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Development of Discovery Learning-Based E-LKPD for Linear Equation Material in Class VIII SMP/MTs

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ABSTRACT

This research and development (R&D) aims to produce an electronic Student Worksheet (E-LKPD) on straight-line equation material based on discovery learning that qualifies as valid and practical. This type of research is development research with the 4-D development model (Define, Design, Develop, Disseminate). Data collection instruments involved validation sheets and student response questionnaires. Data analysis techniques used include validity and practicality analysis. The E-LKPD validation results were 89.28% with very valid criteria. E-LKPD testing in small groups resulted in a practicality level of 83.82%, categorized as practical, while testing in the big group reached 82.004%, with practical criteria. The data analysis concluded that the discovery of learning-based E-LKPD on straight-line equation material has complied with the validity and practicality standards. Accordingly, the developed E-LKPD can be used by students in grade VIII.

INTRODUCTION

In 21st-century learning, students must be able to think critically and systemically, especially in formulating and solving problems, have creativity and innovation, and communicate and work together. To realize these requirements, students can be supported by learning mathematics. The characteristics of mathematics are abstract objects of study, agreement, deductive reasoning, axiomatic, and structured. Thus, mathematics is a subject that is difficult to understand, monotonous, and unpleasant [1]. Therefore, teachers must be able to make math lessons creative, innovative, inspiring, and fun learning.

Mathematics learning implemented by teachers, especially on the material of straight-line equations, is still not maximally implemented. The learning process on straight-line equation material still prefers to be teacher-centered. Based on the results of interviews with one of the mathematics teachers at SMP Negeri 2 Pekanbaru, it was found that the ability of students to learn straight-line equation material was still lacking, especially in making graphs and determining the form of the line equation. One of the causes of students' problems in learning straight-line equation material is the lack of understanding of students in understanding the concept of straight-line equations [2]. Mathematics teaching materials are abstract concepts; the key to learning mathematics is a good understanding of the concepts [1].

Interaction is one of the important things in the learning process. Learning can be delivered

using various models, methods, and strategies, and learning can also be delivered with the help of teaching materials such as Student Worksheets or LKPD [3]. LKPD is the best learning facility because it allows students to understand the material [4]. Based on the analysis of LKPD used in mathematics learning at SMP Negeri 2 Pekanbaru. The results of the analysis show that, overall, the LKPD can help students practice doing math problems. LKPD consists of a summary of the material, examples of problems and solutions, and practice problems. Still, LKPD tends to present concepts or principles without any steps that guide or encourage students to find these concepts or principles meaningfully. Therefore, research is needed to develop innovative LKPDs that support learning.

In preparing for the era of Society 5.0, education should utilize technology more in learning. The Society 5.0 era allows teachers to use digital tools, online learning platforms, educational applications, and other digital resources to create an interesting, interactive, and relevant learning experience for students [5]. Moreover, using technology such as computers, the internet, and learning applications can help students understand mathematical concepts better [6]. Electronic LKPD (E-LKPD) is one form of technology utilized to solve the challenges in this Society 5.0 era.

E-LKPD is a transformation of the presentation of LKPD from printout to electronic (digital). E-LKPD is an activity that is structured and adjusted to the material and learning model in which some features support material information for students, including images, audio, video, or QR codes to access links to the web that support the learning process to create student understanding [7]. In addition, the use of E-LKPD in learning can make students' learning activities more enjoyable, motivate students in learning [8], measure students' abilities after learning, and make it easier for students to understand because it is practical and attractively presented, which can increase the enthusiasm for learning [9]. The E-LKPD used must also be designed as well as possible so that the learning objectives reach the target as expected [10].

The web-based application "liveworksheet.com" is an application that can convert printed worksheets in the form of .doc, .pdf, and .jpg into interactive online worksheets that can correct the system. Many variations of questions can be created through this application, such as multiple choice, short answer, choose right or wrong, match, dropdown list, and drop and drag [11]. In addition, it can also insert sound, videos from YouTube, and links. The benefits of this website are that it can make E-LKPD online, save time and paper, can be made as needed, and students can easily work on LKPD online on their gadgets [12].

The development of E-LKPD also requires an appropriate learning approach and model to support the learning process. Discovery learning is a learning model that allows students to build their knowledge. Discovery learning provides opportunities for students to think, discover, argue, and work together through scientific learning activities, thus helping students learn important concepts that can improve learning outcomes [13]. Discovery learning can be used as a teacher's reference to help students improve and enhance cognitive skills and processes, developing the ability to find their concepts of teaching materials [14].

The results of previous research by [10] resulted in a discovery that learning-based mathematics E-LKPD, which also uses live worksheets, has been rated as very valid and very practical by experts, so it can be said that the E-LKPD is eligible for use in mathematics learning, especially at the secondary school level, and can be used as a reference in this study.

Based on the problems found and the results of previous studies, the researchers felt the need to develop an E-LKPD that can support the mathematics learning process in the Society 5.0 era. The use of E-LKPD assisted by liveworksheets in the learning process is a means of presenting subject

matter and providing evaluation questions, and is expected to facilitate students in understanding straight-line equation material. The E-LKPD developed must be feasible and facilitate students' understanding of straight-line equation material. For this reason, conducting a study to develop E-LKPDs assisted by liveworksheets that meet the valid and practical requirements is necessary.

METHODS

Research and development (R&D) was done using the 4-D model from Thiagarajan, which consists of 4 stages: Define, Design, Develop, and Disseminate. The Define step includes several analyses, such as the initial end, students, tasks, and concepts, and formulating learning objectives. The analysis consists of identifying problems, examining the characteristics of students, formulating indicators of competency achievement (IPK), and developing the concept of straight-line equation material and learning objectives. The Design step is the stage for drafting a product, which involves selecting media and format and making initial product designs and research instruments. The Develop step includes a) validation by experts followed by revision; b) one-to-one test; c) product trial (small group and large group). The Disseminate step is the use of the product on a wider scale. The product is packaged, distributed, and set for a wider scale at this step.

The types of data obtained are qualitative and quantitative. Qualitative data was obtained from teacher interviews, responses, and input from validators on the E-LKPD validation sheet and students on the student response questionnaire sheet. Meanwhile, the assessment scores on the validation sheet and the learner response questionnaire produced quantitative data.

Data collection in this research included interviews, literature studies, documentation studies, and questionnaires. Interviews were conducted with direct questions and answers from sources who acted as informants to obtain the data needed for the research. Documentation studies are carried out by collecting and studying the necessary information or data through important documents available. Questionnaires or questionnaires are conducted by presenting questions or written statements to be answered by respondents.

The research instrument in this study is a validation sheet to assess the validity of the E-LKPD assessed by the validator and a student response questionnaire to assess the practicality of the E-LKPD. The type of answer on the validation sheet and the learner response questionnaire uses a Likert scale with four answer options, namely: 1 (Very Unsuitable), 2 (Unsuitable), 3 (Suitable), and 4 (Very Suitable).

The validation process by experts involved three validators who are specialists in educational technology and mathematics education. Each validator assessed the E-LKPD based on four main criteria: 1) content validity: which evaluates the accuracy, relevance, and completeness of the material presented in the E-LKPD; 2) construct validity: which assesses the logical coherence, instructional design, and alignment with learning objectives; 3) language validity: checks for clarity, readability, and appropriateness of the language used for the target audience; 4) technical validity: reviews the usability, functionality, and technical aspects of the E-LKPD, including the integration of multimedia elements.

The data analysis technique includes validity analysis and practicality analysis. The validity of the product developed was obtained using the formula:

$$V_a = \frac{T_s}{T_{sm}} \times 100\%$$

Description:

V_a : Validity value

T_s : Total score obtained

T_{sm} : Total maximum score

Table 1. Validity Criteria

Interval (%)	Criteria
$85{,}00 < V_a \leq 100{,}00$	Very valid
$70{,}00 < V_a \leq 85{,}00$	Valid
$50{,}00 < V_a \leq 70{,}00$	Less valid
$01{,}00 < V_a \leq 50{,}00$	Invalid

E-LKPD is valid if the validity value reaches an interval of more than 70.00%. The practicality of the E-LKPD developed is obtained from the results of analyzing student response questionnaire data using the formula.

$$P_a = \frac{T_s}{T_{sm}} \times 100\%$$

Description:

P_a : Practicality value

T_s : Total score obtained

T_{sm} : Total maximum score

Table 2. Practicality Criteria

Interval (%)	Criteria
$85{,}00 < V_a \leq 100{,}00$	Very practical
$70{,}00 < V_a \leq 85{,}00$	Practical
$50{,}00 < V_a \leq 70{,}00$	Less practical
$01{,}00 < V_a \leq 50{,}00$	Unpractical

E-LKPD is called practical if the validity value reaches an interval of more than 70.00%.

RESULTS AND DISCUSSION

This research produces E-LKPD based on discovery learning on straight-line equation material for class VIII junior high school students, which gets valid and practical categories. The development model used in this research is the 4-D development model, which consists of four stages: define, design, develop, and disseminate. The results obtained from each of these stages are as follows.

1. Define

At this step, the first activity carried out was the initial-end analysis. This research started with problems in learning straight-line equation material. This is caused by the students' lack of understanding of straight-line equations. Based on interviews and documentation studies, it was found that the LKPD used in mathematics learning did not entirely refer to Permendikbud Number 22 of 2016.

The next step is to analyze the characteristics of students at the junior high school level. The E-LKPD developed is designed for grade VIII students (13-14 years old). According to Piaget, the development of the abilities of students aged 13-15 years is in the formal operational period, in which the development of thinking increases to a higher, abstract, and complicated level. However, the increase occurs gradually so that not all students immediately enter the formal operational stage of cognitive development. So that the ability of students to think abstractly is still not fully developed. Accordingly, the E-LKPD to be developed should be able to be used by learners with high, medium, and low abilities. Task analysis begins with analyzing the basic competencies (KD) listed in

Permedikbud Number 37 of 2017, which is KD 3.4 Analyze linear functions as (straight line equations) and interpret their graphs related to contextual problems and KD 4.4 Solve contextual problems related to linear functions as straight line equations. Based on the results of the KD analysis, indicators of competency achievement (IPK) were formulated. In concept analysis, researchers compiled straight-line equation material that refers to the basic competencies (KD). Based on the results of the task analysis, learning objectives were formulated.

2. Design

In the Design step, media selection, format selection, initial E-LKPD design, and research instrument design were conducted. Researchers chose a web-based application called liveworksheets.com to present E-LKPD in media selection. Previously, the E-LKPD was designed using the Ms. Power Point 2019 application, converted into Portable Document Format (PDF), and then into the E-LKPD format using the website https://liveworksheets.com. In the format selection, the researcher elaborated on the format of the E-LKPD into three parts: the format of the E-LKPD cover, the format of the E-LKPD content, and the format of the exercise questions. In the initial design of the media, researchers made an initial design, or Prototype 1, which will be assessed in the next step of the research. Researchers also drafted research instruments such as validation sheets and student response questionnaires. The design of the first page of the validation sheet consists of the identity of the validated E-LKPD, the preface, and instructions for filling out the validation sheet. The next page contains E-LKPD assessment questions based on presentation aspects, didactic requirements (content), construction requirements (language), and technical requirements (graphics). Then, it contains a column of comments and suggestions from the validator, a column of conclusions on the feasibility of E-LKPD to be tested, and a column of validator signatures. The design of the first page of the learner response questionnaire consists of the identity of the test subject, preface, instructions for filling out the questionnaire, question items for assessing the practicality of E-LKPD based on ease of use, time efficiency, attractiveness, ease of understanding, and the benefits of E-LKPD. Then, it contains a column of comments and suggestions from the test subjects and a validator signature column.

3. Develop

At the Develop step, product validation, revision activities, and trials were carried out. Validation was carried out by three validators where the validators received E-LKPD accessed through a link or a QR code scan. The results of E-LKPD validation can be seen in Table 3 below.

Table 3. E-LKPD Validation Result Data

Assessment Aspects	Average E-LKPD Score from the Three Validators (%)				Average (%)	Criteria
	1	2	3	4		
Viewing	87,50	89,28	88,09	88,69	88,39	Very Valid
Content	90,48	89,29	88,09	89,29	89,29	Very Valid
Language	90,00	88,33	90,00	88,33	89,17	Very Valid
Graffiti	90,74	89,81	90,74	89,81	90,28	Very Valid
Total average (%)	89,68	89,18	89,23	89,03	89,28	Very Valid

From the data presented in Table 3, the average score for each aspect assessed on the E-LKPD is based on the criteria of being highly valid. The total average result of E-LKPD 1 validation is 89.68%, E-LKPD 2 is 89.18%, E-LKPD 3 is 89.23%, and E-LKPD 4 is 89.03%. Overall, the average score of E-LKPD validation results is 89.28% with very valid criteria. Although it has been qualified

as very valid, the validator suggested improving several parts of the E-LKPD. The validators gave suggestions on the developed E-LKPD as follows.

a. A group column will be added to the student identity for each E-LKPD.
b. In the stimulation section of E-LKPD 1, replace some of the words used, such as the word "live," replaced "operate", "plastered," replaced "known", and "nominal meter" replaced "nominal in the taximeter".
c. In the problem statement section of E-LKPD 2 and 3, change the problems given.
d. In the data collection section of E-LKPD 2, add an example of a slope for a line that slopes to the left.
e. In the data collection section of E-LKPD 4, replace the steps to find the formula for determining the equation of a line through two points and the equation of a line through a point and a known gradient.
f. Combine the E-LKPD with the exercise questions on the same link and put the answer submission column using the Google form link at the end of the E-LKPD work.

After being validated and revised according to the suggestions, the next step is the one-to-one E-LKPD test for three students. The results of the one-to-one test conducted showed that the level of readability of the E-LKPD developed was good because students could work and understand the activities in the E-LKPD. However, students still experienced a few problems in solving the problems. This test resulted in several inputs, including the following.

a. In E-LKPD 1 and 2 of the Let's Practice section, there is a lot of information about how to type the correct answer because if the way of typing the answer is wrong, the system will judge the answer as wrong even though the typed answer is correct. It is better to add more information to make it easier for students to know the procedure for typing answers that should be.
b. In the E-LKPD 4 section, Let's Practice, the answer choices on drag-and-drop questions do not appear. It is better to write the answer again above the answer column that will be shifted.

Then, the valid E-LKPD was tested in a small group of 6 students, and the large group was tested on 38 class VIII students at SMP Negeri 8 Pekanbaru who had heteroen ability. This trial was conducted to see the practicality of E-LKPD by students. The results of the questionnaire of students' responses to using E-LKPD can be seen in the E-LKPD small group trial table in the questionnaire of students' responses in Table 4 and Table 5.

Table 4. Data on Student Response Questionnaire Results in Small Group Trials

Assessment Aspects	E-LKPD				Average (%)	Criteria
	1	2	3	4		
Ease of use	81,3	83,3	83,3	81,3	82,3	Practical
Time efficiency	83,3	83,3	83,3	79,2	82,28	Practical
Attractiveness	86,7	87,5	85,8	85,8	86,45	Very Practical
Ease of understanding	83,3	84,7	82,6	83,3	83,46	Practical
Benefits of E-LKPD	84,2	85,8	84,2	84,2	84,6	Practical
Total Average					83,82	Practical

Table 4 shows that six students' total average score of E-LKPD practicality was 83,82% with practical criteria.

Table 5. Data on Student Response Questionnaire Results in Large Group Trials

Assessment Aspects	E-LKPD				Average (%)	Criteria
	1	2	3	4		
Ease of use	79,9	80,3	81,6	80,9	80,68	Practical
Time efficiency	83,6	84,9	82,9	82,9	83,56	Practical
Attractiveness	83,6	84,3	84,2	83,7	83,95	Practical
Ease of understanding	80,3	81,8	80,2	80,9	80,8	Practical
Benefits of E-LKPD	80,8	81,6	80,8	80,9	81,03	Practical
Total Average					82,004	Practical

Based on Table 5, the total average score of E-LKPD practicality by 38 students is 82,004%, with practical criteria. From the results of the E-LKPD validation, the results of the questionnaire of students' responses to the use of E-LKPD in the small group trial and the large group trial, it can be concluded that the discovery learning-based E-LKPD on the material of straight line equations in class VIII SMP/MTs has qualified valid and practical.

4. Disseminate

At this step, the E-LKPD is uploaded to the Google Drive link, https://bit.ly/E-LKPDPGL, to be shared with teachers and students to be disseminated easily. The link has an instruction sheet for using E-LKPD and links to access each E-LKPD.

Based on the results of the analysis of E-LKPDs done by students in small group trials and large group trials, researchers found that at the stimulation and problem statement stages, students can understand the problem well, can write down things that are known and asked and can write temporary answers to the problems presented. At the data collecting stage, students can use prior knowledge that they already have, select and use certain procedures, and link various concepts to find formulas related to straight-line equations. At the data processing stage, the results showed that some students still had difficulty solving the problems presented in the E-LKPD. This is because students are less accustomed to solving routine nun problems. In this case, the researcher guides students in solving these problems. At the verification stage, students have been able to re-examine and relate to the temporary answers made previously with the results of problem-solving. At the generalization stage, students can conclude the results obtained from working on E-LKPD.

The results of this study align with findings from previous research indicating that discovery learning can significantly enhance students' understanding and engagement in mathematical concepts ([10], [7]). Moreover, the use of E-LKPD facilitated by technology, such as liveworksheets.com, supports the interactive and engaging nature of learning, which has been shown to improve student outcomes in various educational settings ([8], [9]). By integrating these technological and pedagogical approaches, this research contributes to the broader literature on innovative educational tools and their impact on student learning.

Overall, the E-LKPD work by students is well done, and students actively discuss and ask researchers if they have difficulties working on E-LKPD. This is in line with what is conveyed [13]. Discovery learning provides opportunities for students to think, find, argue, and cooperate through scientific learning activities, thus helping students learn important, useful concepts for improving learning outcomes. The discovery learning model will provide opportunities for students to play an active role in learning and can help form effective teamwork [15].

Researchers evaluated the strengths and weaknesses of the developed E-LKPD. The strength of this E-LKPD is that it can be opened through various devices such as smartphones, laptops, or

computers, but the E-LKPD that researchers developed is more recommended for smartphones. This is because the activity steps require students to write on paper and then upload answers using the Google form link. If you want to open E-LKPD using a computer or laptop, it can be done with the solution part of uploading the answer manually by answering the paper directly to the teacher. This is also one of the weaknesses that researchers have developed in the E-LKPD. Another strength is that the E-LKPD presents a confirmation video, which is useful for understanding the concepts that students have found in previous activities so that they can solve the problems given.

Another weakness in the E-LKPD that researchers developed is that to access this E-LKPD, the device used by students must be connected to the internet network. However, the internet quota for opening E-LKPD is not too burdensome for students. For one E-LKPD, the required quota is less than 10 MB. It is also known that, in general, many schools have utilized wifi and the availability of multimedia laboratories, so it does not rule out the possibility that E-LKPD cannot be implemented in the learning process. The use of E-LKPD is also one of the platforms to familiarize students with the era of digitalization.

CONCLUSIONS AND SUGGESTIONS

This development research produces a product in mathematics E-LKPD based on a discovery learning model on straight-line equation material. The development procedure used in this research is the 4-D model, which consists of four steps: Define, Design, Development, and Disseminate. At the define step, the activities carried out are end-start analysis, learner analysis, task analysis, concept analysis, and formulation of learning objectives. At the design step, the activities are designing E-LKPD and designing validity and practicality instruments. E-LKPD validation, one-to-one tests, and small and large group trials are conducted at the development step. At the disseminate step, E-LKPD packaging is carried out. E-LKPD is uploaded to a Google Drive link, which contains an instruction sheet for using E-LKPD, along with a link to access each E-LKPD in the form of an instruction sheet. The results of this study indicate that the discovery of learning model-based mathematics E-LKPD on straight-line equation material has a valid and practical category.

This E-LKPD development research only measures the validity and practicality of E-LKPD based on discovery learning on straight-line equation material in general. Therefore, future researchers can research other aspects of mathematics learning, such as facilitating the abilities needed to learn mathematics.

Suggestions for implementing E-LKPD in other schools can begin with providing training sessions for teachers to familiarize them with using E-LKPD and the liveworksheets.com platform. This will ensure teachers can effectively integrate E-LKPD into their lesson plans and utilize all available features. Ensure students have access to the necessary technology, such as smartphones, tablets, or computers, and a reliable internet connection. Schools may consider setting up computer labs or providing devices for students who do not have access at home. Encourage collaborative learning by assigning group activities within the E-LKPD. This will help students to work together, share ideas, and develop teamwork skills. Teachers should provide regular feedback on students' work within the E-LKPD. This will help students understand their progress and areas for improvement, fostering a continuous learning process. Align the E-LKPD content with the existing curriculum to ensure it complements and enhances the standard teaching material. This alignment will help seamlessly integrate the E-LKPD into the daily teaching schedule. Before full implementation, conduct pilot testing in a few classes before full implementation to identify potential challenges and

gather feedback from teachers and students. Use this feedback to make necessary adjustments to the E-LKPD. Engage parents by providing them with information about the E-LKPD and its benefits. Encouraging parental support can enhance student motivation and participation. Regularly update and improve the E-LKPD based on feedback and new educational research to keep the content relevant and effective. By following these suggestions, other schools can successfully implement E-LKPD and enhance their students' learning experience, making mathematics education more interactive, engaging, and effective.

REFERENCE

[1] T. Lioba, N. Yuniasih, and C. I. R. Nita, "Pengembangan E-LKPD Berbasis Aplikasi Liveworksheets pada Materi Volume Bangun Ruang Kelas V SDN Kebonsari 4 Malang," *Semin. Nas. PGSD UNIKAMA*, vol. 5, no. 1, pp. 307–313, 2021.

[2] Z. D. Novitasari and N. Fitriani, "Analisis Kesalahan Siswa pada Persamaan Garis Lurus Berdasarkan Tahapan Kastolan," *JPMI (Jurnal Pembelajaran Mat. Inov.*, vol. 4, no. 4, pp. 957–964, 2021, doi: 10.22460/jpmi.v4i4.957-964.

[3] M. Rachmasari, V. Serevina, and A. S. Budi, "Lembar Kerja Elektronik Peserta Didik Dengan Model Pembelajaran Berbasis Masalah Untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi," vol. VIII, pp. SNF2019-PE-223–232, 2019, doi: 10.21009/03.snf2019.01.pe.28.

[4] F. R. Fairuz, N. Fajriah, and A. Danaryanti, "Pengembangan Lkpd Materi Pola Bilangan Berbasis Etnomatematika Sasirangan Di Kelas Viii Sekolah Menengah Pertama," *EDU-MAT J. Pendidik. Mat.*, vol. 8, no. 1, pp. 29–38, 2020, doi: 10.20527/edumat.v8i1.8343.

[5] K. Rahmadani, U. Azmi Rifaldi, and H. Umam, "Revolusi Pendidikan Indonesia Di Era 5.0," *April*, vol. 18, no. 01, pp. 65–71, 2024.

[6] H. Saputra, L. F. Utami, and R. D. Purwanti, "Era Baru Pembelajaran Matematika: Menyongsong Society 5.0," *Indiktika J. Inov. Pendidik. Mat.*, vol. 5, no. 2, 2023, doi: 10.31851/indiktika.v5i2.11155.

[7] T. Maullidyawati, L. Maulidiya, R. S. Rahmadani, and R. Hidayah, "Pengembangan E-LKPD Berbasis Inkuiri Flipped Classroom Pada Materi Kesetimbangan Kimia Untuk Melatihkan Literasi Sains Di Era Merdeka Belajar," *UNESA J. Chem. Educ.*, vol. 11, no. 2, pp. 104–112, 2022, doi: 10.26740/ujced.v11n2.p104-112.

[8] V. Puspita and I. P. Dewi, "Efektifitas E-LKPD berbasis Pendekatan Investigasi terhadap Kemampuan Berfikir Kritis Siswa Sekolah Dasar," *J. Cendekia J. Pendidik. Mat.*, vol. 5, no. 1, pp. 86–96, 2021, doi: 10.31004/cendekia.v5i1.456.

[9] L. D. Sariani and I. M. Suarjana, "Upaya Meningkatkan Belajar Matematika Melalui E-LKPD Interaktif Muatan Matematika Materi Simetri Lipat dan Simetri Putar," *Mimb. PGSD Undiksha*, vol. 10, no. 1, pp. 164–173, 2022, doi: 10.23887/jjpgsd.v10i1.46561.

[10] D. A. Prayoga, K. Kartini, and T. Solfitri, "Rancangan E-LKPD Materi Bangun Ruang Sisi Datar Berbasis Discovery Learning untuk Memfasilitasi Kemampuan Pemahaman Matematis Peserta Didik Kelas VIII SMPMTs," *Juring (Journal Res. Math. Learn.*, vol. 5, no. 4, p. 311, 2022, doi: 10.24014/juring.v5i4.17570.

[11] V. H. Ha Le and D. Prabjandee, "A Review of the Website Liveworksheets.com," *Comput. Assist. Lang. Learn. Electron. J.*, vol. 24, no. 1, pp. 269–279, 2023.

[12] U. Umaroh, Novaliyosi, and Y. Setiani, "Pengembangan Lembar Kerja Peserta Didik Elektronik (E-LKPD) Berbasis Problem Based Learning (PBL) untuk Memfasilitasi Kemampuan Penalaran Peserta Didik pada Materi Lingkaran," *Wilan. J. Inov. dan Ris. Pendidik. Mat.*, vol. 3, no. 1, pp. 61–70, 2022, doi: 10.56704/jirpm.v3i1.13368.

[13] Y. I. Wulandari, Sunarto, and S. A. Totalia, "Implementasi Model Discovery Learning Dengan Pendekatan Saintifik Untuk Meningkatkan Kemampuan Berfikir Kritis Dan Hasil Belajar Siswa Mata Pelajaran Ekonomi Kelas Xi Iis I Sma Negeri 6 Surakarta Tahun Pelajaran 2014/2015,"

BISE J. Pendidik. Bisnis Dan Ekon., vol. 1, no. 2, pp. 1–21, 2016.

[14] S. L. Ridwan, "Peningkatan Kemampuan Berpikir Kritis dan Hasil Belajar Peserta Didik Melalui Model Pembelajaran Discovery Learning," *J. Didakt. Pendidik. Dasar*, vol. 5, no. 3, pp. 637–656, 2021, doi: 10.26811/didaktika.v5i3.201.

[15] S. Mawaddah and R. Maryanti, "Kemampuan Pemahaman Konsep Matematis Siswa SMP dalam Pembelajaran Menggunakan Model Penemuan Terbimbing (Discovery Learning)," *EDU-MAT J. Pendidik. Mat.*, vol. 4, no. 1, pp. 76–85, 2016, doi: 10.20527/edumat.v4i1.2292.

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