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THE PRACTICALITY AND EFFECTIVENESS OF *LIVE WORKSHEETS-BASED* MATH *E-MODULES* TO IMPROVE STUDENT NUMERACY

PRAKTIKALITAS DAN KEEFEKTIFAN *E*-MODUL MATEMATIKA BERBASIS *LIVE WORKSHEETS* UNTUK MENINGKATKAN NUMERASI SISWA

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ABSTRACT

Starting from the lack of students' reasoning level on numerical problems, considering the demands of the times and the independent curriculum where students apply technology and the three indicators of numeracy in learning, there is a need for electronic teaching materials in the form of e-modules based on live worksheets to enhance students' numeracy skills. The purpose of this study was to develop a mathematics E-module based on live worksheets to improve student numeracy that is practical and effective. This research method applies the Instructional Development Institute (IDI) procedural development model which consists of 3 main phases: the define phase, the develop phase, and the evaluate phase. This research is focused on the development phase which covers the practical aspects of the E-module, and the evaluation phase which assesses the effectiveness of the E-module. Meanwhile, the definition phase has been conducted in previous research. The subjects in this study were students of class X PPLG 2 SMK Negeri 7 Batam with a total of 40 students. The instrument used for practicality is using a questionnaire and to see the effectiveness of using an essay test. The practicality test in the teacher response questionnaire was 93% and the student response questionnaire was 86% with a very practical category. E-module effectiveness test based on student post-test results obtained 85% with a very effective category. Thus, the live worksheets-based math E-module to improve student numeracy that has been used is declared practical and effective.
Keywords: E-module, Live Worksheets, Student Numeracy

ABSTRAK

Bermula dari kurangnya tingkat penalaran siswa terhadap soal berbentuk numerasi, mengingat tuntutan zaman dan kurikulum merdeka yang menekankan penerapan teknologi serta tiga indikator kemampuan numerasi dalam pembelajaran, maka dibutuhkan bahan ajar berbentuk elektronik modul (E-modul) berbasis live worksheets untuk meningkatkan numerasi siswa. Tujuan penelitian ini adalah untuk mengembangkan E-modul matematika berbasis live worksheets untuk meningkatkan numerasi siswa yang praktis dan efektif. Metode penelitian ini menerapkan model pengembangan prosedural Instruksional Development Institute (IDI) yang terdiri dari 3 fase utama: tahap penentuan (define), tahap pengembangan (develop), dan tahap evaluasi (evaluate). Penelitian ini difokuskan pada fase pengembangan yang mencakup aspek praktis dari E-modul, dan tahap evaluasi yang menilai efektivitas E-modul. Sementara itu, tahap definisi telah dilakukan dalam penelitian sebelumnya. Subjek dalam penelitian ini adalah siswa kelas X PPLG 2 SMK Negeri 7 Batam dengan jumlah 40 siswa. Instrument yang digunakan untuk praktikalitas adalah menggunakan angket dan untuk melihat keefektifan menggunakan tes uraian.

Uji praktikalitas pada angket respon guru sebesar 93% dan angket respon siswa sebesar 86% dengan kategori sangat praktis. Uji efektifitas E-modul berdasarkan hasil post-test siswa mendapatkan hasil 85% dengan kategori sangat efektif. Dengan demikian E-modul matematika berbasis live worksheets untuk meningkatkan numerasi siswa yang telah digunakan dinyatakan praktis dan efektif
Kata kunci: *E-modul, Live Worksheets, Numerasi Siswa*

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INTRODUCTION

The independent curriculum is a curriculum that provides freedom to choose learning according to the individual needs of students. (Nugraha, 2022). This curriculum is set to be used starting in 2022 by the government. In the independent curriculum, the Ministry of Education and Culture implements a new program, namely the National Assessment (AN). Rohim et al., (2021) explained that AN consists of three parts, namely Minimum Competency Assessment (AKM), Character Survey (SK), and Learning Environment Survey (SLB). One of the aspects in AKM is students' numeracy skills. The Ministry of Education and Culture (2017) explains numeracy is a thinking ability that involves the use of mathematical concepts, procedures, facts, and tools to solve everyday problems in a variety of contexts that are relevant to individuals as Indonesian citizens. There are 3 indicators of numeracy skills according to Kemendikbud, (2017) namely: 1) Can operate various numbers or symbols related to basic mathematical concepts to solve problems in everyday life; 2) Able to analyze information presented in various formats such as graphs, tables, diagrams, and others; 3) Able to interpret the results of the analysis to make predictions and make decisions.

The Program for International Student Assessment (PISA) 2022 showed that Indonesia's numeracy learning outcome ranking rose 5 to 6 positions compared to PISA 2018, which was ranked 69 out of 80 test-taking countries. The test scores showed that the average student score was 359 in reading, 366 in math and 383 in science (OECD, 2023). Based on the PISA results, it can be concluded that student numeracy in Indonesia is low. One of the factors causing low numeracy in Indonesia is that students are not accustomed to solving mathematical literacy problem solving questions that require reasoning, critical thinking, reflective, and creative from content, context, material, and process (Suryapuspitarini. et al, 2018). It is also due to the lack of utilization of technology in learning at school.

In today's digital era, the world of technology is developing very quickly. In line with the current situation in the field of education also requires an increase in learning media to support the efficiency of learning in the classroom (Mulyani & Haliza, 2021). one of the lessons that requires an increase in learning media is mathematics. Teaching materials in mathematics lessons are generally more dominant in mastering mathematical skills. Teaching materials that are intended in addition to presenting mathematical material, must also be able to contain contextual problems that can direct students in handling numeracy cases (Widiantari, 2022). Meanwhile, Indonesian students are not yet good at linking or applying their mathematical knowledge in various situations. Then students are also less able to translate mathematical sentences and symbols, and write or represent the information given (Tasyanti. et al, 2018). Therefore, it can be concluded that students need interesting teaching materials that can be used and easily understood and can improve understanding of mathematical numeracy concepts.

On September 15, 2023, researchers conducted observations and interviews with the aim of knowing the level of understanding of the concept of numeracy in mathematics of students at SMKN 7 Batam. The interview results obtained from Mrs. NH, who is a mathematics teacher at SMKN 7 Batam, stated that in mathematics learning activities, she has implemented learning that uses numeracy concepts. However, many students still cannot imagine how to solve the problem into everyday life.

This is because the use of technology-based teaching materials has not been applied during learning. He also stated that during the teaching and learning process, he only uses ordinary printed modules and has not used interactive learning media, one of which is an electronic module (E-module).

According to Sugianto in the journal Lestari (2022) states that E-Modules are independent learning materials that are systematically arranged and displayed in electronic format, including audio, animation, and navigation. Basically, E-modules are learning materials that are arranged systematically and use language that is easily understood by students according to their level of understanding and age. It allows learners to learn independently with minimal assistance from the teacher (Prastowo, 2014). This is certainly superior to ordinary printed modules which still have shortcomings. The disadvantages of using ordinary printed modules are that students still find it difficult to understand the concept of the material provided. Printed modules are quickly boring to learn, and students have to spend money to print modules, so learning activities are not optimal (Lestari, 2022).

In addition, he also stated that numeracy learning materials are only explained to students who will carry out AKM in the stabilization held at the school. So not all students receive numeracy learning materials at school. The lack of numeracy skills of students of SMK Negeri 7 Batam can also be seen from the report card of SMKN 7 Batam in 2023 in Table 1.

Table 1. Education Report Card of SMKN 7 Batam

No.	Indicator	Report Card Score 2023	Report Card Score 2022	Achievements
A1	**Literacy skills** Percentage of learners based on ability to understand, use, reflect on and evaluate different types of texts (international and fictional texts)	86,67	58,54	Good
A2	**Numeracy skills** Percentage of learners based on ability to think using mathematical concepts procedures, facts and tools to solve everyday problems in a variety of relevant contexts.	64,44	36,59	Medium

Source: Grade X Math Teacher

Based on Table 1, it was found that the numeracy skills of students of SMKN 7 Batam are still medium, where only 64.44% of students can reach the minimum number. In addition to conducting interviews with teachers, researchers also gave questionnaires as a preliminary study to students related to teaching materials and understanding of numeracy concepts. The questionnaire contained ownership of self-learning handbooks, other learning resources, students' knowledge of numeracy, and the need for mathematics teaching materials.

The questionnaire results showed 86.4% of students answered no to the question item "Do you have a handbook to study at home independently?". Then for the question item "Have you understood the three indicators of the numeracy concept?" 54.5% of students answered "no". Furthermore, 90.9% of students agreed with the question item "Do you agree if there is a math E-module that can be accessed anywhere and anytime?". So, from the results of the questionnaire, it can be concluded that students really need interesting teaching materials that can be used and easily understood independently and can improve their understanding of the concept of mathematical numeracy and also their enthusiasm for learning.

One strategy to assist teachers in increasing student involvement and independence and deepening understanding of numeracy concepts in learning is to use learning media. According to Satrianawati (2018) learning media is defined as a means of conveying messages and being able to stimulate the thoughts, attention, and feelings of its users. In addition, learning media also acts as tools and materials used to increase the effectiveness and efficiency of the learning process so that learning objectives can be achieved. Gusmania & Wulandari, (2018) stated that the use of media in teaching is prioritized to improve the quality of learning, especially in the learning process so that students can

understand math lessons. One of the learning media that can be used is an electronic module (E-module). E-modules have several advantages compared to printed modules, namely making it easier for users to include multimedia content such as audio, video, animation, and other features (Rahman, 2021).

One of the E-modules that can be developed is using live worksheets. Live worksheet is an online learning platform that allows teachers to create and share various interactive activities with students (Amalia, Buchori, & Astuti, 2023). One of the advantages of Live worksheets for teachers is its ability to save time and paper usage (Farman et al, 2021). Live worksheets can be accessed easily because they are website-based, making it possible to create interactive online worksheets that can be directly accessed and worked on by students. After working, students can send the results to the teacher (Khikmiyah, 2021).

This research has been conducted previously in the development process up to the stage of producing a valid E-module. This research aims to analyze the level of practicality and effectiveness in improving student numeracy. These live worksheets are in the form of an interactive E-module in which there is material covering the concept of numeracy containing Learner Worksheet (LKPD) questions and interactive Formative Tests so that students no longer need to look for material and questions separately. Therefore, it is expected that this live worksheets-based E-module can be used easily independently at home.

METHODS

This research is a type of development research with the development model referring to the Instructional Development Institute (IDI) procedural model which involves three stages: the definition stage (define), the development stage (develop), and the evaluation stage (evaluate). The steps to carry out the three stages are as follows.

1. Definition stage (define)

   The definition stage and development stage (validation step) have been carried out by providing instruments to material experts and media experts. Material expert instrument validation obtained the results of achieving a total percentage in the content feasibility aspect of 87%, the presentation feasibility aspect of 89% and the language aspect of 87%. Meanwhile, the media experts obtained the results of the total percentage achievement in the media feasibility aspect of 88%. It can be concluded from the results of the instrument material experts and media experts fall into very valid criteria (Riduwan, 2017).

2. Development Stage (develop)

   At this stage, researchers distributed response questionnaires to three teachers and small group of six students. The small group trial was conducted on 6 students who were selected based on the high, medium and low categories in the class. This step was taken to collect data related to the level of practicality of using the E-module. In one of the statements in the student questionnaire instrument, students agreed that the existence of this live worksheets-based E-module can help them understand the material more easily independently. Students also agree that this live worksheets-based E-module improves their understanding in working on numerical problems on the material of linear equations of two variables. Based on the above statements, many students feel that this live worksheets-based E-module is practical to use. In addition, teachers and students were asked to provide feedback as a basis for making the second revision based on the responses given by them. Learning media based on live worksheets to improve students' mathematical numeracy skills can be declared practical if the results of the degree of achievement from student and teacher questionnaires are included in the percentage of 80-89 with the practical category (Hartanto, 2020). If it is not practical, then revisions will be made according to the suggestions of the respondents.

3. Evaluation stage (Evaluate)

   Test the effectiveness of the media (product) using the test method by giving a post-test after students have finished using the learning media in the field trial. Making the test refers to the math numeracy test grid which includes 3 numeracy indicators. The number of items in the post-

test is 6 essay test that refer to the basic competencies in learning math numeracy. Learning media based on live worksheets to improve math numeracy at SMK Negeri 7 Batam can be declared effective if the learning outcomes of math numeracy from the post-test results obtain minimum classical completeness (KKM), namely ≥70 effective category (Widyoko, 2017).

The instrument used to collect practicality data in this study is a teacher and student response questionnaire. Meanwhile, to obtain effectiveness data, a post test was conducted in the form of an essay test in accordance with the trial material. The practicality response questionnaire from the teacher consists of 10 statements, of which 3 statements aim to assess the material aspect and 7 statements to assess the media aspect. While the response questionnaire from students consists of 9 statements, with 3 statements to assess the quality of content and objectives, 2 statements to assess technical quality, and 4 statements to assess learning quality. Furthermore, effectiveness data is obtained from the results of the post test in the form of description questions according to the trial material of linear equations of two variables consisting of 6 questions.

One way to process the questionnaire data on practicality can also be seen from the Degree of Achievement (DP) which can be calculated using the following formula (Hartanto, 2020).

$$DP = \frac{\sum X}{n \times \sum item \times \text{highest scale}} \times 100\% \quad \text{.....(1)}$$

Description:
DP = Degree of achievement
$\sum X$ = Total score of measurement results
n = Number of samples
$\sum item$ = Number of instrument items

The highest scale in the formula above is the highest scale of the instrument used, which is 4 based on a modified Likert scale based on Table 2. The degree of achievement categories can be seen in Table 2.

Table 2**.** Expert Validity Test Assessment Criteria

Percentage of Degree of Achievement (% DP)	Category
90 – 100	Very Practical
80 – 89	Practical
65 – 79	Quite Practical
55 – 64	Less Practical
0 – 54	Not Practical

Source: Hartanto, (2020)

Learning media based on live worksheets to improve student numeracy can be declared practical if the results of the degree of achievement of the student and teacher questionnaires are included in the percentage of 80-89 with the practical category. For student numeracy test results, it will be calculated using the following formula (Arikunto, 2010):

$$\text{Final Grade} = \frac{\text{Sum of Acquisition Scores}}{\text{Total Maximum Score}} \times 100\% \quad \text{.....(2)}$$

The scores obtained were converted to obtain numerical test scores. Data on the level of effectiveness of interactive learning media is obtained through student test scores and based on the KKM which is 70. After assessment, student numeracy scores are classified based on the value intervals presented in Table 3.

Table 3. Interpretation of Numeracy Score

Value Interval	Category
$x \leq 40$	Low
$40 < x \leq 70$	Medium
$70 < x \leq 100$	High

Source: Yustinaningrum, (2023)

Next, the data was measured for effectiveness using the following formula for the percentage of class completeness:

$$\text{Percentage of Class Completion} = \frac{\text{Total Number of Students Who Obtained} \geq 70}{\text{Total Number of Students}} \times 100\% \quad \text{.....(3)}$$

The study result data was then calculated and then converted into the product effectiveness level based on Table 4.

Table 4**.** Criteria for Product Effectiveness Level

Criteria Interval	Criteria
$p > 80$	Highly Effective
$60 < p \leq 80$	Effective
$40 < p \leq 60$	Effective Enough
$20 < p \leq 40$	Less Effective
$p \leq 20$	Ineffective

Source**:** Widyoko (2017)

Learning media based on live worksheets to improve student numeracy can be declared effective if the post-test results obtain minimum classical completeness (KKM) in the effective category.

RESULT AND DISCUSSION

The mathematics e-module that has been said to be valid by material experts and media experts, then seen its practicality through trials. The product trial was carried out in January 2024 on the subject of the system of linear equations of two variables. In this study, the trial was carried out by distributing the link https://bit.ly/emodulliveworksheets to open the live worksheets-based math E-module to teachers and students. E-modules were used in two learning meetings with math teachers. After using the E-module, a questionnaire was given to 3 mathematics teachers and 6 students of class X PPLG 2 at SMK Negeri 7 Batam. The response questionnaire uses a Likert scale with a maximum score of 4 which means strongly agree and a minimum score of 1 which means strongly disagree.

The results of teacher and student responses to the live worksheets-based math E-module learning media to improve student numeracy can be seen in Table 5 and 6. From table 5, it can be seen that the teacher's response to the live worksheets-based math E-module developed reached a percentage of 93% with a very practical category. So that this live worksheets-based math E-module is suitable for use as learning media. While in table 6, it can be seen that students' responses to the live worksheets-based math E-modules developed reached a percentage of 86% with a very practical category. Thus, this live worksheets-based math E-module is feasible to be used as a learning media.

Table 5**.** Percentage of Teacher Response Questionnaire to E-modules

Number	Aspect	Item Number	Validator		
			1	**2**	**3**
1	Material	1	4	4	3
		2	4	4	3
		3	4	4	3
		4	4	4	3
2	Media	5	3	3	3
		6	4	4	3
		7	4	4	3
		8	4	4	3
		9	4	4	3
		10	3	3	2
Amount			39	40	32
Total Score			111		
Total Maximum Score			120		
Degree of achievement			93%		
Practicality Level Category			Very Practical		

Table 6. Percentage of Student Response Questionnaire to E-modules

Number	Aspect	Item Number	Validator					
			1	**2**	**3**	**4**	**5**	**6**
1	Quality of Content and Purpose	1	3	4	3	3	3	3
		2	3	4	4	3	4	4
		3	4	3	3	3	4	3
2	Technical Quality	4	4	4	3	4	4	4
		5	3	3	3	4	4	4
		6	3	4	4	4	4	3
3	Quality of Learning	7	3	3	4	3	3	4
		8	3	3	3	4	4	3
		9	3	3	4	3	3	3
Amount			29	31	31	31	33	31
Total Score			186					
Total Maximum Score			216					
Degree of Achievement			86%					
Practicality Level Category			Very Practical					

Some things that make a product practical are that the media made has the advantage of being easy to use. According Andriyani et, al, (2020) The live worksheet application is provided free of charge by the search engine provider, Google. This application allows educators to convert traditional printable worksheets, such as documents, PDF, JPG, or PNG, into online exercises. According to Sholehah (2021), some of the advantages of the features available in live worksheets include: 1) Ability to display videos from YouTube. 2) The facility to create questions either in the form of essays or fill-in columns as well as multiple choice questions that are answered by clicking on the correct option. 3) A feature to create questions that allow learners to pair existing answer options into the appropriate column. 4) Option to create matching questions using arrows, as well as questions and answers that use audio. 5) Ability to check and correct learners' answers by circling, crossing out, boxing, lining up, and adding comments to their answers.

After obtaining a practical E-module, the next step is to see the effectiveness of the E-module that has been developed. The effectiveness test was conducted on a large class of X *Pengembangan Perangkat Lunak dan Gim* (PPLG) 2 students at SMK Negeri 7 Batam, totaling 40 students. Students use the E-module individually where students can immediately work on sample questions and formative tests independently. During the trial, students can use the E-module well, only constrained by the internet which is sometimes slow when used. The learning outcomes test was used to assess the improvement of students' learning outcomes after using the developed E-module (Retno, et al, 2021). This opinion is reinforced by (Fransisca, 2017) theory which states that the effectiveness aspect can be tested through student learning outcomes tests. The students were given a post-test question containing 6 numeracy description questions to find out the students' numeracy results. The students' post-test results are presented in Table 7.

Table 7. Student Post Test Results

Value Interval	Number of students	Category
$x \leq 40$	0	Low
$40 < x \leq 70$	6	Medium
$70 < x \leq 100$	34	High

From Table 7, there were 34 students who passed and 6 students who did not pass from a total of 40 students who took the post-test. The results of the effectiveness test of the live worksheets-based mathematics E-modules developed reached a percentage of 85%, categorized as very effective. Thus, it is proven that the use of E-modules based on live worksheets is very effective to improve students' numeracy in the learning process.

The arrangement of the E-module material that has been developed follows the assessment of 3 numeracy indicators obtained from various sources of school books and modules. The following development products are presented in Figure 1 and Figure 2.

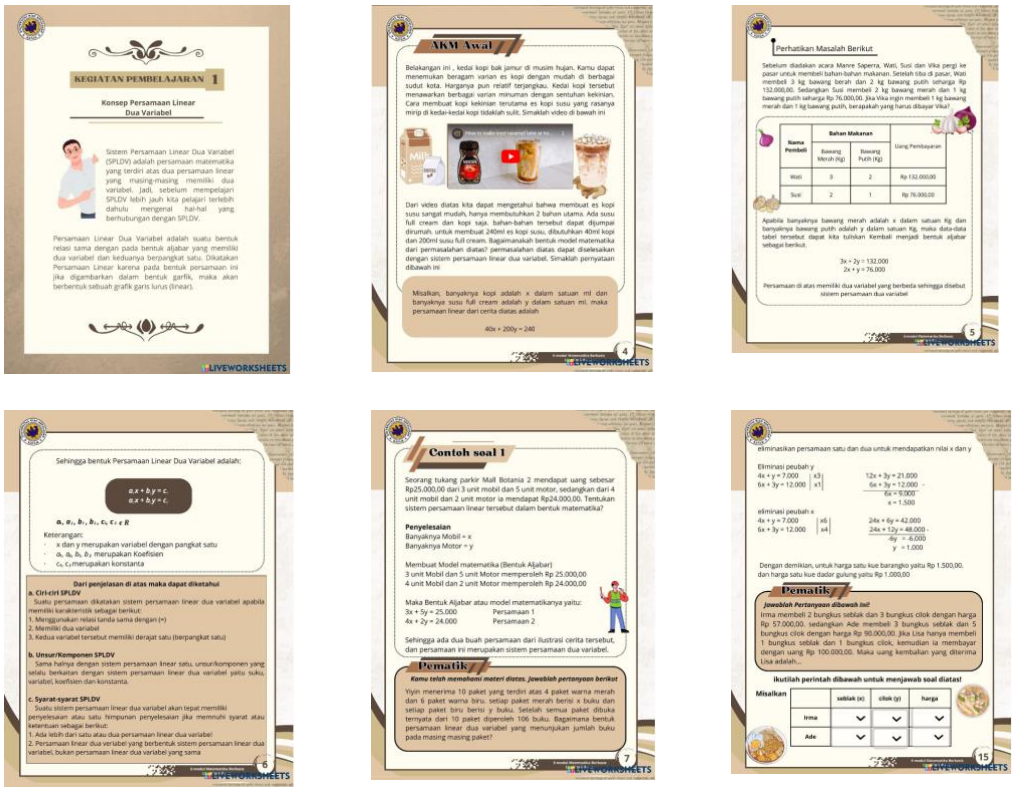

Figure 1. Content of Material Discussion on E-modules

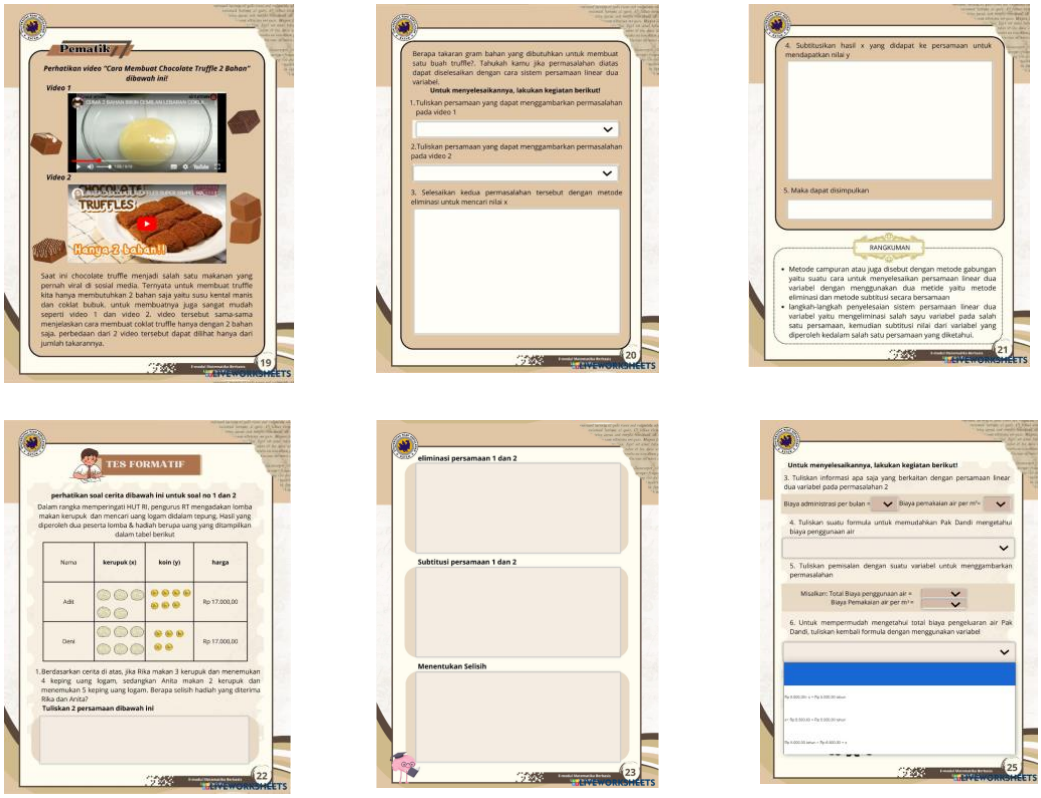

Figure 2. Sample Questions and Formative Tests on E-modules

As can be seen from Figures 1 and 2, there are questions and answer columns, each of which must be filled in by students following the direction of the question instructions. Based on the material and formative questions provided, it can help students to examine further to answer the questions of the existing problems. Overall, the results obtained above show that the live worksheets-based math E-module to improve student numeracy meets media feasibility based on effectiveness, and practicality. These results are in line with the research of Septonanto et al. (2024) which states that the results of validity research from teaching material experts, practitioners, and student responses and teacher responses after making improvements to E-LKPD can be declared suitable for use.

CONCLUSION

Based on the results of the research conducted, it can be concluded that:

1. The live worksheets-based mathematics e-module developed to improve student numeracy is practical to use with the percentage of practicality achievement in teacher questionnaires 93% and student questionnaires 86% with a very practical category.
2. The live worksheets-based math e-module developed to improve student numeracy is effective with the number of students who score above the KKM of 70 as many as 34 students out of 40 students obtaining a degree of achievement of 85% with a very effective category.

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