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DEVELOPMENT OF E-LKPD ASSISTED LIVEWORKSHEET ON OPPORTUNITY MATERIAL

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Abstract

This study aimed to develop an Electronic Learner Worksheet (E-LKPD) assisted by Liveworksheet on probability material for vocational students using the Problem Based Learning (PBL) model, focusing on its validity, practicality, and potential effect on learning motivation. This research uses the AADIE development model. The research applied the Research and Development (R&D) method with the ADDIE model (analysis, design, development, implementation, evaluation). Data were collected through interviews, expert validation questionnaires, and student response questionnaires. The developed product was validated by media and material experts, then tested through one-to-one, small group, and field trials. Data were analyzed using percentage calculations. The validation results showed 91.67% from media experts with the category "very valid" and 88.33 from material experts with the category "very valid". The practicality test at the small group stage obtained 91.94% with the category "very practical, and the field test showed a potential effect on learning motivation of 92.07% with the category "very high". In conclusion, the E-LKPD assisted by Liveworksheet on probability material is valid, practical, and has the potential to enhance students' motivation in learning mathematics. This indicates that interactive digital worksheets integrated with PBL can serve as an effective alternative learning medium for vocational school students.

Keywords: addie, e-lkpd, opportunity

Abstrak

Penelitian ini bertujuan untuk mengembangkan Lembar Kerja Siswa Elektronik (E-LKPD) yang didukung oleh Liveworksheet pada materi probabilitas untuk siswa vokasional menggunakan model Pembelajaran Berbasis Masalah (PBL), dengan fokus pada validitas, kepraktisan, dan potensi dampaknya terhadap motivasi belajar. Penelitian ini menggunakan model pengembangan AADIE. Penelitian ini menerapkan metode Penelitian dan Pengembangan (R&D) dengan model ADDIE (analisis, desain, pengembangan, implementasi, evaluasi). Data dikumpulkan melalui wawancara, kuesioner validasi ahli, dan kuesioner tanggapan siswa. Produk yang dikembangkan divalidasi oleh ahli media dan materi, kemudian diuji melalui uji coba satu-satu, kelompok kecil, dan uji lapangan. Data dianalisis menggunakan perhitungan persentase. Hasil validasi menunjukkan 91,67% dari ahli media dengan kategori "sangat valid" dan 88,33% dari ahli materi dengan kategori "sangat valid". Uji kepraktisan pada tahap kelompok kecil memperoleh 91,94% dengan kategori "sangat praktis", dan uji lapangan menunjukkan dampak potensial terhadap motivasi belajar sebesar 92,07% dengan kategori "sangat tinggi". Kesimpulannya, E-LKPD yang didukung oleh Liveworksheet pada materi probabilitas valid, praktis, dan berpotensi meningkatkan motivasi belajar matematika siswa. Hal ini menunjukkan bahwa lembar kerja digital interaktif yang terintegrasi dengan PBL dapat menjadi alternatif media pembelajaran yang efektif bagi siswa sekolah kejuruan.

Kata kunci: addie, e-lkpd, peluang

INTRODUCTION

Mathematics has a very important role because in addition to providing the ability to count numbers, it also trains the mind to think logically and analytically. One of the essential

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math materials but often an obstacle for students is the material of Opportunities. The concept of chance is not only useful in the field of mathematics, but also has broad applications in everyday life, the world of work, and various disciplines such as statistics, economics, and data science (Kurniawan & Suryadi, 2020). However, many vocational students have difficulty understanding this material because it is abstract and requires a high level of logical thinking.

In the era of the industrial revolution 4.0, technological advances are increasingly affecting the development of science. This rapidly developing and modern science and technology brings changes that have an impact on the dynamics of human life, particularly within the realm of education (Jannah & Oktaviani, 2022). Technological developments have created various innovations in learning, such as e-learning, digital learning applications, and interactive platforms that allow the learning process to be more flexible, interesting, and efficient (Maritsa et al., 2021). One of the important elements in modern learning is learning media. Learning media is a tool that serves to convey learning information to students making the learning process more effective and efficient ((Ahmad Zaki, 2020); (Tafonao, 2018)).

Learner Worksheet (LKPD) is one of the learning media that is now widely developed. LKPD is an activity sheet designed to motivate students to take an active role in learning via organized activities (Suwastini et al., 2022). Along with the development of information technology, conventional LKPD has now been transformed into E-LKPD (electronic LKPD), which can be accessed through digital devices without the need to be printed (Farkhati & Sumarti, 2019; (Zahroh & Yuliani, 2021). One of the digital platforms that support the development of E-LKPD is Liveworksheet. Liveworksheet is a web-based tool that enables educators to convert traditional worksheets into interactive online exercises. This application allows the integration of various multimedia elements such as video, audio, images, and animation, so that students can learn more enthusiastically without feeling bored (Fitriani et al., 2021; Supriatna et al., 2023). Liveworksheet can also increase students' learning motivation and facilitate automatic assessment of student work by teachers.

Considering the challenges in learning opportunity material and students' lack of interest in mathematics, interactive, interesting, and easily accessible learning media are needed. One learning approach that can be used is the model of Problem Based Learning (PBL), which encourages students to understand concepts through solving contextual

problems that are close to real life (Ardianti et al., 2021). The application of PBL packaged in the form of E-LKPD assisted by Liveworksheet is expected to be able to improve understanding of the concept of opportunity and encourage active involvement of learners during the education process.

Previous research includes several relevant studies: (Lestari, 2022) about Development of Electronic Learner Worksheet Learning Media (E-LKPD) Web-Based Liveworksheet at Sman5 Metro; (Shalahuddin & Hayuhantika, 2022) about Development of contextual ELKPD with liveworksheet media on circle material for eighth-grade students; (Firtsanianta & Khofifah, 2022) about the Effectiveness of E-LKPD Assisted Liveworksheet to Improve Learner Learning Outcomes. Based on the results of these three studies, the researcher intends to develop learning media that are currently busy among students as a medium for learning mathematics to increase students' enthusiasm for learning. Based on this background, researchers conducted research on "Development of Electronic Learner Worksheets (E-LKPD) Assisted by Liveworksheet on Opportunity Material".

Based on the results of these three studies, most of the studies were conducted at the general secondary school or junior high school level, and none specifically targeted vocational high school students who often face unique challenges in understanding abstract mathematical concepts such as probability. Additionally, previous research has been limited to the development and testing of the validity or effectiveness of E-LKPD, while this study goes further by also testing its practicality and potential impact on student learning motivation. This makes this study unique, as it provides empirical evidence that E-LKPD supported by Liveworksheet is not only valid and practical but also has the potential to positively impact vocational high school students' motivation to learn probability. As a result, the researchers plan to develop popular learning media among students as a tool for learning mathematics to enhance their enthusiasm for learning. Therefore, the researcher conducted a study titled “Development of E-LKPD Assisted by Liveworksheet on Probability Material.”

METHODS

This research uses Research and Development (R&D), which is a process used to validate and develop research products (Istiqomah et al., 2019). The ADDIE development model is

utilized. Below is a description of the ADDIE development phases (Rayanto & Sugianti, 2020), namely: Analyze, Design, Development, Implementation, Evaluation. This study was conducted at SMK Sjakhyakirti Palembang. The research subjects were 10th grade students at SMK Sjakhyakirti, including 3 students in the one-to-one test, 9 students in the small group test, and 28 students in the field test (1 class). Subject selection used purposive sampling with the following criteria: (1) currently studying probability material, (2) present and willing to participate in the full trial, (3) representing a range of abilities (high–medium–low).

This development research utilizes interviews and questionnaires as methods for gathering data.

1. Interview: carried out to determine the E-LKPD needs of educators and learners with the help of a liveworksheet on opportunity content.
2. Questionnaires: validation questionnaires from media and validation of the material to evaluate how trustworthy the developed liveworksheet-assisted e-LKPD is. Questionnaire for student feedback to assess how useful e-LKPD with liveworksheet assistance.

The collected data is then analyzed using the following technique:

1. Analysis of Data from Expert Validation

The researcher wed Likert A scale, which goes from 1 to 4, are taken into consideration when analyzing data from validation results by media and material experts.

Table 1. Product Validity Category

Achievement Level	Criteria
80% < $V \leq$ 100%	Very Valid
60% < $V \leq$ 80%	Valid
40% < $V \leq$ 60%	Fairly Valid
20% < $V \leq$ 40%	Less Valid
0% < $V \leq$ 20%	Not Valid

(Source: (Rosdiana et al., 2022)

Researchers used the following formula to calculate the mean value of product validation test scores in order to evaluate the validity of the liveworksheet e-LKPD:

$$V = \frac{\sum Skor\ Per\ Item}{Skor\ Maksimum} \times 100\%$$

2. Data Analysis of Product Practicality

The product practicality data is calculated as follows:

$$P = \frac{\sum Skor\ Respon\ Siswa}{Skor\ Maksimum} \times 100\%$$

Calculation of the average percentage score of students:

$$X = \frac{\sum x}{n} \times 100\%$$

Table 2. Student Response Questionnaire Criteria

Achievement Level	Criteria
80% < X ≤ 100%	Very Practical
60% < X ≤ 80%	Practical
40% < X ≤ 60%	Practical Enough
20% < X ≤ 40%	Less Practical
0% < X ≤ 20%	Not Practical

Source: (Nesri & Kristanto, 2020)

3. Analysis of Data from the Learning Motivation Questionnaire

Analysis of student learning motivation using a motivation questionnaire, calculated as a percentage:

$$P = \frac{\sum Skor\ motivasi\ siswa}{Skor\ Maksimum} \times 100\%$$

Calculation of the average score of student percentages:

$$X = \frac{\sum x}{n}$$

Table 3 Student Response Questionnaire Criteria

Inverval	Description
81-100	Very High
66-80	High
56-65	Medium
46-55	Low
0-45	Very low

Source: (Pohan & Simanjuntak, 2023)

RESULTS AND DISCUSSION

The development research was conducted at SMK Sjakhyakiri Palembang. The result of the development is e-LKPD assisted by Liveworksheet, focusing on opportunity material. The steps of developing e-LKPD assisted by Liveworksheet follow the ADDIE stages (analysis, design, development, implementation and evaluation). **Analysis:** Researchers conducted a

number of activities during the analysis stage, such as: (1) needs analysis, grounded in interviews with math educators and demonstrating that educators have never utilized digital-based learning resources like e-LKPD with Liveworksheet's assistance. In response, researchers tried to make e-LKPD assisted by Liveworksheet. (2) According to an analysis of learner characteristics gathered from interviews with three students and math teachers, students' enthusiasm in learning the subject was still poor, and they required assistance in order to inspire them to learn, particularly when it came to the chances available. Interviews with three tenth graders at SMK Sjakhyakirti revealed that, in contrast to reading textbooks, students require learning materials that may make the subject matter engaging and not dull. (3) curriculum analysis that entails examining the curriculum employed at SMK Sjakhyakirti, The results obtained that SMK Sjakhyakirti uses the Merdeka curriculum. Researchers conducted an analysis by adjusting the development of liveworksheet-assisted e-LKPD with learning outcomes (CP) and learning objectives (TP) in phase E concerning opportunity material.

Design: In the design stage, researchers do, (1) collecting sources, which involves collecting references from textbooks (teacher and student books for the Merdeka curriculum), Youtube videos and examples of lkpd. (2) compiling an e-LKPD content framework, which involves compiling a content structure based on the characteristics of vocational students and opportunity material. (3) selecting a learning model using a problem-based learning (PBL) model. (4) preparing the structure of e-LKPD, the structure is arranged systematically. (5) designing e-LKPD products. The design is visualized in the form of a storyboard that shows the presentation of content and interactive e-LKPD.

Development: In developing e-LKPD assisted by liveworksheet, Researchers engage in a variety of tasks, such as creating e-LKPD, obtaining expert validation, and carrying out one-to-one activities. Prototype I refers to the unvalidated results of creating e-LKPD.In the process of expert validation of the development of e-LKPD assisted by liveworksheet on opportunity material, two types of validation were carried out, validation material and media validation. Dr. Ely Susanti, M.Pd., a media validation, and Efryanty, M.Pd., a material validation, served as the study's validators. The purpose of this validation was to identify the benefits and drawbacks of e-LKPD in prototype I and make changes in accordance with

professional advice. The results of the validation by media and material experts are shown in the table below.

Table 4. Validation Results By Media

No	Aspect	Number Of Scores	Maximum Score
1.	Display	20	20
2.	Font Usage	8	8
3.	Interactivity	10	12
4.	Technical Quality	8	8
5.	Suitability Of Media With Material	9	12
	Total	55	60
	Product Validation (%) $V = \frac{\sum Skor\ Per\ Item}{Skor\ Maksimum} \times 100\%$	$V = \frac{55}{60} \times 100\%$ = 91,67%	
	Criteria	Very Valid	

Table 5. Validation Results By Material

No	Aspect	Number Of Scores	Maximum Score
1.	Content Quality	16	20
2.	Language	16	16
3.	Relevance and Contextuality	11	12
4.	Intergration With PBL Model	10	12
	Total	55	60
	Product Validation (%) $V = \frac{\sum Skor\ Per\ Item}{Skor\ Maksimum} \times 100\%$	$V = \frac{53}{60} \times 100\%$ = 88,33%	
	Criteria	Very Valid	

Table 6. Validation Results By Media And Material Experts

No	Validation Name	Validation Type	Percentage	Criteria
1.	Dr. Ely Susanti, M.Pd	Media	91,67%	Very Valid
2.	Efryanty, M.Pd	Material	88,33%	Very Valid

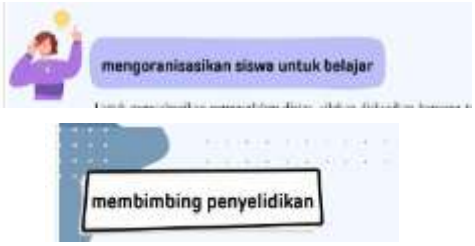
Referring to table 6, which presents the outcomes of validation carried out by media experts and material experts on e-LKPD products assisted by liveworksheet meet very valid criteria with the percentage obtained, namely 91.67% of validation results by media experts and 88.33% of validation results from material experts. Following validation by media and material experts, it was determined that adjustments were necessary based on their recommendations and suggestions. Below is an explanation of the revisions made based on the suggestions provided as follows:

Table 7. Suggestions and comments from validators

Validator	Comments and Suggestions
Mrs. Dr. Ely Susanti, M.Pd (Media Expert)	The display is quite attractive and not confusing, although the consistency of the design and placement of elements can still be refined
Mrs. Efriyanty, M.Pd (Material Expert)	For the learning outcomes section, please display it according to the focus of learning, namely opportunities.

Table 6. Display before and after revision

Before Revision



After revision

Element Refinement

Before Revision

After Revision

Learning Outcomes Improvement

In addition to expert validation, individual or one-to-one trials were carried out. Three students who were not part of the research sample were given prototype 1 at this point; they represented high, medium, and poor ability levels. In order to determine whether or not the e-LKPD has to be changed, an individual trial was carried out to find any potential flaws from the perspective of the students. After conducting e-LKPD trials, Students were interviewed by researchers to get their opinions on e-LKPD assisted by liveworksheet on opportunity material for vocational students. The following table displays the outcomes of each student's comments:

Table 8. Student Comments on One To One

Inisial Nama	Comments
MML (high ability)	I think learning with e-LKPD is very interesting in doing learning because during learning it makes me not bored in doing it because of the attractive appearance and there are also animated videos in it and e-LKPD is easy to use on my cellphone.
APDR (medium ability)	I think this e-LKPD is very easy to understand, the instructions given are also very clear so it does not make confusion when working on the questions in it. I also feel that learning is more fun
MRP (low ability)	I think the learning media is easy to understand and the explanation is very good and facilitates the learning process. There are pictures that can attract attention and there are also animated videos to watch so you don't get sleepy.

Implementation: The stage of implementation is completed after the results of validation by experts have been acquired, and One To One satisfies all necessary standards.The implementation stage is the small group trial and field trial stage. The small group activity involved 9 students who were selected based on diverse academic abilities, The three categories are low, medium, and high ability. In the small group stage, which involved nine students, the average percentage of student responses to the questionnaire that met the "very practical" criterion was 91.94%. In summary, the e-LKPD supported by liveworksheet on opportunity material for vocational students is proven to be very practical. The next stage is the field test, which is the implementation of E-LKPD on a wider scale and in a more real learning context in the classroom. The field test's objective is to determine how students react to using E-LKPD with the use of a liveworksheet on opportunity content. especially in terms of increasing learning motivation. The field test was conducted at SMK Sjakhyakirti on May 21, 2025, the test subjects were 28 students of class X MPLB. After conducting the trial, students were then directed to complete a survey on learning motivation.

the percentage of student motivation is 92.07% with the category "very good". In the learning process, these results indicate that the liveworksheet-assisted e-LKPD that has been created has a potential effect on student learning motivation. The high average percentage of motivation identifies that this e-LKPD is able to attract attention, show interest, and encourage active involvement of learners during the process of learning. This aligns with (Suharsono & Handayani, 2022) which shows that the use of liveworksheet-based interactive media contributes positively to increasing student learning motivation.

Evaluation: At the evaluation stage, researchers assessed the quality of e-LKPD assisted by liveworksheet on opportunity material for vocational students making use of student response surveys and validation surveys from media and material expert. The media expert validation results indicated a percentage of 91.67%, placing it in the "Very Valid" category. The results of material experts' validation fell into the "Very Valid" category with a percentage of 88.33%. Additionally, the "Very Practical" criterion on the student response form from the average for the Small Group stage was 91.94%. Evaluation was also conducted to see the potential effect of e-LKPD assisted by Liveworksheet on student learning motivation. To find out the potential effect, students were given a student learning motivation questionnaire. From the calculation results, a percentage of 92.07% was obtained which was included in the "very high" category.

These findings are in line with (Lestari, 2022) research, which states that digital worksheets can increase learning effectiveness because they are more interactive and interesting than printed worksheets. These results are also consistent with the findings of (Shalahuddin & Hayuhantika, 2022), which emphasize that interactive learning media can increase student engagement in the mathematics learning process. Furthermore, research by (Firtsanianta & Khofifah, 2022) shows that the development of technology-based LKPD has a high level of feasibility and is practical for use in the classroom.

However, the novel contribution of this study lies in its potential impact on the learning motivation of vocational high school students. While previous studies tended to stop at the stage of product validation and practicality, this study proves that Liveworksheet-assisted E-LKPD can increase student motivation in learning probability material. This is demonstrated by the 92.07% student motivation percentage, which falls into the “very high” category. Thus, the results of this study on the use of E-LKPD based on Liveworksheet not only support the feasibility of the product but also contribute to enhancing learning motivation, which is a crucial factor in mathematics education at vocational high schools.

CONCLUSION

The development research shows that E-LKPD assisted by liveworksheet on opportunity material for students is carried out with the ADDIE model. The validation results showed 91.67% from media experts with "very valid" criteria and 88.33 from material experts with "very valid" category. The practicality test at the small group stage obtained 91.94% with the

category "very practical, and the field test showed a potential effect on learning motivation of 92.07% with the category "very high". Thus, this E-LKPD is feasible to use and successful in enhancing student motivation to learn.

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