



Development of e-worksheet based on discovery learning using liveworksheets to improve concept understanding ability

Halifa Ismaniar¹, Sumarni^{2*}, Mohamad Riyadi³

^{1,2*,3}Mathematics Education Study Program, Universitas Kuningan, Kuningan, Jawa Barat, Indonesia

¹halifah.ismaniar@gmail.com; ^{2*}marnie.1205@gmail.com; ³pmohamadriyadi@uniku.ac.id

*marnie.1205@gmail.com

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Abstract

This study aims to develop a discovery learning-based E-WORKSHEET using live worksheets to improve students' concept understanding ability on curved-sided space building material, test the validity of E-WORKSHEET, test the practicality of E-WORKSHEET, and see the improvement of students' concept understanding ability. The method used is Research and Development (R&D) using the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation). The research was conducted in class IX-F MTs Negeri 2 Kuningan with 32 students. Data collection techniques used in this study include interviews and needs questionnaires. The data analysis techniques used were the validity test, practicality test and N-Gain test. The validation test results from material experts showed a validity percentage of 88.17%, while the validation results from media experts reached a validity percentage of 96.53%. The practicality test results showed that the E-WORKSHEET implementation reached a practicality level of 94.84%, so it can be categorized as very practical. The technique to test the improvement of concept understanding ability is by giving pre-test and post-test questions to class IX-F students, as many as 32 students with details of the pre-test average of 15.16 and post-test average of 82.66. Based on the results of data analysis to find N-Gain, E-WORKSHEET is also able to improve students' mathematical concept understanding ability with an average N-Gain of 0.8 in the N-Gain category.

Keywords: Curved Side Spaces; Discovery Learning; E-WORKSHEET; Mathematical Concept Understanding Ability; Liveworksheets

Abstrak

Penelitian ini bertujuan untuk mengembangkan E-WORKSHEET berbasis discovery learning menggunakan liveworksheets untuk meningkatkan kemampuan pemahaman konsep siswa pada materi bangun ruang sisi lengkung, menguji kevalidan E-WORKSHEET, menguji kepraktisan E-WORKSHEET, dan melihat peningkatan kemampuan pemahaman konsep siswa. Metode yang digunakan adalah Research and Development (R&D) dengan menggunakan model pengembangan ADDIE (Analyze, Design, Development, Implementation, and Evaluation). Penelitian dilakukan di kelas IX-F MTs Negeri 2 Kuningan dengan jumlah 32 siswa. Teknik



pengumpulan data yang digunakan pada penelitian ini diantaranya wawancara dan angket kebutuhan. Teknik analisis data yang digunakan adalah uji kevalidan, uji kepraktisan dan uji N-Gain. Hasil uji validasi dari ahli materi menunjukkan persentase validitas sebesar 88,17%, sementara itu, hasil validasi dari ahli media mencapai persentase validitas sebesar 96,53%. Hasil uji kepraktisan menunjukkan bahwa implementasi E-WORKSHEET tersebut mencapai tingkat kepraktisan sebesar 94,84%, sehingga dapat dikategorikan sebagai sangat praktis. Teknik untuk menguji peningkatan kemampuan pemahaman konsep yaitu dengan memberikan soal pre-test dan post-test kepada siswa kelas IX-F sebanyak 32 siswa dengan rincian rata-rata pre-test sebesar 15,16 dan rata-rata post-test 82,66. Berdasarkan hasil analisis data untuk mencari N-Gain, E-WORKSHEET mampu meningkatkan kemampuan pemahaman konsep matematis siswa dengan rata-rata N-Gain sebesar 0,8 dalam kategori “tinggi”.

Kata Kunci: Bangun Ruang Sisi Lengkung; Discovery Learning; E-WORKSHEET; Kemampuan Pemahaman konsep Matematis; Liveworksheets

Introduction

Mathematics is one of the basic sciences that is very important to be taught in schools (Komalasari, Sumarni, & Adiastry, 2021; Yuniar, Sumarni, & Adiastry, 2020). This is due to the fact that mathematics acts as a subject that provides students with logical, analytical, systematic, critical and creative thinking skills, as well as the ability to work together (Silalahi, Siahaan, & Tambunan, 2023). The objectives of mathematics learning stated in the 2013 Curriculum are so that students can: (1) understand mathematical concepts; (2) apply patterns as a basis for solving problems, and be able to make generalizations based on existing phenomena or data; (3) using reasoning related to mathematical properties, carrying out mathematical manipulations both in simplification and component analysis in problem solving, both in the context of mathematics and outside mathematics; (4) convey ideas and reasoning and be able to compose mathematical evidence using complete sentences, symbols, tables, diagrams, or other media to explain situations or problems; (5) develop an attitude of appreciation for the usefulness of mathematics in everyday life; (6) demonstrate attitudes and behavior in accordance with values in mathematics and learning; (7) carry out motor activities that involve mathematical knowledge; (8) using simple teaching aids and technological results to carry out mathematical activities (Syahril, Saragih, & Heleni, 2021). In line with this, Permendikbud No. 58 of 2018 states that one of the goals of learning mathematics in schools is that students have the ability to explain the relationship between concepts and be able to use them appropriately in solving problems (Silalahi *et al.*, 2023). Therefore, the ability to understand concepts is the most important thing in understanding mathematical concepts, because understanding concepts will support other mathematical abilities (Faisal, Sumarni, & Riyadi, 2023; Novita, Sumarni, & Riyadi, 2022; Sumarni & Adiastry, 2015; Sumarni *et al.*, 2018).



In fact, understanding of mathematical concepts in Indonesia is still low, because many students find it difficult to understand the concepts. According to OECD (2019) the results of the 2018 PISA survey show that the average score for understanding mathematical concepts in Indonesia reached 379, below the international average score of 489. The low ability of students to understand concepts is caused by the use of teaching materials that cannot understand mathematical concepts students (Nurlaila, Agus, & Lestari, 2022).

The results of observations and interviews with mathematics subject teachers in class IX MTs Negeri 2 Kuningan show that students' ability to understand concepts is still in the low category. Teachers believe that understanding concepts is an essential basic skill for students to support other mathematical abilities. The ability to understand concepts is considered as a link between the various concepts studied. This is in line with the opinion of Marasabessy *et al.* (2021) where concepts have high interconnectedness, that is, one concept can support another concept. The teacher said that one of the materials that needed to be improved in understanding the concept was the material on curved sided shapes. This can be seen from the learning results of class IX students in the previous year. Marasabessy *et al.* (2021) also stated that students still find it difficult to understand the concept of curved geometric figures.

The learning method used still uses conventional learning methods, which causes students to sometimes feel bored with mathematics lessons (Destiana, Sumarni, & Adiastruti, 2020). Apart from that, they rely on textbooks available in the school library as their learning resource (Sofyan, Sumarni, & Riyadi, 2021). So far, there are no teaching materials such as student worksheets used by teachers. Therefore, this has not succeeded in encouraging student participation in independent learning and does not provide training for them to discover and develop their knowledge (Zamrodah, 2020).

To overcome the problem of students' ability to understand mathematical concepts and make them active in learning, it is necessary to develop alternative interactive teaching materials, namely by using Student Worksheets to learn a concept so that students can solve problems (Rahmawati, Sumarni, & Adiastruty, 2023; Yulia, Buyung, & Relawati, 2018). WORKSHEET can be presented online so its name is Electronic Worksheet (E-WORKSHEET). Using E-WORKSHEET has many advantages compared to printed WORKSHEET, for example E-WORKSHEET can contain animations and videos that are interesting for students, can save paper usage, increase teacher creativity in using technology and is more practical (Armanda & Putra, 2023). Based on technological developments, E-WORKSHEET can be developed with the help of the live worksheets platform as an interactive learning tool.

Liveworksheets is a platform that can change traditional WORKSHEET so that it can be converted into file types (document, pdf and jpg) into online WORKSHEET for



students (Supriatna, Siregar, & Nurrahma, 2022). E-WORKSHEET will be improved by exploring more live worksheet features, including variations of mathematics questions such as multiple choice, short fill, drag and drop and connecting arrows, with the hope that these variations can avoid student boredom (Sarman, Suastika, & Murniasih, 2023).

The results of research conducted by Amsari and Haryati (2023) show that the discovery learning method can improve students' understanding of concepts. In line with research conducted by Soliya et al. (2022), where their research developed discovery learning-based WORKSHEET whose results can improve students' ability to understand concepts. But this WORKSHEET has not used technology for its development. Based on this description, interactive learning media is needed with a discovery learning learning model assisted by live worksheets in order to support the learning process so that students are interested in participating in learning activities and are able to increase students' understanding of concepts.

Meanwhile, research was previously carried out by Shalahuddin dan Hayuhantika (2022), where this research developed E-WORKSHEET using a live worksheet platform on circle material. The difference with the research carried out is that this research uses curved sided space building materials. The similarity in this research is developing E-WORKSHEET using live worksheets to improve students' ability to understand concepts. The results of other research conducted by Nurlaila et al. (2022), where this research develops E-WORKSHEET using live worksheets to improve students' ability to understand concepts in social arithmetic material. The difference with what the researchers did was in the material, the material the researchers used was a curved sided space shape.

The similarity is developing E-WORKSHEET using the live worksheets platform to improve students' ability to understand concepts. As with research conducted by Supriatna et al. (2022), where this research develops E-WORKSHEET based on problem based learning using live worksheets in elementary schools. The difference with what the researchers did lies in the school's targets and learning model. Researchers use the discovery learning model in SMP/MTs. The similarity lies in the use of live worksheets as interactive media. Meanwhile, the results of research conducted by Amsari and Haryati (2023) show that the discovery learning method can improve students' understanding of concepts. In line with research conducted by Soliya et al. (2022), where their research developed discovery learning-based WORKSHEET whose results can improve students' ability to understand concepts. But this WORKSHEET has not used technology for its development.

Referring to the previous explanation, further research needs to be carried out, namely developing E-WORKSHEET using liveworksheets on curved sided building material. The learning used in this research is discovery learning. This research aims to develop E-WORKSHEET based on discovery learning using live worksheets to improve



students' ability to understand concepts in curved sided geometric material, test the validity of E-WORKSHEET, test the practicality of E-WORKSHEET, and see an increase in students' ability to understand concepts.

Method

The type of research applied is development research. The development carried out in this research was to create a mathematics E-WORKSHEET for SMP/MTs by applying the discovery learning model. This research refers to the ADDIE development model, its development stages which include five stages, namely Analysis, Design, Development, Implementation and Evaluation (Utami, Suastra, & Suarni, 2022). The research was carried out in class IX F of MTs Negeri 2 Kuningan which is located at Jalan Eyang Hasan Maulani, Sindangsari, Sindangagung District, Kuningan Regency, West Java 45573. This activity was carried out in the even semester of the 2023/2024 academic year. The subjects in this research were students in class IX F of MTs Negeri 2 Kuningan for the 2023/2024 academic year, totaling 32 students. The determination of the research subject was adjusted to the materials and products developed by the researcher, as well as suggestions from the class IX mathematics teacher at MTs Negeri 2 Kuningan.

In this research, the ADDIE development model was used, which was developed by Dick and Carry. This development research method has five stages, namely analysis, design, development, implementation and evaluation (Usman, Mulbar, & Wahyuni, 2023).

1. Analysis Stage

This analysis stage is carried out so that the E-WORKSHEET developed is relevant to learning in schools. The analysis carried out is as follows:

a. Needs analysis

The needs analysis aims to determine the initial conditions that exist at MTs N 2 Kuningan, especially in class IX F. The results of the analysis show that the learning process still uses conventional learning with textbook learning resources and has not used learning media that is able to motivate students to be enthusiastic about learning. So the development of interactive learning media by utilizing this technology is very necessary when learning mathematics to increase students' enthusiasm and motivation in participating in mathematics learning.

b. Curriculum analysis

The curriculum used at MTs N 2 Kuningan is the revised 2013 curriculum. The E-worksheet developed is adapted to the learning objectives in the 2013 curriculum.

2. Design Stage

The design carried out by researchers includes determining materials, designing E-WORKSHEET, and preparing research instruments. The design stages of these three things are as follows:



a. Material determination

The researcher determined the material for curved geometric shapes because in the results of an interview with the class IX mathematics teacher, the teacher stated that the students' scores for the curved sided geometric material were relatively low..

b. E-WORKSHEET Design

The E-WORKSHEET design consists of: (1) a cover containing the WORKSHEET title, subject identity, class/grade level identity, and author identity; (2) instructions for using E-WORKSHEET; (3) basic competencies, indicators of competency achievement, learning objectives for learning media and learning objectives; (4) student identity; (5) instructions for use; (6) learning video materials; (7) practice questions, containing various variants of practice questions, including (essay, check box, word search, and drag and drop).

c. Preparation of research instruments

Next, create a research instrument. The instruments used in this research were expert validation sheets, response questionnaires, and test instruments for pre-test and post-test questions..

d. Development stage

At this stage the E-WORKSHEET components, materials, pre-test and post-test questions are prepared. Then during validation, the experts make revisions by providing suggestions and input for the E-WORKSHEET being developed..

4. Implementation Stage

At this stage, E-WORKSHEET is implemented with a discovery learning model that has been developed by researchers. E-WORKSHEET was implemented for 32 class IX F students at MTs N 2 Kuningan in the even semester of the 2023/2024 academic year. The implementation stage of the E-WORKSHEET aims to determine the level of practicality and level of students' ability to understand mathematical concepts.

5. Evaluation Stage

Evaluation is carried out by giving pre-test and post-test questions to students. At this stage the aim is to find out whether the product is practical and can improve students' understanding of concepts. Instruments in the research include structured interviews and questionnaires, to understand existing problems, as well as to assess the condition of students including the facilities and infrastructure they have in the context of the learning scheme. To measure the validity of E-WORKSHEET, researchers validated material experts and media experts. Practicality is measured by providing teacher and student response questionnaires.

Data analysis techniques are used to design products that meet the criteria for validity, practicality and increased understanding of concepts. The following steps are taken to evaluate the quality of the product developed..



1. Validity analysis

The E-WORKSHEET validity assessment was carried out using the E-WORKSHEET validation sheet instrument which had been prepared by researchers and had been deemed appropriate by experts. The assessment scale used is a Likert scale with four levels. Quantitative data obtained from the recapitulation of experts' answers is then converted into percentages using the following formula:

$$P = \frac{f}{n} \times 100\%$$

Information:

P = percentage score

f = total score obtained

n = maximum number of scores (Gulo & Harefa, 2022)

With the following validity criteria:

According to Watika dan Suliyannah (2019), WORKSHEET is said to be valid if it obtains a percentage $\geq 60\%$.

1. Practicality Analysis

Quantitative data obtained from the recapitulation of answers from student and teacher response questionnaires were then converted into percentages using the following formula:

$$P = \frac{\sum x}{\sum x_i} \times 100\%$$

Information:

P = percentage of respondents

$\sum x$ = total score from respondents

$\sum x_i$ = total ideal score (Gulo & Harefa, 2022)

2. Gain Test Analysis

Students' understanding of mathematical concepts can be demonstrated through Gain. Gain is calculated using the following formula.

$$\text{Normal Gain} = \frac{\text{skor post test} - \text{skor pre test}}{\text{skor ideal} - \text{skor pre test}}$$

If the N-Gain is ≥ 0.3 or is in the medium category, it can be interpreted that the E-WORKSHEET has had a significant impact on increasing student understanding.

Result

This research applies the ADDIE development model which consists of 5 stages, namely analysis, design, development, implementation and evaluation.

1. Analysis stage

a. Needs analysis

The needs analysis shows that students at MTs N 2 Kuningan, especially in class IX F, experience difficulties in understanding mathematical concepts, especially in curved geometric shapes. Learning that is still conventional and less innovative causes a lack of motivation and enthusiasm for student learning. Therefore, the development of



interactive learning media, such as E-WORKSHEET, is very necessary to increase student motivation and enthusiasm for learning.

b. Curriculum analysis

The results of the curriculum analysis show that MTs N 2 Kuningan uses the revised 2013 curriculum. However, learning methods that are still teacher-centered are not in line with the 2013 curriculum learning paradigm which emphasizes students as the center of learning. Learning media innovations, such as WORKSHEET, are needed to support the learning process in accordance with the 2013 curriculum paradigm.

2. Design stage

The design stage in the ADDIE model involves three main steps. First, determining the material was carried out by selecting curved-sided building material that was relevant to students' needs, in accordance with the 2013 curriculum. Second, the design of the E-WORKSHEET was carried out using the Canva application in PDF format, including various elements such as instructions for use, student identity, learning video material, and practice questions. Third, the preparation of research instruments was carried out, including expert validation sheets, response questionnaires, and test instruments for pre-test and post-test questions, which involved aspects such as the validity of material and media experts, as well as comments and suggestions from respondents.

3. Development stage

The E-WORKSHEET development stage involves several steps as follows:

a. Collect E-WORKSHEET components

The development of the E-WORKSHEET component is carried out by compiling material, sample questions and evaluation.

b. The design of the E-WORKSHEET display is carried out through the Canva and Microsoft Word applications with various elements such as cover, student identity, basic competencies, learning objectives, instructions for use, stimulation stages, data collection, data processing, verification and drawing conclusions. Third, E-WORKSHEET validation is carried out by material experts and media experts using a validity questionnaire. The following are validation results from material experts and media experts.

Table 1. Material Expert Validation Results

No	Aspect	Material Expert 1			Material Expert2		
		Skor	%	Ket	Skor	%	Ket
1	E-WORKSHEET Component	17	85	Very Valid	19	95	Very Valid
2	Language	3	100	Very Valid	4	100	Very Valid
3	Content Component	18	75	Valid	23	96	Very Valid
4	Concept Understanding Ability	12	60	Fairly Valid	20	100	Very Valid
5	Discovery Learning	17	71	Valid	24	100	Very Valid



No Aspect	Material Expert 1		Material Expert2	
	Skor	% Ket	Skor	% Ket
Average	88,17		Very Valid	

Table 2. Media Expert Validation Results



No	Aspect	Ahli Media 1		
		Score	%	Information
1	Simplicity	8	100	Very Valid
2	Integration	11	91,67	Very Valid
3	Emphasis	4	100	Valid
4	Balance	7	88	Very Valid
5	Form	8	100	Very Valid
6	Color	4	100	Very Valid
Average		96,53		Very Valid

According to Watika dan Suliyanah (2019), E-WORKSHEET is valid with a percentage $\geq 60\%$. The media expert validation results showed a percentage of 96.53%, indicating that the E-WORKSHEET prepared by the researchers was very valid and ready to be used in learning.

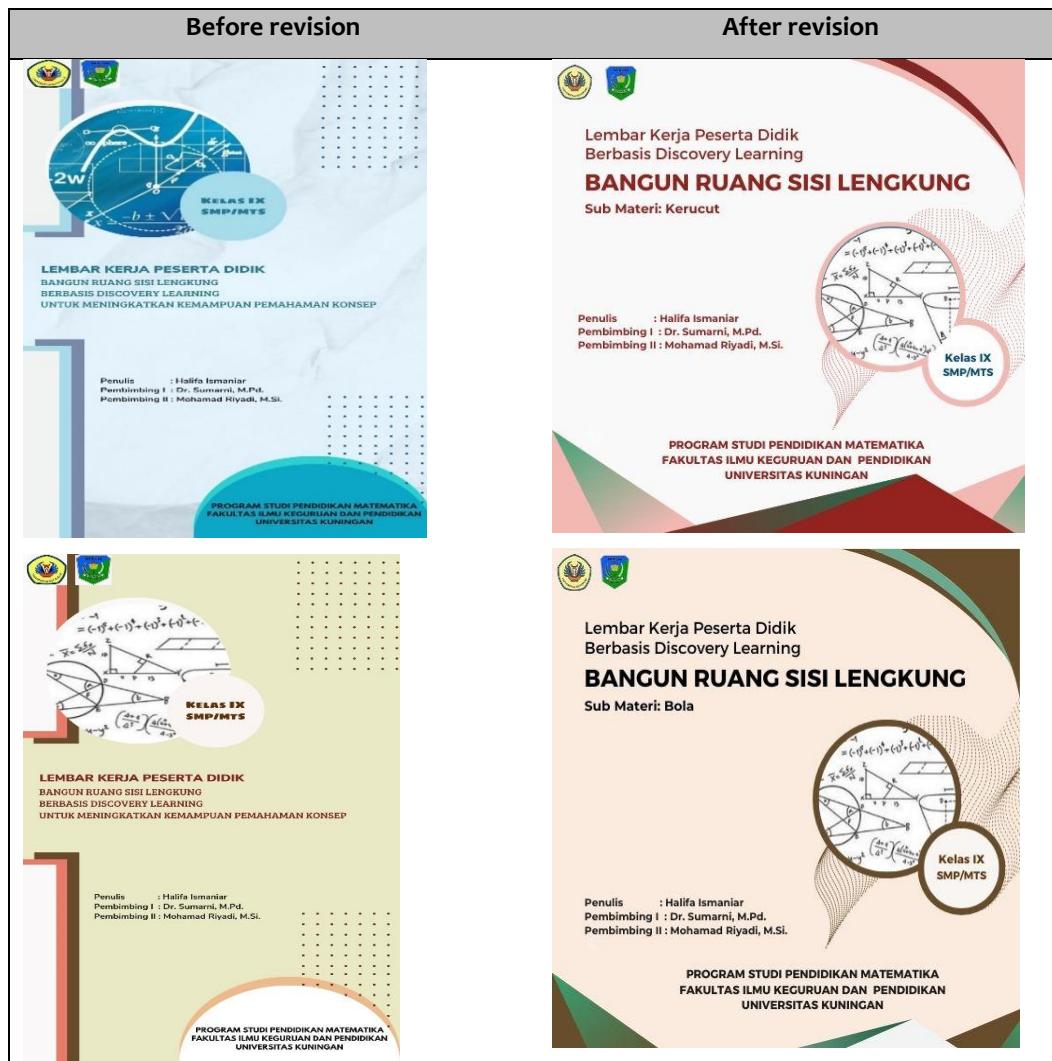
a. Revision

After the validation process, the validators provide input and suggestions to improve the quality of interactive learning media. Based on this feedback, researchers revised the interactive learning media before implementing it. The following is a Table 3 containing suggestions and input from validators:

Table 3. Before and after revision

Before revision	After revision
Comments and suggestions from media experts: - Consistent use of themes and colors in each E-WORKSHEET. - Cover design in terms of arrangement and use of images	
	





Input and suggestions from material experts:

The stimulation section does not explicitly mention building tubes, cones and balls first.

Sebuah kaleng susu berbentuk tabung, pada selimutnya dipasang stiker yang berisi identitas produk berupa merek, nutrisi, berat kemasan dan keterangan produk dengan stiker berukuran 10 cm x 44 cm. Tentukan luas bahan yang diperlukan untuk membuat kaleng susu tersebut!

Bagian atas dari sebuah gelas pada gambar di samping berbentuk kerucut. Diameter gelas tersebut 7 cm dan panjang garis pelukisnya 8 cm. Hitunglah volume gelas itu dengan menggunakan $\pi = \frac{22}{7}$!

Gambar di samping menunjukkan benda logam berbentuk setengah bola dengan diameter luar 24 cm. Hitunglah volume benda tersebut jika ketebalannya 0,5 cm dengan $\pi = 3,14$!

Sebuah kaleng susu akan dipasangkan stiker yang tercantum identitas produk berupa merek, nutrisi, berat kemasan dan keterangan produk dengan stiker berukuran 10 cm x 44 cm. Tentukan luas bahan yang diperlukan untuk membuat kaleng susu tersebut!

Diameter gelas di samping berukuran 7 cm dan panjang garis pelukisnya 8 cm. Hitunglah volume gelas itu dengan menggunakan $\pi = \frac{22}{7}$!

Gambar di samping menunjukkan mangkuk pembuat krim salad dengan diameter luar 24 cm. Hitunglah volume benda tersebut jika ketebalannya 0,5 cm dengan $\pi = 3,14$!

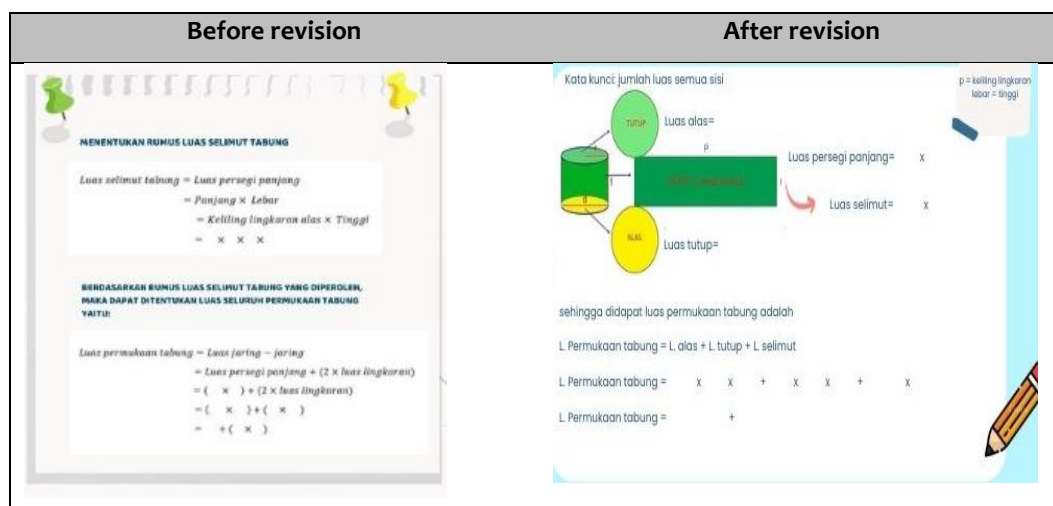
Input and suggestions from material experts:

- Clarify the instructions on the problem of determining the net of a tube, cone and ball, and put a question mark at the end of the problem.



Before revision	After revision
<p style="text-align: center;">MANAKAH YANG TERMASUK JARING JARING TABUNG</p> <p>GAMBAR A = GAMBAR B = GAMBAR C = GAMBAR D = GAMBAR E =</p>	<p style="text-align: center;">Dari beberapa gambar di atas, manakah yang termasuk jaring-jaring tabung?</p> <p>Gambar A = Gambar B = Gambar C = Gambar D = Gambar E =</p>
<p style="text-align: center;">MANAKAH YANG TERMASUK JARING JARING KERUCUT</p> <p>GAMBAR A = GAMBAR B = GAMBAR C = GAMBAR D = GAMBAR E = GAMBAR F =</p>	<p style="text-align: center;">Dari beberapa gambar di atas, manakah yang termasuk jaring-jaring kerucut?</p> <p>Gambar A = Gambar B = Gambar C = Gambar D = Gambar E = Gambar F =</p>
<p style="text-align: center;">MANAKAH YANG TERMASUK JARING JARING BOLA</p> <p>GAMBAR A = GAMBAR B = GAMBAR C = GAMBAR D = GAMBAR E = GAMBAR F =</p>	<p style="text-align: center;">Dari beberapa gambar di atas, manakah yang termasuk jaring-jaring bola?</p> <p>Gambar A = Gambar B = Gambar C = Gambar D = Gambar E = Gambar F =</p>
<p>Input and suggestions from material experts:</p> <ul style="list-style-type: none"> - - Formulate the formula for the surface of a tube 	





1. Implementation stage (Implementation)

In this stage, the E-WORKSHEET that had been developed by researchers was applied to 32 students in class IX F at MTs N 2 Kuningan in the even semester of the 2023/2024 academic year. The aim of implementing E-WORKSHEET is to measure students' practicality and understanding of mathematical concepts. E-WORKSHEET is implemented in 4 learning sessions, with 3 sessions lasting 2 lesson hours, and 1 session lasting 1 hour. Each learning session lasts 40 minutes, so the total time required to implement E-WORKSHEET is 280 minutes. Details of learning activities during the research are as follows: on March 21 2024, the researcher conducted a pre-test and applied E-WORKSHEET on the tube subtopic. On March 22 2024, researchers applied E-WORKSHEET to the cone subtopic. On March 23 2024, researchers applied E-WORKSHEET to the football subtopic. On March 25 2024, researchers gave a post-test to students. The following are the results of student and teacher responses which are used to assess the practicality of E-WORKSHEET.

Table 4. Results of Student Practicality Questionnaire

No	Indicator	Score	Percentage	Description
1	Content and media display	499	97,46	Very Practical
2	Material	242	94,53	Very Practical
3	Ease of use of E-WORKSHEET	241	94,14	Very Practical
4	Implementability	235	91,80	Very Practical
5	Ability to understand concepts	604	94,38	Very Practical
Average		94,84		Very Practical

The results of the student practicality test research listed in Table 4 show that the implemented E-WORKSHEET reached a percentage of 94.84%. This places it in the very practical category. Thus, it is proven that the E-WORKSHEET can be used well in the context of student learning.



Table 5. Teacher Practicality Questionnaire Results

No	Indicator	Score	Percentage	Description
1	Content and media display	14	87,50	Very Practical
2	Material	11	91,67	Very Practical
3	Ease of use of E-WORKSHEET	7	87,50	Very Practical
4	Implementability	16	100,00	Very Practical
5	Ability to understand concepts	17	85,00	Very Practical
Average		90,28		Very Practical

The results of the practicality test listed in Table 5 show that E-WORKSHEET reached a percentage of 90.28%. These results put the E-WORKSHEET into the very practical category.

2. Evaluation stage (evaluation)

The final step in developing E-WORKSHEET is evaluation. Evaluation is carried out by giving pre-test and post-test questions to students consisting of 5 descriptive questions. The pre-test was carried out at the beginning before the E-WORKSHEET was given to students who the researchers had carried out on March 21 2024, while the post-test was carried out at the end after the E-WORKSHEET was given to students who the researchers had carried out on March 25 2024.

The results of this research are in line with the results of research by Soliya *et al.*, (2022) which states that discovery learning can help students understand a concept, with steps to implement it consisting of: (1) stimulation; (2) problem identification; (3) data collection; (4) data processing; (5) proof: (5) drawing conclusions. The development of E-WORKSHEET aims to improve students' ability to understand mathematical concepts by using liveworksheets based on discovery learning. This E-worksheet aims to improve students' ability to understand concepts. So that students learn to understand concepts with indicators of concept understanding ability which consist of (1) classifying objects based on certain properties in accordance with the concept; (2) presenting concepts in various forms of mathematical representation; (3) developing necessary conditions or special requirements for a concept; (4) using, utilizing, and selecting particular procedures or operations; (5) apply concepts or algorithms in solving problems. This E-WORKSHEET has gone through the material expert validation and media expert validation stages by obtaining results in the very valid category so it is suitable for use in the learning process. After implementation, the practicality of the E-WORKSHEET was tested using student and teacher response questionnaires. The results of the practicality test produce a score that can be categorized as very practical, thus proving that E-WORKSHEET is effectively used by students in improving students' ability to understand concepts. This is relevant to the research results of Salahuddin and Hayuhantika (2022) which prove that E-LKPD uses practical and effective live worksheets in improving students' ability to understand mathematical concepts.



Conclusion

E-WORKSHEET based on discovery learning using live worksheets is used for learning curved sided shapes. Research shows that this product is in accordance with the ADDIE model, meets validity standards with a percentage of 88.17% and 96.53%, is very practical with a practicality level of 94.84%, and is effective in increasing students' understanding with a moderate increase based on the average score N -Gains. Some suggestions in this research include that future researchers can develop E-WORKSHEET by expanding the use of Liveworksheets features such as short entries, long entries, check boxes, word search, drag and drop, and videos from YouTube; develop E-WORKSHEET for materials other than curved sided room construction, according to relevant education levels; Utilizing E-WORKSHEET in mathematics learning to build curved sided spaces with a focus on students who are active in a participatory manner.

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Author Biography

	<p>Halifa Ismaniar is a graduated student the Kuningan University. She graduated in 2024(She is passionate about mathematics education. Author’s research interests lie in mathematics education, media interactive, and development method. She can be contacted at email: halifa.ismaniar@gmail.com</p>
	<p>Sumarni is a lecturer at the Kuningan University. She was appointed lecturer in the university in 2014. She is passionate about mathematics education. Author’s research interests lie in mathematics education, media interactive, qualitative research, and development method. She can be contacted at email: marnie.1205@gmail.com</p>
	<p>Mohamad Riyadi is a lecturer at the Universitas Kuningan. He was appointed lecturer in the university in 2013. He is passionate about analysis mathematics. Author’s research interests lie in applied mathematics education, qualitative research, and development method. He can be contacted at email: mohamad.riyadi@uniku.ac.id.</p>

