding through an approach that focuses not only on memorization but also actively involves students. According to Lestariningsih & Trismawati (2020:117), in PMRI learning, students cannot be considered passive recipients but rather active participants directly involved in the learning process. This aligns with PMRI principles, which emphasize the importance of providing students with real-world experiences so they can connect mathematical concepts to everyday contexts.

According to research conducted by Fauziah et al. (2020:195), the PMRI approach provides opportunities for students to reconstruct mathematical concepts and ideas by integrating their personal experiences. Furthermore, this approach also has other important goals, as expressed by Ancient (2022:26) PMRI aims to make learning more enjoyable, easier for students to remember and can train students to be more critical in thinking and brave put forward opinion. PMRI is a mathematics learning process that is carried out by making a reality and the students' living environment the first step in learning (Afrianti et al., 2023:72). Therefore, before developing engaging learning media to improve student learning outcomes and help students understand the subject matter, a needs analysis must first be conducted.

Based on previous research, learning media that is interesting, interactive and relevant to everyday life is really needed to improve students' understanding (Amalia et al., 2022:2; Ndraha & Harefa 2023:5329). Although E-LKPD is an effective medium in helping students understand material by displaying questions in multimedia formats, such as videos, images, and interactive symbols (Supriatna et al., 2022:4026; Farkhati & Sumarti 2019:2). The novelty in this research lies in the use of more varied multimedia technology and the integration of learning methods that support the active involvement of students, as exemplified in PMRI learning to create more comprehensive and contextual learning.

Thus, based on the background description, the researcher decided to choose the title "development of E-LKPD assisted by liveworksheets using the PMRI approach on the material of Relations and Functions of class VIII of SMP Negeri 8 Lubuklinggau as the focus of this research. This research aims to produce E-LKPD assisted by Liveworksheets using the PMRI approach on the material of relations and functions of class VIII that is valid, practical and has potential effects.

2. METHODS

The development model used in this research is the ADDIE development model. According to Kurnia et al. (2019:519), the ADDIE model has five stages: Analysis, Design, Development, Implementation, and Evaluation. Developmental research is a type of research that focuses on developing, expanding, and further exploring a theory within a specific discipline. Developmental research can also be defined as a scientific method for obtaining data that can later be used to produce, develop, and validate a product.

According to Tegeh & Kirna (2013:16) development research conducted in order to improve the quality of learning has 5 characteristics in research: 1) The problems solved are real problems related to innovative efforts or the application of technology in learning, which are used as professional accountability and commitment. 2) Development of models, approaches and also learning methods and learning media that can support effectiveness in achieving student competencies. 3) Validation product development process, this process is carried out through expert testing and limited field testing that needs to be done, so that the resulting product can be useful in improving the quality of learning. 4) The process of developing models, methods, approaches, modules and also learning media needs to be neatly documented. 5) Systematics in accordance with research rules that reflect originality.

This research produced a teaching material product in the form of an E-LKPD based on PMRI, with the development design used being the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. This development research procedure used the implementation stages of the five ADDIE stages. These stages can be explained as follows (Salamah, 2023: 51-54): Analysis, Design, Development, Implementation, and Evaluation. This data collection technique was carried out by researchers using three techniques that is Observations, interviews, and questionnaires were conducted by the researcher to obtain the data needed for the E-LKPD development research. The data analysis techniques used in this study are as follows: Validity Testing, Practicality Testing, and potential effect analysis.

3. FINDINGS AND DISCUSSION

The research conducted is a development research or Research and Development (R&D) which creates a product in the form of E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions in Junior High Schools developed with the ADDIE development model. This development model consists of five stages, namely: Analysis Stage, Planning Stage (Design), Development Stage (Development), Implementation Stage (Implementation), and Evaluation Stage (Evaluation). The following is an explanation of the stages carried out in developing E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions.

Analysis Stage

The analysis stage is the initial step in the ADDIE development model. At this stage, the main activity is analyzing the need for developing teaching materials, analyzing the feasibility and requirements for developing such teaching materials. At this stage, the author sought information regarding problems in the classroom to find the reasons for the need to develop E-LKPD assisted by liveworksheets using the PMRI approach. The analysis conducted at this stage includes an analysis of problems in the Mathematics learning process and relevant teaching materials to address these problems.

The needs analysis conducted at SMP Negeri 8 Lubuklinggau through observation and interviews in class VIII found that in the learning process the teacher only used mathematics textbooks, where the book has not been able to attract students' interest in learning, the activities in the book are also less guided which causes students to become passive in mathematics learning so that student learning outcomes are still low. This shows that the lack of variety of media and innovative teaching materials is the main obstacle in creating effective and interesting mathematics learning for students at SMP Negeri 8 Lubuklinggau. Not only students who need other teaching materials such as E-LKPD assisted by liveworksheets, teachers also need teaching materials that can be used as tools that can guide students and invite students to carry out discovery activities in Mathematics learning.

Therefore, it is hoped that the development of e-LKPD (Electronic Student Worksheets) teaching materials, supported by liveworksheets, will create active and enjoyable learning activities and improve learning effectiveness and student learning outcomes. E-LKPD is also expected to provide a variety of more interactive and guided activities, thereby increasing student interest in learning and making them more active in discovering mathematical concepts.

Planning Stage (Design)

After conducting the analysis, the next stage is the planning stage (Design). This design stage aims to create a draft of the developed E-LKPD. The steps taken at this stage are: 1) Determining basic competencies, indicators and learning objectives. Here the researcher chose the material on Relations and Functions. 2) Collecting and selecting references/sources used. 3) Preparing the framework and creating the E-LKPD design starting from the beginning, the content section, and the end. 4) Selecting the liveworksheets platform used to assist with additional features in perfecting the E-LKPD. 5) Preparing the benchmark test. 6) Preparing the assessment instrument for the developed E-LKPD.

Development Stage

The third stage is the development stage which is a continuation of the design stage. At this stage the author realized the E-LKPD design that had been made. The development of the E-LKPD was carried out with the help of liveworksheets. After the developed E-LKPD was finished, the next step was to validate the E-LKPD that had been made. Validation was carried out by 3 experts, namely: Dr. Dian Ramadan Lazuardi, M.Pd. as a language expert, Dr. Leo Charli, M.Pd. as a media expert and as a material expert, Mr. Drajat Friansah, M.Pd. After the validation was completed and revised according to the validator's suggestions, the E-LKPD assisted by liveworksheets used the PMRI approach on the material of relations and functions.

Implementation Stage

The implementation stage is divided into 4 parts, namely; teacher practicality test stage, small group trial, and large group trial. 1) Teacher practicality trial; Teacher practicality trial by Mrs. Rusnila Emmi, S.Pd. as a mathematics teacher of class VIII SMP Negeri 8 Lubuklinggau. Before filling out the practicality sheet, teachers are given E-LKPD products assisted by liveworksheets, to provide an assessment by filling out the practicality sheet based on what the teacher observes. On the practicality sheet, teachers fill out 15 statement items and assessments use a Likert scale. Teachers are asked to fill out the practicality sheet by giving a checklist () in the column for each statement. 2) Small Group Trial; The Small Group trial was conducted in class F SMP Negeri 8 Lubuklinggau. The small group trial used 6 students with different ability levels, namely high, medium and low. Where the author explains how to use the developed E-LKPD, then students are asked to fill out the questionnaire by giving a checklist () in the column for each statement. 3) Large group trial; The large group trial was conducted in class VIII G of SMP Negeri 8 Lubuklinggau involving all class VIII students. In the large group trial, students

learned to use E-LKPD assisted by liveworksheets that had been developed. The large group trial was measured using a test with 5 essay questions. Students were tested after the learning process was completed to determine the potential effects of the developed product.√√

Evaluation Stage

The final stage is the evaluation stage. The evaluation was conducted by the author with the assistance of a supervisor. The evaluation included input, criticism, and suggestions at each stage of development. This evaluation process aims to ensure that the product meets the expected quality standards and can make a positive contribution to use in school learning.

Products that have been created before being tested in learning activities must first be validated. Validation was carried out by three experts, namely: Dr. Dian Ramadan Lazuardi, M.Pd. as a language expert, Dr. Leo Charli, M.Pd. as a media expert and Mr. Drajat Friansah, M.Pd. as a material expert. The following data from the validation results were carried out.

The language validation test was conducted on April 24, 2025, by validator Dr. Dian Ramadan Lazuardi, M.Pd. Validation was carried out by assessing the developed E-LKPD. The assessment was carried out by filling out a validation questionnaire containing 12 assessment items and providing criticism and suggestions for the developed E-LKPD. The following results of the language validator can be seen in Table 1 below.

Table 1. Results of the Validation Analysis by Linguists

Indicator Evaluation	Assessment Items	R	S= r-1
Straightforward	Correctness of sentence structure	4	3
	Standardization of terms	4	3
Communicative	Understanding of messages or information	5	4
Dialogic and Interactive	Ability to provide motivation	5	4
Conformity to student development	Accuracy of illustrations	5	4
	Compliance with the intellectual development of students	4	3
	Suitability with students' emotional development	5	4
Conformity with language rules	Grammatical correctness	4	3
	Consistency in using terms	5	4
	Consistency in using symbols	4	3
	The language used in E-LKPD assisted by liveworksheets is easy to understand.	5	4
	The language used is in accordance with EYD	4	3
Amount		54	42
Aiken Average,V		0.90	
Aiken's V coefficient criterion		Very Valid	

Based on table 1 above, the V value is 0.90, which means that the E-LKPD assisted by liveworksheets using the PMRI approach is included in the "Very Valid" category.

The media validation test was conducted on April 30, 2025, by validator Dr. Leo Charli, M.Pd. Validation was carried out by assessing the developed E-LKPD. The assessment was carried out by

filling out a validation questionnaire containing 16 assessment items and providing criticism and suggestions for the developed E-LKPD. The following are the results of the media validator.

Table 2. Media Expert Validation Analysis Results

IndicatorEvaluation	Assessment Items	r	S=r- 1
Size E-LKPD	E-LKPD size complies with ISO standards	5	4
	Compliance with the contents of E-LKPD	5	4
Appearance	The E-LKPD cover display is attractive	4	3
	The color combination on the E-LKPD cover is attractive	4	3
	The E-LKPD background display is attractive	5	4
	The attractiveness of the E-LKPD layout display	5	4
	The colors and layout elements are harmonious and clarify the 4 functions.	4	3
	Conformity of images with the contents of E-LKPD	4	3
Use of Letters	The use of font variations is not excessive.	5	4
	The letters used	5	4
	Using proper punctuation	5	4
	Use of spacing between lines appropriately	4	3
	The separation between paragraphs is clear and appropriate.	4	3
Consistency	Appropriate placement of layout elements (title, subtitle, illustration)	4	3
	Consistency of font type and size	5	4
	Correctness of writing foreign terms and term names	5	4
Amount		73	57
Aiken Average,V		0.91	
Aiken's V Coefficient Criteria		Very Valid	

Based on table 2 above, the V value is 0.91, which means that the E-LKPD assisted by liveworksheets using the PMRI approach is included in the "Very Valid" category.

The material validation test was conducted on May 6, 2025, by validator Mr. Drajat Friansah, S.Si, M.Pd. The assessment was carried out by filling out a validation questionnaire containing 15 assessment items and providing criticism and suggestions for the developed E-LKPD. The following are the results of the material validator.

Table 3. Results of Material Expert Validation Analysis

Assessment Indicators	Assessment Items	r	S=r-1
Suitability of material with Basic Competencies (KD)	Completeness of materials	5	4
	Breadth of material	5	4
	Into the material	4	3
Accuracy of Material	Case accuracy	4	3
	Accuracy of images and illustrations	4	3
	Accuracy of terms	4	3
State-of-the-art	Pictures and illustrations in everyday life	5	4
	Using problems in everyday life	5	4
Encouraging Curiosity	Using problems in everyday life	4	3
	Encourage curiosity	4	3
Characteristics of PMRI	Use of context	5	4
	The use of models for progressive mathematization	4	3
	Utilization of student construction results	4	3
	Interactivity	4	3
	relatedness	4	3
Amount		65	50
Aiken Average,V		0.84	
Aiken's V Coefficient Criteria		Very Valid	

Based on table 3 above, a V value of 0.84 was obtained, which means that the E-LKPD assisted by liveworksheets using the PMRI approach is included in the "Very Valid" category.

The following is a recapitulation of the assessments of the three validators, namely language experts, media experts and material experts, which can be seen in table 4 below:

Table 4.Validator Assessment Recapitulation Results

No	Validator Name	Expert	Aiken's V value	Category
1	Dr. Dian Ramadan Lazuardi, M.Pd	Language	0.90	Very Valid
2	Dr. Leo Charli, M.Pd	Media	0.91	Very Valid
3	Drajat Friansah, M.Pd	Material	0.84	Very Valid

The validity assessment of E-LKPD assisted by liveworksheets has been carried out, with the following results: based on the validation of language experts, the Aiken's V value was obtained at 0.90 which is included in the very valid category, for the validation of media experts, the Aiken's V value was obtained at 0.91 also in the very valid category, while the validation of material experts produced an Aiken's V value of 0.84 which is also classified as very valid. All of these values are included in the very valid category (Aiken's V value of 0.80) based on the interpretation table, so this E-LKPD is suitable for use in the learning process.

E-LKPD Practicality Test

The teacher practicality trial was conducted on May 19, 2025, by the mathematics teacher of SMP Negeri 8 Lubuklinggau, Mrs. Rusnita Emmi, S.Pd. The trial was conducted by giving scores on the teacher practicality questionnaire sheet, the questionnaire sheet contained 15 statement items. The following are the results of the teacher practicality questionnaire on E-LKPD assisted by liveworksheets using the PMRI approach that was developed can be seen in table 5.

Table 5. Results of Teacher Practical Trials

Aspect	Indicator	Score obtained	Category
Accuracy in determining KD and indicators	Use of Basic Competencies (KD)	5	Very good
The appeal of electronic Student Worksheets (E-LKPD)	The overall appearance of the E-LKPD assisted by liveworksheets using the PMRI approach to the material on relations and functions for class VIII is interesting.	5	Very good
	The color combination used in E-LKPD motivates students to learn.	4	Very good
The suitability of the presentation of content with material activities that lead to understanding the concept	The problem of practice and competency tests in E-LKPD creates problems that students often encounter.	5	Very good
	Students can connect the contents of this E-LKPD with things they have seen/know that are related to everyday life.	5	Very good
	The problem that initiates learning activities to be able to imagine the material to be studied	5	Very good
	The activities in E-LKPD make it easy for students to understand the material concepts.	5	Very good
Readability of material	Students do not need to write the answers on another sheet of paper because the answer sheets on E-LKPD are available in sufficient quantities.	5	Very good
	The materials used in this E-LKPD are easy to understand.	5	Very good
Motivation to learn	Through E-LKPD, students find it easier to remember the concepts of relations and functions.	5	Very good

Students understand mathematical concepts better if they are obtained by determining them themselves.	4	Good
The commands in E-LKPD help students understand the material concepts.	5	Very good
Through this E-LKPD, students can communicate with friends in completing existing exercises or problems.	4	Good
After using this E-LKPD, students can create mathematical models/concepts that are appropriate to the problem.	4	Good
Through this E-LKPD, students can solve problems of relationships and functions related to everyday life.	5	Very good
Amount	71	
Presentation	95%	
Coefficient Criteria	Very Practical	

Based on table 5, it is known that the average results of the teacher response questionnaire with 15 statement items are 95% with the classification "Very Practical".

Small Group Trial

The small group trial was conducted on May 21, 2025 in class VIII of SMP Negeri 8 Lubuklinggau. The small group trial used 6 students with different ability levels, namely high, medium and low, selected according to the suggestions of the mathematics teacher of class VIII (F) of SMP Negeri 8 Lubuklinggau. Before students filled out the practicality questionnaire, the author first explained how to use the E-LKPD that had been made, then students were asked to fill out a questionnaire containing 15 statement items by giving a checklist () and choosing the assessment indicators SB = Very Good, B = Good, C = Sufficient, K = Less, SK = Very Less. The aim is to find out the practicality of the E-LKPD that has been developed. The following are the results of the small group trial can be seen in table 6.√

Table 6. Student Response Analysis Results

Small Group Trial Test

No	Student Code	Total Scores Obtained	Total Amount	Score Level Practicality	of Classification
1	S-1	65	75	87%	Very Practical
2	S-2	65	75	87%	Very Practical
3	S-3	67	75	89%	Very Practical
4	S-4	61	75	81%	Very Practical
5	S-5	68	75	91%	Very Practical
6	S-6	69	75	92%	Very Practical
Amount			450	527%	Very Practical
Average				88%	Very Practical

Based on table 6. above, it is known that the average response of students in the small group trial was 88% with the classification "Very Practical".

Results of All E-LKPD Practicalities

The following is a recapitulation of teacher and student practicality which can be seen in table 7.

Table 7. Recapitulation of Practicalities of Teacher and Student Assessment

No	Assessor	Maximum Score	Values Earned
1	Teacher Practicality	75	71
3	Small Group Test (6 Students)	450	395
Amount		525	466
Product Practicality Percentage		88.76%	
Criteria		Very Practical	

Based on a recapitulation of teacher and student responses to the LiveWorksheets-assisted E-LKPD, the average score was 88.76%, falling within the 81%-100% range, classified as very practical. Therefore, it can be used in large groups during the implementation stage.

Field Test

Field test This study was conducted with 24 students in class VIII G of SMP Negeri 8 Lubuklinggau with the aim of determining the potential effects of E-LKPD assisted by liveworksheets using the PMRI approach. The following data analysis results can be seen in Table 4.9 below:

Table 8. Potential Effect Data Analysis Results

Value Range	Number of Students	Percentage (%)	Category
89-100	11 students	46%	Completed
78-88	10 students	42%	Completed
67-77	2 students	8%	Not Completed
<67	1 student	4%	Not Completed
Amount	24	100%	

Based on table 8. above, the analysis data of 24 students shows a percentage result of 88%, namely 21 students completed and 3 other students (12%) have not completed due to the potential effect on E-LKPD. Therefore, E-LKPD assisted by liveworksheets using the PMRI approach concludes that learning outcomes have a potential effect with the percentage of values with the KKTP (Completeness of Learning Objectives Achievement) benchmark set by the school is 71.

The results of the data analysis of this study present the results of the validity, practicality, and effectiveness tests of E-LKPD assisted by liveworksheets using the PMRI approach on the material on relations and functions of class VIII SMP developed by the author as follows:

Results of the analysis of E-LKPD validity data

The validity test was conducted by 3 experts, namely linguists, media experts, and material experts. The language validation test was conducted by a lecturer at PGRI Silampari University, namely Dr. Dian Ramadan Lazuardi, M.Pd. The calculation results were based on a questionnaire that had been filled out by the validator and calculated using the Aiken's V formula with a total of 12 statements, obtained a V value of 0.90 with a very valid classification. Furthermore, the media validation test was conducted by a lecturer at PGRI Silampari University, namely Dr. Leo Charli, M.Pd. The results of the questionnaire calculation with a total of 16 statement items obtained a V value of 0.91 with a very valid classification. And the material validation test was conducted by a lecturer at PGRI Silampari University, namely Mr. Drajat Friansah, S.Si, M Pd. The results of the calculation of 15 statement items obtained a V value of 0.84 with a very valid classification.

From the results of the validity test of E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions of class VIII SMP, it has high validity and is suitable for use to support the learning process. E-LKPD is stated to be very good and suitable for use seen from several aspects of the material, the material in E-LKPD has been designed in accordance with the demands of basic competencies (KD). This can be seen from the completeness in E-LKPD designed in such a way that students can get concepts, facts through guided and structured discovery activities at each stage starting from the orientation stage of formulating problems, hypothesizing, planning experiments, conducting experiments, collecting data, concluding to communicating the findings obtained and in E-LKPD also equipped with scores and correct answers when completing E-LKPD. In addition, the suitability and accuracy of images, illustrations, examples, and cases in E-LKPD are related to everyday life. From the results of the validation of material experts, this E-LKPD can be concluded as feasible in the material aspect category. Secondly, the language aspect is considered appropriate, because in developing this E-LKPD, the language used in E-LKPD is straightforward, communicative, dialogical, interactive, in accordance with Indonesian language rules and consistent in the use of terms and symbols. So it can be concluded based on the results of the validation of the language expert, E-LKPD is in the appropriate category reviewed from the language aspect. And thirdly, from the media aspect, it is considered appropriate, because the size of E-LKPD is in accordance with ISO standards, the cover design of E-LKPD that is made is appropriate seen from the harmonization of the cover layout, focusing on a good point of view, not using too many letter combinations, cover illustrations that are made to describe the contents of the material. Then the shape, color, size, proportion of E-LKPD are consistent. The design of the contents of E-LKPD is appropriate, in terms of typography, the use of letter variations is not excessive. Then in terms of illustration, the contents are able to use the meaning/meaning of the object. Furthermore, the form is accurate and proportional according to reality and the E-LKPD that is developed is creative and dynamic. So it can be concluded based on the results of the validation of the media expert, E-LKPD is in the appropriate category reviewed from the media aspect.

Based on the validation assessment of E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions of class VIII SMP given by 3 validators, the validation of language experts obtained an Aiken's V value of 0.90 which is included in the very valid category, for media expert validation obtained an Aiken's V value of 0.91 also with a very valid category, while the validation of material experts produced an Aiken's V value of 0.84 which is also classified as very valid. All of these values are included in the very valid category (Aiken's V value of 0.80) according to the interpretation table of Aiken's V validation. So it can be concluded that E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions of class VIII SMP is declared valid and can be used in learning.

Results of the analysis of practical data on E-LKPD

The practicality trial was conducted by teachers and students. The teacher's practicality test was conducted by Mrs. Rusnila Emmi, S.Pd, as one of the mathematics teachers of SMP Negeri 8 Lubuklinggau using a questionnaire containing 15 statements. The results of the teacher's practicality were 95% with a very practical classification. Next, the student's practicality trial was a small group trial. In the small group trial, 6 students with different ability levels were used, namely high, medium, and low. The assessment was carried out by students filling out a student response questionnaire containing 15 statements with the answer choices "SB = Very Good, B = Good, C = Sufficient, K = Less,

SK = Very Less". The results of the small group trial's practicality were 88%, with a very practical classification.

Final Product Revision

Linguists validated the language and writing components of the liveworksheet-assisted E-LKPD using the PMRI approach developed by the author and adapted to correct writing rules. The authors then revised the E-LKPD based on the suggestions provided by the linguists. This validation process ensured that the language used in the E-LKPD was clear, easy to understand, and supported PMRI learning objectives. Improvements were made based on input from the linguists to enhance the overall quality and effectiveness of the E-LKPD.

Media experts assessed the feasibility and suitability of the E-LKPD developed by the author. Then, the author revised the E-LKPD according to the suggestions given. Material experts validated by assessing the suitability and feasibility of the material in the E-LKPD developed by the author and adjusted it to the students' ability levels. Then, the author revised the E-LKPD according to the suggestions given by the material experts. In this study, the E-LKPD uses the PMRI approach developed by the author with the help of liveworksheets. The use of interactive features provided by liveworksheets, such as drag-and-drop, multiple choice, or short answer, also optimizes the student learning experience. The material in the E-LKPD includes relations and functions, which are presented with the iceberg concept typical of PMRI, where students are invited to start learning from real contexts to formal mathematical understanding. This finding is also in line with research conducted by Lusiana Afriantil; Agustiany Dumeva Putri; Retni Paradesa (2023). The title "Development of E-LKPD Based on Interactive Multimedia Liveworksheet with PMRI Approach on Cube and Block Material" obtained the developed results are classified as very valid quantitatively with an average score of 80.9 and are also classified as very practical quantitatively with an average score of 84 and have a potential effect that obtains an average score of 73.8 with a good category.

4. CONCLUSION

Based on the results of the development of E-LKPD assisted by liveworksheets using the PMRI approach on the material of relations and functions of class VIII SMP, the following conclusions can be drawn: This development research produces E-LKDP assisted by liveworksheets using the PMRI approach that is valid and practical, and the potential effects are: The validity of the developed E-LKPD is categorized as "Very Valid" with the acquisition of Aiken's V value of language validation of 0.90, media validation of 0.91, and material validation of 0.84 which is determined based on the three expert or validator assessments. The practicality of E-LKPD shows a percentage of (88.76%) from the results of determining the value of E-LKPD from the calculation of student and teacher questionnaires. So that the developed E-LKPD is categorized as "Very Practical". E-LKPD assisted by liveworksheets using the PMRI approach on the subject of relations and functions of class VIII has aspects of learning outcomes and potential effects on students where the percentage obtained is 88% with as many as 21 students entering the complete category and a percentage of 12% with as many as 3 students in the category of not yet passing the Completeness in Achieving Learning Objectives of at least 71 set by the school.

It is recommended that the E-LKPD developed in this study be categorized as valid, practical and have a potential effect on student learning outcomes, so that this E-LKPD can be used as an alternative teaching material for students and teachers during the learning process.

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