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Developing Interactive Electronic Student Worksheets through Discovery Learning and Critical Thinking Skills during Pandemic Era

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Abstract: *The pandemic period forces the teaching and learning process to be carried out online. However, most of the teaching materials are still in the form of those used in pre-pandemics and, therefore, are irrelevant to use. Therefore, educators need alternative teaching materials suitable to support online learning in a pandemic. For this reason, this study aims to produce interactive electronic student worksheets for junior high school students based on discovery learning and oriented towards quality critical thinking skills in terms of validity, practicality, and effectiveness. The development model used is ADDIE, which consists of analysis, design, development, implementation, and evaluation stages. There are a number of research and development instruments used. It consists of electronic student worksheets validation by material and media experts, electronic student worksheets by students, pretest questions, and posttest questions. The results showed that the electronic student worksheets developed were declared feasible in terms of their validity, practicality, and effectiveness. The validity of electronic student worksheets is indicated by the average score of 3 material and media expert validators, each of which falls into the valid and very valid categories. The practicality of electronic student worksheets is evidenced by the average score of student assessments which fall into the very practical category. At the same time, its effectiveness is indicated by an increase in students' critical thinking skills after being given treatment using electronic student worksheets.*

INTRODUCTION

Critical thinking skills are high-level thinking skills that are part of 21st-century skills (As'ari, Kurniati, & Subanji, 2019; Spector & Ma, 2019; Zetriuslita, Wahyudin, & Dahlan, 2018; Yılmaz-Özcan & Tabak, 2019; Almulla, 2018). Furthermore, this ability is not an innate ability, so that it can be developed through a structured learning experience (Peter, 2012; Udi & Amit, 2011; Wale & Bishaw, 2020; Demirci & Özyürek, 2017; Dekker, 2020). In addition, this ability is important to have because it is considered valuable across disciplines (Spector & Ma, 2019). Therefore, it takes learning that is oriented to the ability to think critically to be implemented in teaching and learning activities.

In the process of critical mathematical thinking, students will make statements related to the problems faced and connect existing problems with knowledge and experience (Widyatiningtyas, Kusumah, Sumarmo, & Sabandar, 2015). Learners who think critically will always monitor their own thinking to ensure that no conclusion or solution is given prematurely (Chikiwi & Schäfer, 2018). Critical thinking generates critical action (Dekker, 2020) and enables students to synthesize, analyze, and assess their thoughts, beliefs, and actions (Demirci & Özyürek, 2017). Thus, it can be said that critical mathematical thinking is the systematic ability to combine initial knowledge, mathematical reasoning skills, and the ability to apply cognitive strategies in solving mathematical problems.

However, there is no effort made by the teacher to develop students' critical thinking skills (As'ari, Mahmudi, & Nuerlaelah, 2017). Teaching practice to develop critical thinking skills is still relatively limited (Almulla, 2018). Most students are rarely given the opportunity to practice their critical thinking skills in learning (Noer, 2018). As a result, 65.7% of teachers reported that their students' critical thinking skills were underdeveloped (Almulla, 2018). Therefore, it takes a comprehensive effort made by the teacher to facilitate learning that supports critical thinking skills, one of which is by providing teaching materials that are oriented towards this ability.

Mathematics learning that can build and develop students' mathematical critical thinking skills is learning designed to activate students by engaging them with non-routine problems, then encourage them to solve them both individually and in groups (Widyatiningtyas, Kusumah, Sumarmo, & Sabandar, 2015). Learning environments that actively involve students in investigating information and applying knowledge will improve critical thinking skills (Peter, 2012; Noer, 2018). Asking possible assumptions from incomplete information problems can help students develop critical thinking skills (As'ari, Mahmudi, & Nuerlaelah, 2017). Thus, the ability to think critically requires individuals not only to observe conditions as shown but also to question and make conclusions.

Given the current conditions of the Covid-19 pandemic, all learning activities are being carried out online. In online learning, it is recommended to use the asynchronous model, where students do not have to be online at the same time so that students can carry out learning activities at any time (Tanujaya, Prahmana, & Mumu, 2021). This is done to anticipate any disruption to the internet connection of each student. Thus, to support the asynchronous model, teaching materials are needed for students. The teaching materials developed are electronic teaching materials because of the current conditions where learning is online. In addition, the teaching material is interactive design so that students understand the material more easily because, at this time, it requires maximum learning independence. So that two-way communication can occur, namely between teaching materials and students. In order for the teaching material to be more interactive, instructors can add images, videos, and Google forms.

One alternative that can be used to support these situations and conditions is the use of interactive electronic student worksheets, discovery learning-based and oriented to critical thinking skills. Discovery learning is the right model for achieving direct student involvement in the learning process, consisting of six stages, namely stimulation, problem identification, data collection, data processing, verification, and drawing conclusions (Aziz, Tarmedi, & Kusmarni, 2018; In'am & Hajar, 2017). Discovery learning is useful for generating objective attitudes, curiosity to solve problems well, and thinking critically (Ramdhani, Usodo, & Subanti, 2017). Discovery learning on electronic student worksheets is an approach that will focus on learning activities. Students are directed to find mathematical concepts. Thus, the position of discovery learning is in its learning activities. Electronic student worksheets do not only contain material and questions. There must also be learning activities such as finding formulas, finding patterns, and many more. In electronic student worksheets, the portion of learning activities must be greater than the portion of the material.

Based on the above reasons, it is necessary to develop interactive teaching materials that can be used to facilitate students in developing critical thinking skills during a pandemic like this. The teaching materials developed in this study are interactive electronic student worksheets combined with discovery learning to develop students' critical thinking skills.

RESEARCH METHODS

This research is development research using the ADDIE model, which aims to develop valid, practical, and effective electronic student worksheets. There are five stages in the development process, namely the analysis, design, development, implementation, and evaluation stages (Branch, 2009). The analysis phase includes analysis of student needs, curriculum analysis, analysis of student characteristics, and analysis of work plans. Furthermore, the design stage includes the preparation of the initial design of electronic student worksheets that are adjusted to the results of the analysis, the instruments needed, and the determination of the validator. Meanwhile, the preparation of electronic student worksheets and validation is included in the development stage. At the implementation stage, researchers carry out several activities that are implemented to students in teaching and learning activities, including implementing the pretest, trial of electronic student worksheets, posttest, and assessment of electronic student worksheets. Finally, the evaluation stage includes assessing the results of the analysis of validity, practicality, and effectiveness, as well as making improvements to electronic student worksheets. For more details, we can see the development procedure carried out in this study in Figure 1.

The population used in this study were grade VII students from one of the state junior high schools in the Selman district. Furthermore, the selected research sample was 27 students of class VII B

from the school, which would later be used as a large-scale trial class. Meanwhile, for the small-scale trial sample using six students taken from classes VII A, VII C, VII D, VII E, and VII F.

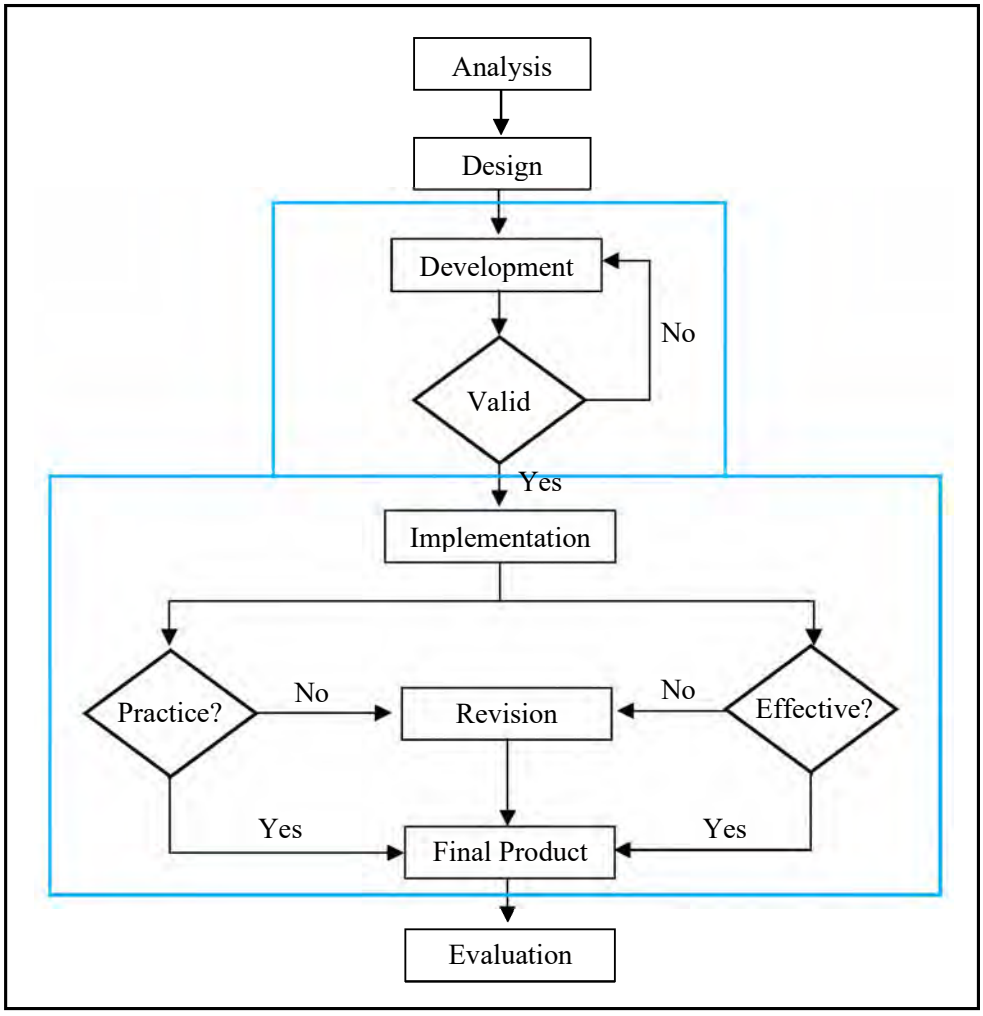


Figure 1: Development Procedure with the ADDIE Model (Branch, 2009)

Data collection techniques consisted of non-test techniques and test techniques. Non-test techniques use interview sheets, observation, and questionnaires. The test technique used the pretest and posttest questions. The data collection instrument was in the form of a questionnaire consisting of validation sheets for electronic student worksheets by material experts, validation sheets for electronic student worksheets by media experts, and assessment sheets for electronic student worksheets by students. Validation sheets for electronic student worksheets by material experts and validation sheets for electronic student worksheets by media experts were used to

obtain validity data. The student's electronic student worksheets were used to obtain practical data. The pretest and posttest instruments were used to obtain the effectiveness data.

The data analysis technique consisted of both qualitative and quantitative data analysis. In quantitative data analysis, all validity, practicality, and effectiveness analyses were carried out. The validity analysis was carried out by calculating the average validation score, followed by looking at the validity category based on the average validation score. The practicality analysis was carried out by calculating the average student assessment score, followed by looking at the practicality category based on the average student assessment score. The guidelines for determining the classification of criteria for categorizing validity and practicality are on a scale of five (Widoyoko, 2018). Meanwhile, the effectiveness analysis was carried out by processing the pretest and posttest values with SPSS to see the value of paired samples test. If the value of paired samples test > 0.05, then *H0* is accepted, so the electronic student worksheet is not effective in terms of students' critical thinking skills and vice versa. $H0$ is the condition where means of pretest score equal with means of the post-test score ($\mu pre = \mu pos$), so that there is no significant difference between the mean pretest and post-test scores.

Next, consider the pre (mean pretest) and post (mean posttest) scores. If mean pretest > mean posttest, it means there is a significant decrease between the average value of students' critical thinking skills before and after using electronic student worksheets. It shows that electronic student worksheets are not effective in terms of students' critical thinking abilities and vice versa. Finally, pay attention to the N-Gain value to determine the category of change/increase that occurred. The formula is used to obtain the N-Gain value (Hake, 1999).

RESULTS AND DISCUSSION

a) Analysis Stage

The analysis stage is the initial stage before designing electronic student worksheets. At this stage, analysis of student needs, curriculum, student characteristics, and work plans is performed. The analysis purposed is to develop a student worksheet that suits your needs.

Student Needs Analysis

Observations have been made by interviewing, filling in both the teacher's need analysis sheet and the students' observation sheet. This activity is intended to find out existing problems and students need to solve these exercises based on the teacher's and student's point of view. Based on observations, we found that the average score of students' daily tests and mid-term mathematics exams had not yet reached the minimum qualification score. Furthermore, the learning activities oriented towards developing critical thinking skills have been done through question exercises but

not routinely. Lastly, the teacher has never made interactive teaching materials, and teachers want students always to have an interest in learning mathematics.

During the pandemic, it is difficult to measure the student's understanding and participation on the material delivered. According to the teacher's opinion, the existing obstacles can be overcome by the use of computer technology, such as the use of interactive electronic teaching materials. At least teachers can find out who has completed the assignment and be able to monitor students' activities in it.

As many as 86.7% of students are agreed if they can have a mathematics learning medium using a computer. Furthermore, 70% of students enjoy learning mathematics using computers, and 60% prefer learning to use computers compared to textbooks. On the other hand, 100% of students use laptops/computers to make assignments, and 63.3% have sought information related to lessons using computers. In addition, 90% of students think learning mathematics using computer assistance can help them understand the material. Lastly, 73.3% of students considered learning mathematics using computer assistance to overcome difficulties, and 83.3% of them often study independently at home.

Teachers are interested in using supporting media such as computers in learning mathematics, especially since schools have complete facilities. The teacher views computer technology as important and needs to use in mathematics learning. Learning mathematics needs to have various interactive electronic teaching materials in order to keep students engaged. The teacher wishes to have the ability to design computer-assisted learning media. Teachers have often made electronic teaching materials for learning mathematics in pdf and documents. However, until now, they have never developed interactive electronic teaching materials. This is because of the abundance of paper materials, limited time to develop teaching materials, demands for maximum learning outcomes, and teachers' limited ability to develop it. Besides, schools do not yet have experts in the design of instructional media (computers), such as interactive electronic teaching materials.

We can conclude from the previous observations that teachers and students alike require interactive electronic teaching materials for mathematics learning. Teachers and students consider how to overcome difficulties in mathematics by utilizing computer assistance. Additionally, students desire novel and interactive teaching materials that incorporate computers/laptops. However, teachers have never developed interactive electronic teaching materials that utilize laptops/computers due to limited time and abilities. Additionally, given that the teacher has provided opportunities for students to develop their critical thinking skills, but not consistently, teaching materials with a critical thinking orientation are required to provide students with additional opportunities to develop their critical thinking skills. As a result, the development of electronic teaching materials that are interactive and geared toward critical thinking skills is necessary.

Curriculum Analysis

From the interviews with teachers, we found that students often experience difficulties in social arithmetic material, for example the concept of interest rate. The teacher assumes that the problem occurs because students have never experienced activities related to it directly. Therefore, they suggest that real examples are needed to help students understand it. One of which is using learning tools that can take an essential role in making real examples to be presented to students.

The researcher's results examining the syllabus and lesson plans show that the school uses the 2013 curriculum. Core Competencies (CC), Basic Competencies (BC), and learning approaches/methods/models are following the 2013 curriculum. In the 2013 curriculum, student-centered learning requires students to be actively involved in learning activities. One approach that can facilitate students to be actively involved in learning activities is discovery learning. Moreover, discovery learning is one of the approaches recommended in the 2013 curriculum.

We develop student worksheets with social arithmetic material based on discovery learning syntax. It requires strong student activeness participation during learning activities to comply with the 2013 curriculum. Core Competencies (CC), Basic Competencies (BC), and Competency Achievement Indicators (CAI) are per the 2013 curriculum. The needs analysis curriculum is in Table 1.

The 2013 Curriculum's Competencies	Needs Analysis	Electronic Student Worksheets
Core Competencies (CC)	Students have a curiosity about science.	The presentation of electronic student worksheets is following discovery learning syntax.
Basic Competencies (BC)	Students can recognize and analyze various social arithmetic situations (sales, purchases, discounts, profits, losses, single interest, percentage, gross, net, tare).	In electronic students, worksheets contain problem statement activities (problem identification) to train students to understand a problem. Problem identification activities are part of the discovery learning syntax.
	Students can solve problems related to social arithmetic (sales, purchases,	The electronic student worksheets contain practice questions related to

	discounts, profits, losses, single interest, percentage, gross, net, tare).	advantages, disadvantages, and percentages; single flower; discount; as well as gross, net, and tare.
Competency Achievement Indicators (CAI)	Students are active in learning	The presentation of material on electronic student worksheets is following discovery learning syntax to find concepts independently. Electronic student worksheets are made interactive; all activities are in Google forms. Also, we provide a complaint box to facilitate students' challenges when learning.

Table 1: Curriculum Analysis

Analysis of Student Characteristics

Class VII students are in the age range 12-14 years, information obtained from the teacher at the interview time. At this time, the age range of 12-14 years is used to properly operate cellphones, laptops, and computers. Based on the results of observations through observation sheets that are shared with students via Google Forms, it is found that 70% of students enjoy learning mathematics using computers. Also, as many as 60% of students prefer to learn using computers rather than textbooks. Therefore, it can be concluded that grade VII students are very close to technology, especially in laptops and computers.

Work Plan Analysis

Researchers created the work plan are as follows:

a. setting development goals,
b. compiling a student worksheet design,
c. compiling the necessary instruments and validating,
d. testing the validity of electronic student worksheets,
e. testing electronic student worksheets on small and large-scale classes,
f. testing the practicality and effectiveness of electronic student worksheets, and
g. evaluations.

b) Design Stage

At the design stage, we design electronic student worksheets based on the analysis results. Electronic student worksheets are designed based on discovery learning syntax. They contain

stimulation activities, problem statements, data collection, data processing, verification, and generalization. Electronic student worksheets are designed with critical thinking orientation to contain activities that train students to interpret, analyze, evaluate, infer, explain, and self-regulation. The design of electronic student worksheets is in Figure 2.

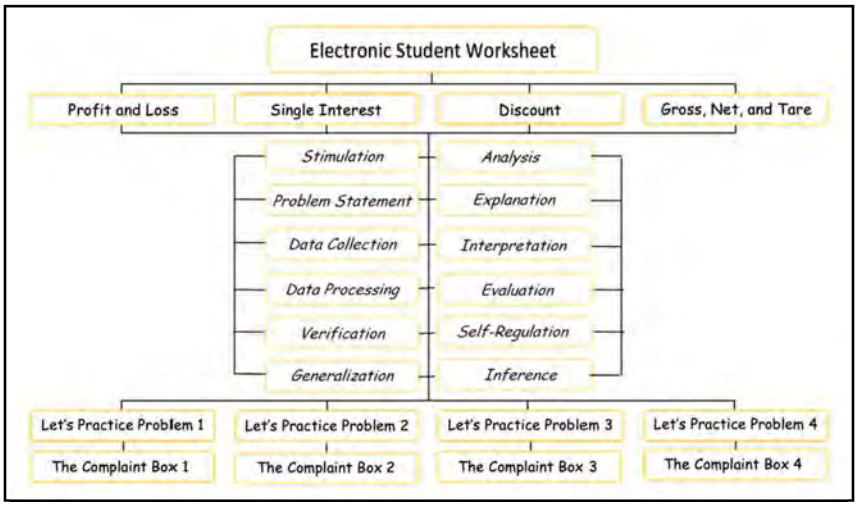


Figure 2: Design of Electronic Student Worksheets

Figure 2 shows that the electronic student worksheets design contains material and evaluation (in practice questions). Electronic student worksheets include activities to understand the concept of gain, loss, percentage, single interest, discounts, gross, net, and tare activities. It also includes exercises as well as a complaint box. The presentation of material in each activity is adjusted to the discovery learning syntax and critical thinking indicators to encourage students to discover concepts independently actively. Such activity is in line with In'am & Hajar (2017) and Ramdhani, Usodo, & Subanti (2017), which state that discovery learning encourages students to take an active role during learning activities. Also, as in Ramdhani, Usodo, & Subanti (2017), researchers did not deliver the material in the final form. We encourage students to identify the problems and also the mathematics concepts by looking for information themselves, compile what is already known and understood in the final form, following the principle of discovery learning.

After students can find the concepts, the evaluation activity continues by doing practice questions. We adjust the instructions for working on and practicing questions to the critical thinking indicator. The process of adjusting instructions in the work and practicing problems is constructed based on the indicators of critical thinking. This process is started by reviewing literature related to this indicator, designing questions that have these skill indicators, implementing them in student worksheets made as part of sample questions, practice questions, and learning evaluations, and finally validating them to the experts. Furthermore, at the end of each exercise, a complaint box is

provided. We also offered a complaint box to facilitate students to express various difficulties so that the teacher can immediately find out. All activities in electronic student worksheets are connected to Google Forms so that the teacher can immediately recognize students' activeness in learning.

In this study, in addition to electronic student worksheets, we prepare several instruments, including test instruments (pretest and posttest questions) and various instruments needed in the development of electronic student worksheets. It includes validation sheets for electronic student worksheets by material experts, validation sheets for electronic student worksheets by media experts, and students' electronic student worksheets.

We used the pretest instrument to determine students' initial abilities before using electronic student worksheets. Meanwhile, we used the post-test instrument to determine students' abilities after using electronic student worksheets. Both material and media experts used the validation sheet of electronic student worksheets to measure the validity of electronic student worksheets, based on each experts' point of view. Students used assessment sheets of electronic student worksheets to see the practicality of electronic student worksheets based on students' points of view. The validator reviewed all instruments used. The names of the validators and their roles are in Table 2.

Validator	Description
Dr. Andriyani, M.Si. (Validator 1)	Validation of material expert instruments (Validation Sheet for Electronic Student Worksheets by Material Experts) Validation of media expert instruments (Validation sheet electronic student worksheets by Media Experts) Validation of student response instruments (Student's Electronic Student Worksheets)
Dr. Puguh Wahyu Prasetyo, S.Si., M.Sc. (Validator 2)	Validation of pretest question instruments Validation of posttest question instruments Validation of electronic student worksheets as material experts Validation of electronic student worksheets as media experts
Prof. Dr. Ir. Dwi Sulisworo, M.T. (Validator 3)	Validation of electronic student worksheets as media experts
Dr. Riawan Yudi Purwoko, S.Si., M.Pd. (Validator 4)	Validation of electronic student worksheets as material experts

Dr. Sri Adi Widodo, M.Pd. (Validator 5)	Validation of electronic student worksheets as media experts
Sisi Pitriyana, M.Pd. (Validator 6)	Validation of electronic student worksheets as material experts

Table 2: List of Validators

c) Development Stage

At this stage, electronic student worksheets we developed according to the design that we made. At first, we created the design in Microsoft Word 2013, and then we made a version in pdf format. Then we uploaded it to flip professional and published it in ".exe" format. To produce interactive electronic student worksheets with pictures, videos, audio, and Google Forms help, we design images and videos with the Canva application.

The next step is to prove their validity. Media experts and material experts measure validity using validated instruments. The evaluation of the validity of electronic student worksheets by material experts with 28 statement items is in Table 3.

Aspects	Score		
	Validator 2	Validator 4	Validator 6
Content Quality and Purpose	59	56	55
Instructional Quality	63	55	55
Total	122	111	110
Average		114,3	
Validity Category		Valid	

Table 3: Recapitulation of the Validity Assessment of Electronic Student Worksheets by Material Experts

The validity evaluation by media experts is in Table 4.

Aspects	Rating Score		
	Validator 2	Validator 3	Validator 5
Quality of Content	17	18	16
Suitability of Learning Design	13	13	11
Motivation	4	4	4
Design Overview	40	36	44
Usage Interactions	13	15	13
Accessibility	13	13	15
usability	17	17	16

Standard Adjustments	5	5	4
Total	122	121	123
Average		122	
Validity Category		Very Valid	

Table 4: Recapitulation of the Validity Assessment of Electronic Student Worksheets by Material Experts

The average score of the three material expert validators shows that electronic student worksheets are in the valid category. The average scores of the three media expert validators indicate that electronic student worksheets are in the very valid category so that the quality of electronic student worksheets is considered valid and worthy of being viewed from the point of view of material experts and media experts.

At this stage, we revised the questionnaire instruments, test instruments, and electronic student worksheets based on validator input. The validator's product validation process produces data on the results of the assessment of electronic student worksheets and input for improvement. The following are some of the input from the media expert validator, which was used as material to improve electronic student worksheets by the researcher.

1. The validator suggested creating instructions for using electronic student worksheets entirely and clearly. The researcher added a video tutorial button using electronic student worksheets that connect to YouTube.
2. The validator suggests replacing the back sound with a dialogue/conversation voice. Researchers changed the sound of the back sound in videos 1, 2, and 3 with a female conversation voice. We then change the male into a female image.
3. The validator recommends that the command sentences' writing on pages 11, 12, 13, 16, 25, 26, 27, 30, 40, 41, 42, 52, 53, and 54 be clarified. Researchers change the word "above" with the specific page in question. We also made improvements to other pages. An example of writing a command sentence revision is in Figure 3.

The validator recommends that the audio on pages 20, 35, 47, and 57 be clarified. We used audio on pages 20, 35, 47, and 57 to convey instructions on students' practice questions. However, because it seemed unclear its usefulness, the researchers removed the audio. The instructions for completing the practice questions are only in Google Forms, which connects to the box provided to answer.

4. The audio sound on the complaint boxes pages 21, 36, 48, and 58 is too low to hear. Also, students can't see the form of motivation on the electronic student. The researcher replaced the clearer audio and added motivational sentences provided in Figure 4.

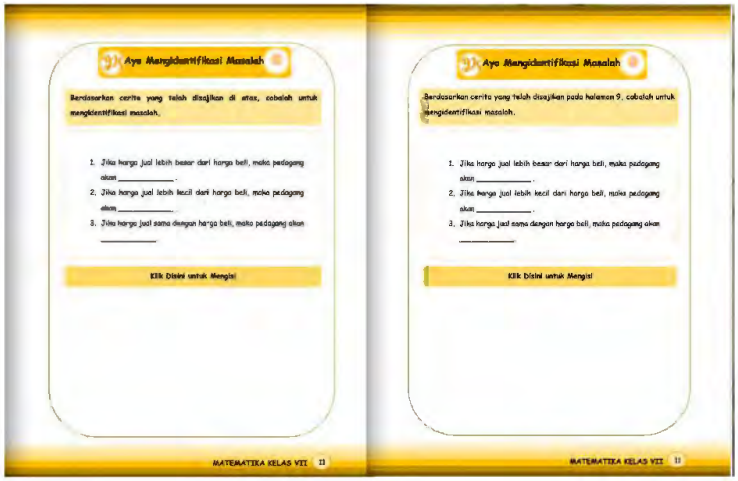


Figure 3: Before (Left) and After Revision of Writing Command Sentences (Right)

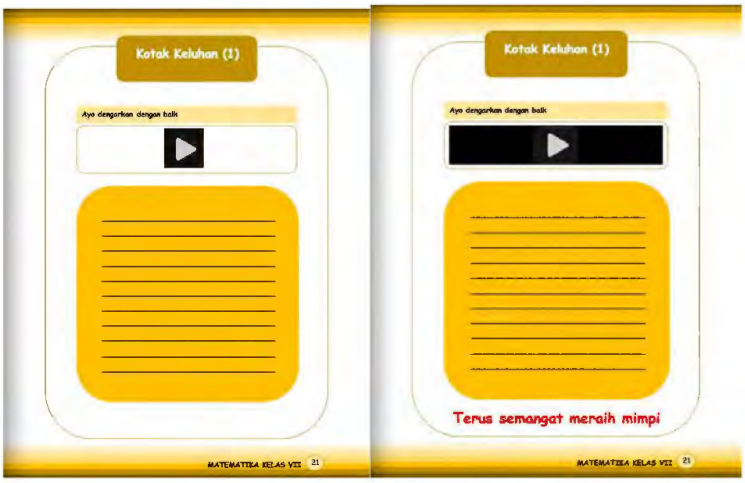


Figure 4: Before (Left) and After Audio Revision and Adding the Motivation Quote (Right)

5. Students will find it difficult to do activities using Google Forms. The validator suggests looking for a more practical step. The researcher added the command in Google Forms to take photos related to the results of activities. They sent the photos to researchers. Because the data obtained will be used again in the next activity. The revision results are in Figure 5.

Figure 5: Before (Left) and After Revision Adding Commands for Taking Photos of Activity Results (Right)

As a result of the limited knowledge of researchers regarding critical thinking indicators, these indicators are not visible in the pictures and stories presented in electronic student worksheets. So that indicators from Ennis (2011) are challenging to achieve in electronic student worksheets. The validator suggested that this deficiency be replaced by providing instruments to measure critical thinking skills to students during field trials. The input has been implemented according to the ability of the researcher.

We used the input of material expert validators as material for improving electronic student worksheets by researchers, namely the addition of detailed instructions on how to work on questions in Google Forms related to practice problems on pages 20, 35, 47, and 57. Researchers add instructions for working on exercises in Google Forms according to critical indicators thinking, as shown in Figure 6. Also, there is another input from one media expert validator. However, we did not use it to improve electronic student worksheets due to the researcher's limited time. At that time, the validator provided the validation results one day before implementing the trial on a large-scale class.

In addition to revisions to electronic student worksheets, there were revisions to the assessment sheets for electronic student worksheets by students, validation sheets for electronic student worksheets by material experts, validation sheets for electronic student worksheets by media experts, pretest, and posttest instruments based on validator input.

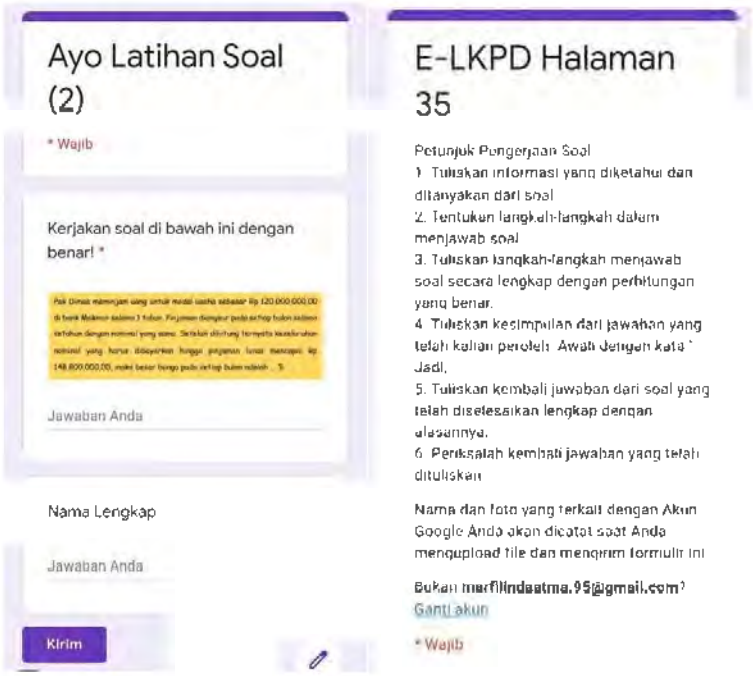


Figure 6: Before (Left) and After Revision of Work Guidelines (Right)

d) Implementation Stage

Electronic student worksheets that have been declared fit for use by the validator and have been valid, we can test them on a large-scale class. However, before being tested on a large-scale class, electronic student worksheets are first tested on a small-scale class as part of the research methodology used in this research. Teachers from Class VII A, C, D, E, and F randomly select six students by the teacher. We allow them to take part in learning activities using electronic student worksheets. After gaining a learning experience with electronic student worksheets, we require them to fill out electronic student worksheets by Google forms, including writing impressions related to electronic student worksheets.

After reviewing the assessment results and the impressions of the small-scale trial class students, there has not been any significant problem with the use of electronic student worksheets. Researchers did not improve electronic student worksheets based on students' points of view in small-scale trials. Indeed, there was an unsatisfactory student assessment, and small-scale trial class students did not have time to try all the facilities in electronic student worksheets. It affects students' assessment of electronic student worksheets. After implementing the small-scale trial class, we implement it for the large-scale trial class.

We implement activities in the large-scale trial class with 31 students. Researchers used electronic student worksheets and 31 students in learning activities as the primary focus at the implementation time. All activities carried out by students during the lesson are centered on electronic student worksheets. We provide the details of the implementation of activities in the large-scale trial class below.

First Meeting Activities

The first meeting was on Tuesday, January 19, 2021. At the first meeting held through the WhatsApp group, we gave 31 students of class VII B pretest questions. Giving pretest questions is used to determine students' initial social arithmetic material before learning using electronic student worksheets. The pretest questions consisted of 5 essay questions with an allocation of time to work for 80 minutes. Students work on the pretest questions at their respective homes, considering that at that time and online learning were implemented.

Second Meeting Activities

The second meeting was on Saturday, January 23, 2021, through the WhatsApp group. We introduced electronic student worksheets to students. We gave a Google drive link to download electronic student worksheets. We taught students how to download electronic student worksheets and how to use electronic student worksheets. These activities are to ensure that students are ready for learning the next meeting with electronic student worksheets. To determine students' readiness to carry out learning with electronic student worksheets, the researcher asked students to take a photo of themselves operating electronic student worksheets. Figure 7 shows the student readiness with electronic student worksheets.

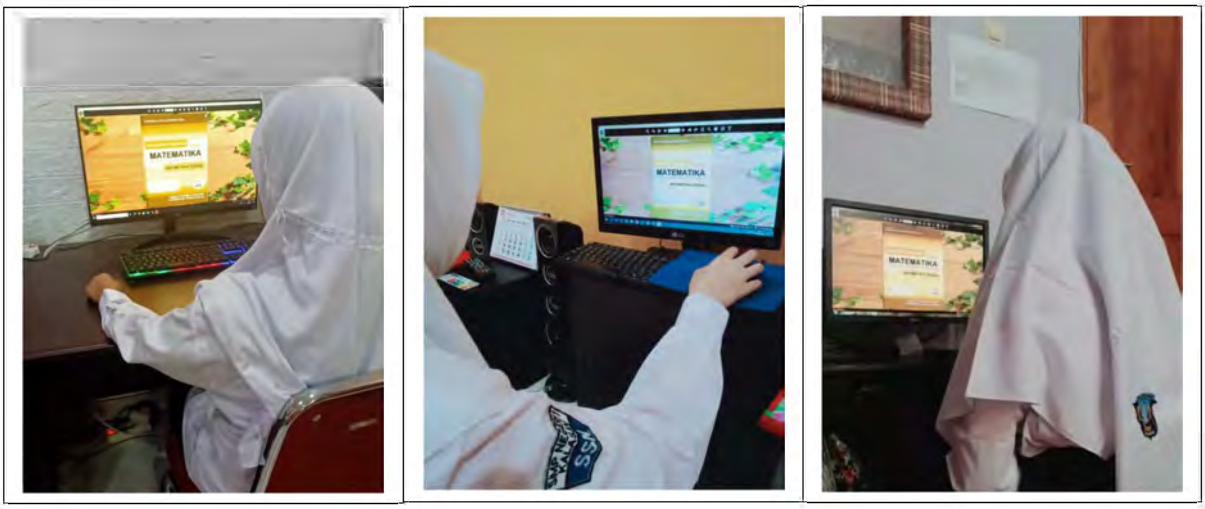


Figure 7: Student Readiness with Electronic Student Worksheets

Third Meeting Activities

The third meeting will be on Tuesday, January 26, 2021, from 08:00 - 09:00. At this meeting, all class VII B students had started to carry out the learning process with the researcher's electronic student worksheets. Researchers' conveyed directions during the learning process through the WhatsApp group. We stimulated the student through electronic student worksheets, identified problems, carried out data collection activities, and carried out data processing activities. We equipped the stimulation activity with simple questions to facilitate students to develop critical thinking skills. Such activity is in line with (Chikiwi & Schäfer, 2018). They stated that one way to create necessary thinking skills is to ask appropriate questions at the cognitive level in teaching and learning mathematics. Examples of student activity results are in Figure 8.

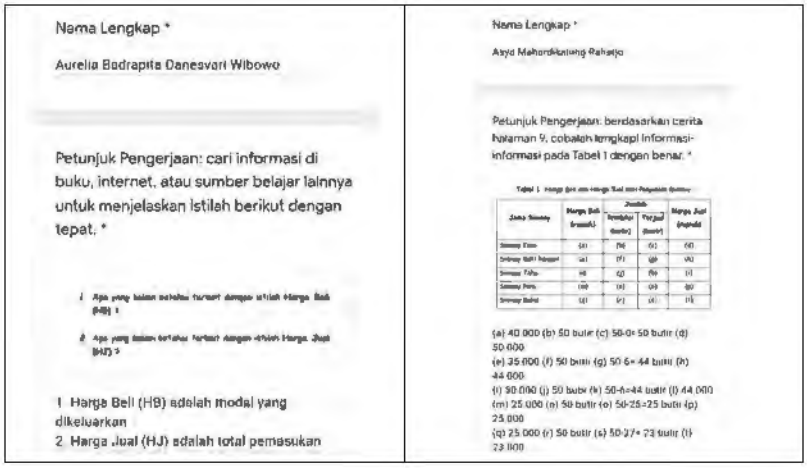


Figure 8: Examples of Student Activity Result in Learning 1

Fourth Meeting Activities

The fourth meeting will be on Tuesday, January 26, 2021, from 09:00 - 10:00. At this meeting, VII B students continued the activities at the third meeting, namely data processing. Researchers gave the direction of the learning process through the WhatsApp group. Students continued data processing activities in electronic student worksheets. Examples of student activities in the form of answers are in Figure 9.

Researchers were unable to cover all the worksheets during the learning process. Therefore, we asked students to complete the remaining materials independently. If there are difficulties, students can fill out a complaint sheet that the researcher provided.

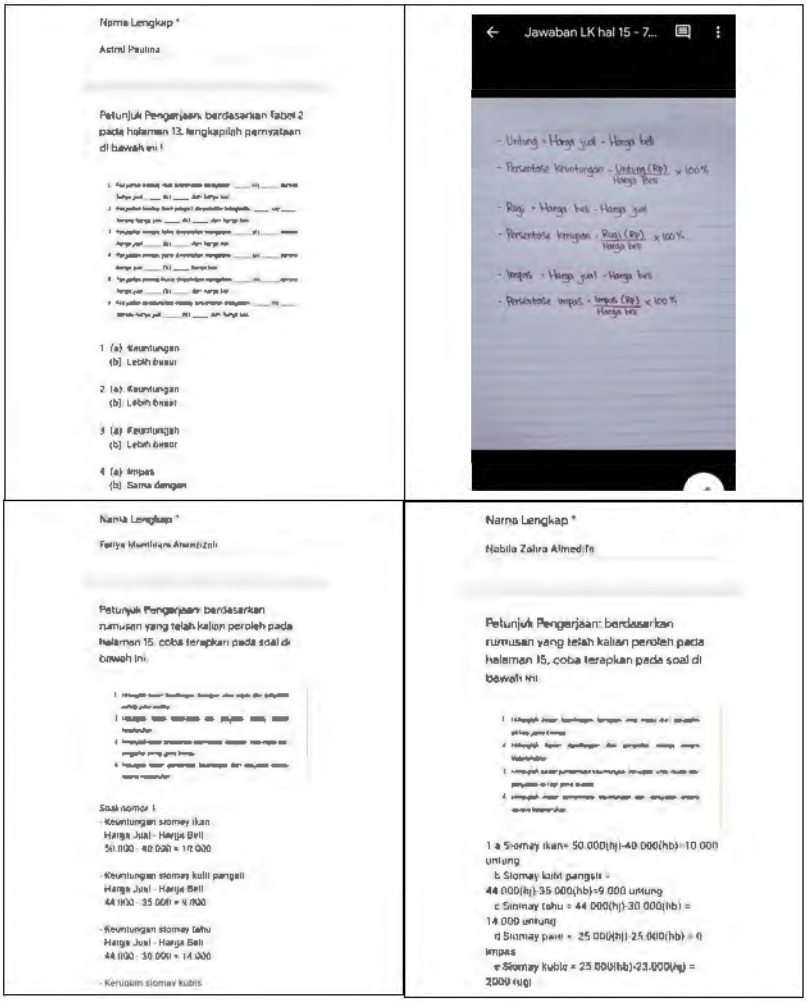


Figure 9: Examples of Student Activity Results in Learning 2

Fifth Meeting Activities

The fifth meeting will be on Tuesday, February 2, 2021, from 08:00 - 09:00. At this meeting, researchers asked students to continue activities at the fourth meeting, namely data processing. Researchers gave directions during the learning process through the WhatsApp group. At this meeting, students continued data processing activities in electronic student worksheets. Furthermore, it is continued with evidentiary activities, conclusion-drawing activities, and activities to fill in the complaint box (for those who wish). Examples of student activities' results

in the form of answers that researchers have received through responses on Google form are in Figure 10.

Page 16

1. Profit siomay fish = selling price - purchase price = 50,000 - 40,000 = 10,000

Benefits of siomay skin dumplings = 44,000 - 35,000 = 9,000

Siomay tofu profit = 44,000 - 30,000 = 14,000

Profit of cabbage siomay = buy price - selling price = 25,000 - 23,000 = 2,000

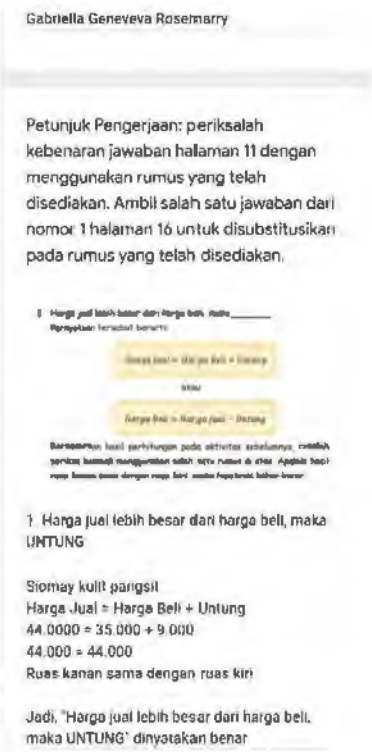
Breakeven (Reverse Capital)
Siomay pare = sale price - buy price = 25,000 - 25,000 = 0
meaning no profit and no loss.

2. Total siomay sales profit = total selling price - total purchase price = 186,000 - 155,000 = 31,000
3. Percentage of fish siomay profit $= \frac{profit}{purchase\ price} \times 100\% = \frac{10.000}{40.000} \times 100\% = 25\%$

Percentage of benefits of skin dumpling siomay $= \frac{9.000}{36.000} \times 100\% = 25{,}7\%$

Percentage of profit tahu siomay $= \frac{14.000}{30.000} \times 100\% = 46{,}7\%$

Percentage of loss of cabbage siomay $= \frac{lose\ out}{purchase\ price} \times 100\% = \frac{2.000}{25.000} \times 100\% = 8\%$



Gabriella Geneveva Rosemarry

Manual Work: Check the correctness of the answer on page 11 by using the formula provided. Take one of the answers from page 1 number 16 to substitute in the formula provided.

1. The selling price is greater than the purchase price, then _____

The statement means:

Selling Price = Buy Price + Profit

or

Buy Price = Sell Price – Profit

Based on the calculation results in the previous activity, try to double-check using one of the above formulas. If the result of the right field is the same as the left field, then your hypothesis is correct.

1. The selling price is greater than the purchase price, then PROFIT.

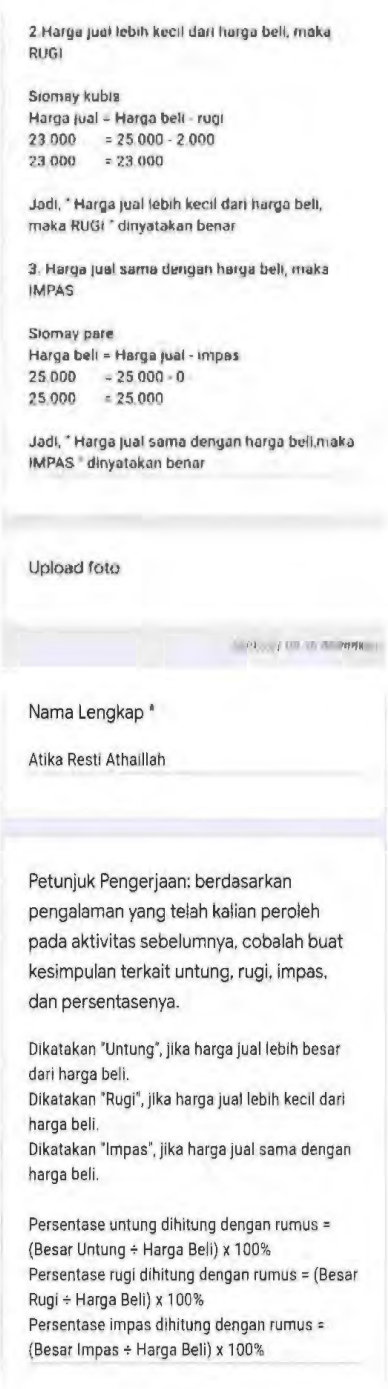
Siomay skin dumplings

Selling Price = Buy Price + Profit

44,0000 = 35,000 + 9,000

44,000 = 44,000

The right field is the same as the left field.



2 Harga jual lebih kecil dari harga beli, maka RUGI

Siomay kubis
Harga jual = Harga beli - rugi
23.000 = 25.000 - 2.000
23.000 = 23.000

Jadi, " Harga jual lebih kecil dari harga beli, maka RUGI " dinyatakan benar

3. Harga jual sama dengan harga beli, maka IMPAS

Siomay pare
Harga beli = Harga jual - impas
25.000 = 25.000 - 0
25.000 = 25.000

Jadi, " Harga jual sama dengan harga beli,maka IMPAS " dinyatakan benar

Upload foto

Nama Lengkap *

Atika Resti Athaillah

Petunjuk Pengerjaan: berdasarkan pengalaman yang telah kalian peroleh pada aktivitas sebelumnya, cobalah buat kesimpulan terkait untung, rugi, impas, dan persentasenya.

Dikatakan "Untung", jika harga jual lebih besar dari harga beli.
Dikatakan "Rugi", jika harga jual lebih kecil dari harga beli.
Dikatakan "Impas", jika harga jual sama dengan harga beli.

Persentase untung dihitung dengan rumus = (Besar Untung ÷ Harga Beli) x 100%
Persentase rugi dihitung dengan rumus = (Besar Rugi ÷ Harga Beli) x 100%
Persentase impas dihitung dengan rumus = (Besar Impas ÷ Harga Beli) x 100%

2. The selling price is less than the purchase price, hence the LOSS.

Cabbage siomay

Selling price = Buy price - loss

23,000 = 25,000 – 2,000

23,000 = 23,000

So, " The selling price is less than the purchase price, then the LOSS " is declared correct.

3. The selling price is equal to the purchase price, then BREAKEVEN

Bitter melon siomay

Buy price = Selling price - breakeven

25,000 = 25,000 - 0

25,000 = 25,000

So, " The selling price is equal to the purchase price, then BREAKEVEN " is declared correct.

Full Name

Atika Resti Athaillah

Manual Instructions: Based on the experience you have gained in previous activities, try to make conclusions regarding profit, loss, break-even, and percentage.

It says "Profit", if the selling price is greater than the purchase price.

It says "Loss", if the selling price is less than the purchase price.

It says "Breakeven", if the selling price is equal to the purchase price.

Profit percentage is calculated by formula = (Profit Amount ÷ Buy Price) x 100%

The percentage loss is calculated by the formula = (Large Loss ÷ Buy Price) x 100%

Breakeven percentage is calculated with the formula = (Breakeven ÷ Buy Price) x 100%

Figure 10: Examples of Student Activity Results in Learning 3

Sixth Meeting Activity

The sixth meeting will be on Tuesday, February 2, 2021, from 09:00 - 10:00. Researchers direct to do all the practice questions in activities 1, 2, 3, and 4 in electronic student worksheets at this meeting. Researchers provide directions during the learning process through the WhatsApp group. Examples of answers to practice questions from students that researchers have accepted via Google form are in Figure 11.

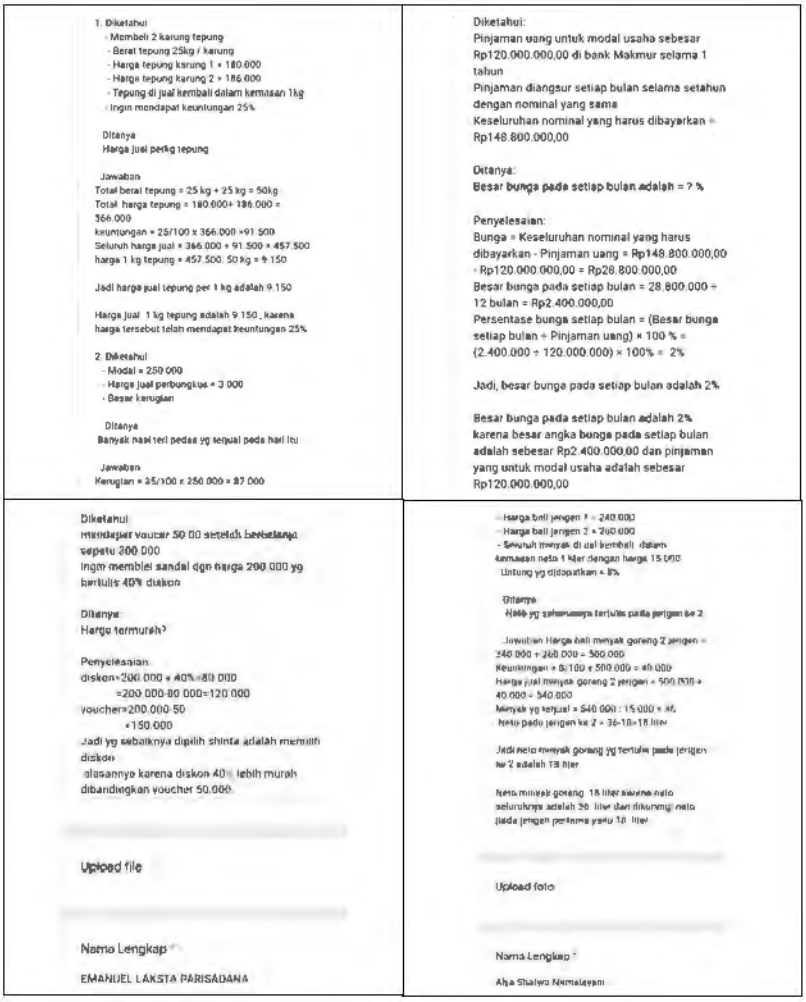


Figure 11: Examples of Results of Student's Exercise Problem Activities in Learning 4

Seventh Meeting Activities

The seventh meeting will be on Wednesday, February 3, 2021. Class VII B students work on post-test questions from their respective homes. Researchers use post-test questions to determine students' social arithmetic material after learning using electronic student worksheets. The posttest questions consisted of 5 essay questions with an allocation of 80 minutes of processing time. Students work on post-test questions at their respective homes because online learning is being implemented. There were 27 out of 31 students who collected posttest answers.

Eighth Meeting Activities

On Friday, February 5, 2021, the researcher asked students to assess the electronic student worksheets used via the Google form link. The link contained "Student Electronic Student Worksheets by Students." There were 30 out of 31 class VII B students who assessed electronic student worksheets. In addition to providing reviews, students also write down their impressions related to the experience of using electronic student worksheets.

Practicality data were obtained from filling out the questionnaire "Assessment sheets of electronic student worksheets by students" by students. Through the electronic student worksheets assessment sheets, students assess the quality of electronic student worksheets in terms of attractiveness and ease of use. The electronic student worksheets assessment sheet becomes a guide for students to assess the quality of electronic student worksheets in practicality. The assessment sheets for electronic student worksheets are given after students have learned using electronic were given student worksheets. We gave the assessment sheets to 31 class VII B students. There were 30 out of 31 students who assessed electronic student worksheets. However, the student assessment data on electronic student worksheets analyzed were only from 27 students. Three students who had assessed electronic student worksheets did not do the posttest.

The average practicality score was 79.9 in the very practical category. Therefore, we can conclude that from students' assessment of electronic student worksheets related to the practicality of the quality of electronic student worksheets, they meet the very practical category. In addition to providing reviews, students also gave impressions related to the use of electronic student worksheets. A total of 27 students whose assessment results were all analyzed gave a good impression of electronic student worksheets. An example of writing student impressions of electronic student worksheets is in Figure 12.

Figure 12: Examples of Students' Impressions of Electronic Student Worksheets

The students' impressions above show that the use of electronic student worksheets makes students more enthusiastic and less dull in learning mathematics. It indicates that electronic student worksheets can motivate students in learning. Motivation to learn is very helpful in developing critical thinking skills. Such motivation is in line with Spector and Ma (2019), who states that critical thinking requires motivation with a tendency to be curious.

Electronic student worksheets have facilitated students' interpretation, analysis, evaluation, inference, explanation, and self-regulation activities. So, it is in line with (Spector & Ma, 2019). They stated that critical thinking starts with simple experiences such as observing differences, facing confusing statements or problems, questioning someone's views, leading to several cases of investigation, and then more complex experiences such as applying thinking skills. High-level thinking skills are logical reasoning, questioning assumptions, considering and evaluating alternative explanations.

e) Evaluation Stage

The validation and testing activities of electronic student worksheets that researchers conducted have resulted in validity, practicality, and effectiveness values through the data analysis process. We also analyze data to determine the quality of the electronic student worksheets we develop. The process of analyzing data on validity, practicality, and effectiveness is included in the evaluation phase in developing electronic student worksheets. At this stage, electronic student worksheets are evaluated based on the results obtained from the assessment and validator input,

student assessments and impressions, and student pretest and posttest results after being given learning with electronic student worksheets. We used the validator's evaluation to determine the validity of electronic student worksheets from material experts and media experts' points of view. Researchers used student assessments to assess the practicality of electronic student worksheets. Meanwhile, we used the pretest and posttest to determine the effectiveness of electronic student worksheets that can be seen in Appendix 2.

Researchers used to pretest and posttest instruments to obtain data on students' critical thinking abilities related to social arithmetic material. Researchers acquired data from the pretest activities were from students before using electronic student worksheets. In contrast, researchers obtained data from posttest activities from students after using electronic student worksheets. The effectiveness data in this study were obtained by looking at the pretest and posttest results of 27 students in class VII B because four students did not do the posttest. Based on the data analysis results, the value of paired samples test is $0.002 < 0.05$. Therefore, there is a significant difference between the average pretest and posttest scores for students' critical thinking abilities.

The average pretest score obtained by students was 77.58. At the same time, the average posttest score obtained by students was 87.33. Based on these results, there is an increase in value from pretest to posttest. For such an N-Gain value, it is 0.43. When viewed from the ability to understand the materials, the growth is in the medium category occurs. Therefore, based on the data obtained, we can conclude that electronic student worksheets are practical when viewed from students' abilities. Such activity is in line with the research results of Ramdhani, Usodo, and Subanti (2017), which show that discovery learning is effective in increasing the average test score for students' critical thinking ability. The increase in the average test score indicates an increase in students' critical thinking skills. In other words, critical thinking skills and academic achievement are closely related to Demirci and Özyürek (2017).

CONCLUSIONS

Electronic student worksheets are said to be successful if they are valid, practical, and effective. The validation of electronic student worksheets and testing of electronic student worksheets on large-scale classes are data on validity, practicality, and effectiveness. The data that have been obtained are analyzed to determine the three points above of the developed electronic student worksheets.

Furthermore, the electronic student worksheets meet the outstanding category from the media expert's point of view with an average validation score of 122 and the good category from the material expert's point of view with an average validation score of 114.3. Product development of

interactive electronic student worksheets for junior high school students based on discovery learning and oriented towards quality critical thinking skills in terms of practicality. Electronic student worksheets meet the convenient category from a student's perspective, with an average assessment score of 79.9. Product development of interactive electronic student worksheets for junior high school students is discovery-based and oriented towards quality critical thinking skills in terms of effectiveness. There is a significant difference between students' pretest and posttest scores for comprehension ability. Lastly, the average posttest score is more than the average pretest score because there is an increase between the pretest and posttest scores with the medium category. Therefore, electronic student worksheets meet the criteria of being effective.

ACKNOWLEDGMENT

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Appendix 1. English Transcript for Figure 3, 4, 5, 6, 8, 9, 10, 11, and 12.

Let's Identify the Problem

Based on the presented story presented, please try to identify the problem.

1. If the selling price is greater than the purchase price, then the trader will _____ .
2. If the selling price is less than the buy price, then the trader will _____ .
3. If the selling price is equal to the purchase price, then the trader will _____.

Click Here to Fill

Let's Identify the Problem

Based on the story that has been presented on page 9, try to identify the problem.

1. If the selling price is greater than the purchase price, then the trader will _____ .
2. If the selling price is less than the buy price, then the trader will _____ .
3. If the selling price is equal to the purchase price, then the trader will _____.

Click Here to Fill

Figure 3: Before (Left) and After Revision of Writing Command Sentences (Right)

The Complaints Box (1)

Let's listen well

Complaints Box (1)

Let's listen well

Keep the spirit of achieving dreams

Figure 4: Before (Left) and After Audio Revision and Adding the Motivation Quote (Right)

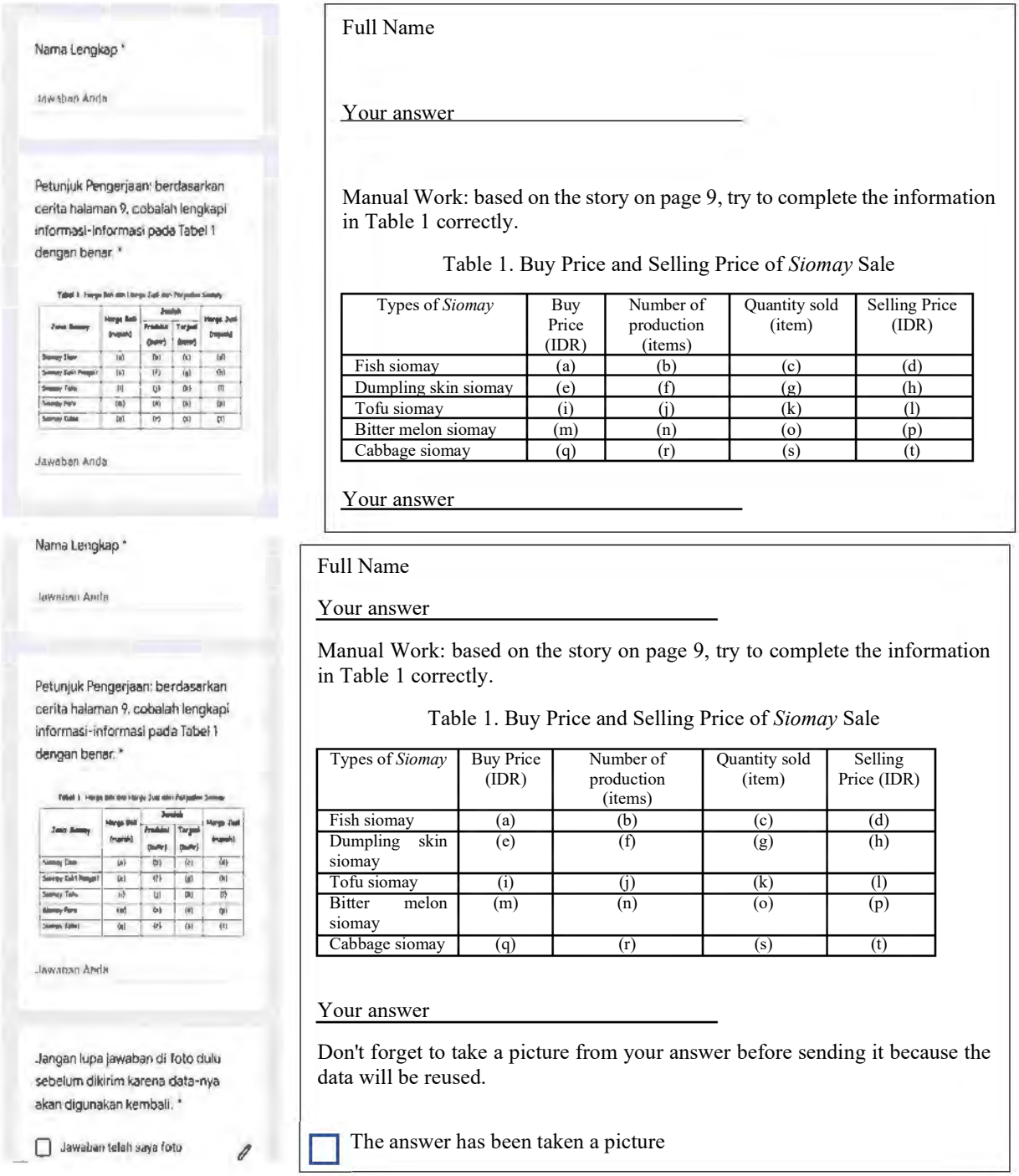
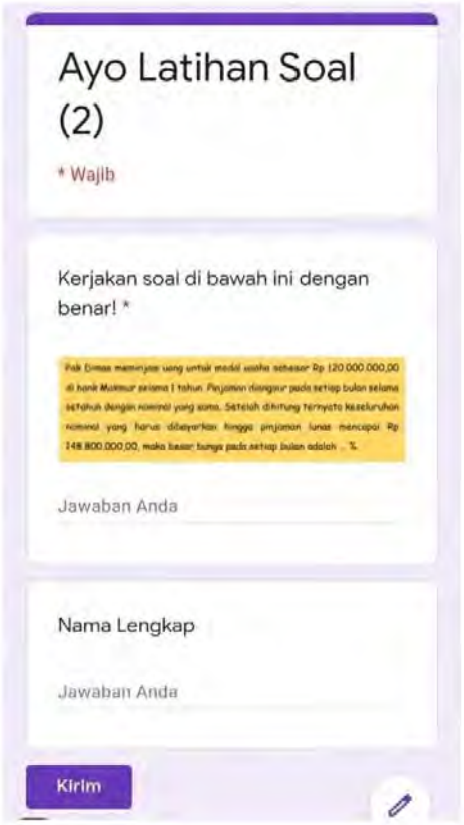


Figure 5: Before (Left) and After Revision Adding Commands for Taking Photos of Activity Results (Right)



Let's Practice Problems (2)

Answer the questions below properly!

Pak Dimas borrowed money for business capital of IDR 120,000,000 at Makmur bank for 1 year. Loans are paid off on a monthly month for the same amount. After calculating the total amount to be paid until the loan reaches IDR 148.800.000, then the interest on each month is ... %.

Your answer

Full Name

Your answer

Submit

ESW Page 35

The instruction of Problem Work:

1. Write down the information that is known and asked from the question.

2. Specify the procedures in answering the question.

3. Write down the procedures to answer the question entirely with the correct calculation.

4. Write down the conclusion of the answer you have obtained. Start with the word "So, ... ".

5. Re-write down the answer to the completed

Figure 6: Before (Left) and After Revision of Work Guidelines (Right)

Nama Lengkap *

Aurelia Badrapita Danesvari Wibowo

Petunjuk Pengerjaan: cari informasi di buku, internet, atau sumber belajar lainnya untuk menjelaskan istilah berikut dengan tepat. *

1. Apa yang kalian ketahui tentang dengan istilah Harga Beli (HB) ?
2. Apa yang kalian ketahui tentang dengan istilah Harga Jual (HJ) ?

1. Harga Beli (HB) adalah modal yang dikeluarkan
2. Harga Jual (HJ) adalah total pemasukan

Full Name

Aurelia Badrapita Danesvari Wibowo

Manual Work: Search the information in a book, internet, or other learning resource to explain the following terms appropriately.

1. What do you know about the term buy price?
2. What do you know about the term selling price?

1. Buy Price is the issued capital.
2. Selling Price is the total income.

Nama Lengkap *

Asya Mahardikaning Raharjo

Petunjuk Pengerjaan: berdasarkan cerita halaman 9, cobalah lengkapi informasi-informasi pada Tabel 1 dengan benar. *

Tabel 1. Harga Beli dan Harga Jual dari Penjualan Siomay

Jenis Siomay	Harga Beli (rupiah)	Jumlah		Harga Jual (rupiah)
		Produksi (butir)	Terjual (butir)	
Siomay Ikan	(a)	(b)	(c)	(d)
Siomay Kulit Pangsit	(e)	(f)	(g)	(h)
Siomay Tahu	(i)	(j)	(k)	(l)
Siomay Pare	(m)	(n)	(o)	(p)
Siomay Kubis	(q)	(r)	(s)	(t)

(a) 40.000 (b) 50 butir (c) 50-0=50 butir (d) 50.000
(e) 35.000 (f) 50 butir (g) 50-6= 44 butir (h) 44.000
(i) 30.000 (j) 50 butir (k) 50-6=44 butir (l) 44.000
(m) 25.000 (n) 50 butir (o) 50-25=25 butir (p) 25.000
(q) 25.000 (r) 50 butir (s) 50-27= 23 butir (t) 23.000

Full Name

Asya Mahardikaning Raharjo

Manual Work: Based on the story on page 9, try to complete the information in Table 1 correctly.

Table 1. Buy Price and Selling Price of Siomay Sale

Types of Siomay	Buy Price (IDR)	Number of production (items)	Quantity sold (item)	Selling Price (IDR)
Fish siomay	(a)	(b)	(c)	(d)
Dumpling skin siomay	(e)	(f)	(g)	(h)
Tahu siomay	(i)	(j)	(k)	(l)
Bitter melon siomay	(m)	(n)	(o)	(p)
Cabbage siomay	(q)	(r)	(s)	(t)

(a) 40,000 (b) 50 pieces (c) 50-0=50 pieces (d) 50,000 (e) 35,000 (f) 50 pieces (g) 50-6= 44 pieces (h) 44,000 (i) 30,000 (j) 50 pieces (k) 50-6=44 pieces (l) 44,000 (m) 25,000 (n) 50 pieces (o) 50-25=25 pieces (p) 25,000 (q) 25,000 (r) 50 pieces (s) 50-27= 23 pieces (t) 23,000

Figure 8: Examples of Student Activity Result in Learning 1

Nama Lengkap *

Astrid Paulina

Petunjuk Pengerjaan: berdasarkan Tabel 2 pada halaman 13, lengkapilah pernyataan di bawah ini !

1. Penjualan siomay ikan dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ dari harga beli
2. Penjualan siomay kulit pangsit dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ dari harga beli
3. Penjualan siomay tahu dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ dari harga beli
4. Penjualan siomay pare dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ harga beli
5. Penjualan siomay kubis dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ dari harga beli
6. Penjualan keseluruhan siomay dinyatakan mengalami ____ (a) ____ karena harga jual ____ (b) ____ dari harga beli

1. (a). Keuntungan
   (b). Lebih besar

2. (a). Keuntungan
   (b). Lebih besar

3. (a). Keuntungan
   (b). Lebih besar

4. (a). Impas
   (b). Sama dengan

Full Name

Astrid Paulina

Working instructions: Based on Table 2 on page 13, complete the statement below!

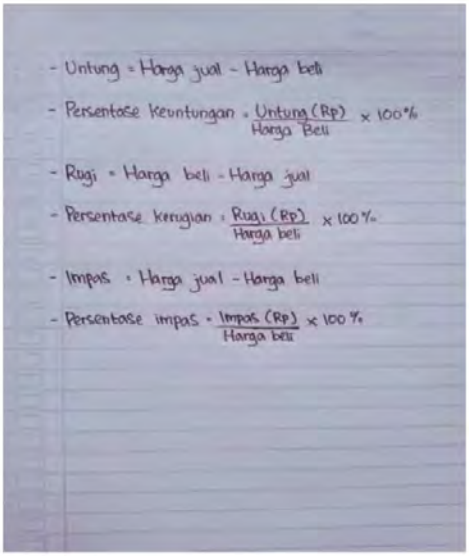
1. The sale of fish siomay is expressed to be _____ (a) _____ due to the selling price of _____ (b) _____ of the purchase price.
2. The sale of dumpling skin siomay is stated to have _____ (a) _____ due to the selling price of _____ (b) _____ of the purchase price.
3. Sales siomay tofu otherwise experienced _____ (a) _____ because of the selling price _____ (b) _____ of the purchase price.
4. Sales siomay pare expressed experiencing _____ (a) _____ because of the selling price _____ (b) _____ purchase price.
5. Sales of cabbage siomay are expressed to experience _____ (a) _____ due to the selling price _____ (b) _____ of the purchase price.
6. The overall sales of siomay are expressed to be experiencing _____ (a) _____ due to the selling price of _____ (b) _____ of the purchase price.

1. (a). advantage (b). Larger

2. (a). advantage (b). Larger

3. (a). advantage (b). Larger

4. (a). Break-even (b). Same as



- Untung = Harga jual - Harga beli
- Persentase keuntungan = $\frac{\text{Untung (Rp)}}{\text{Harga Beli}} \times 100\%$
- Rugi = Harga beli - Harga jual
- Persentase kerugian = $\frac{\text{Rugi (Rp)}}{\text{Harga beli}} \times 100\%$
- Impas = Harga jual - Harga beli
- Persentase impas = $\frac{\text{Impas (Rp)}}{\text{Harga beli}} \times 100\%$

Profit = Selling Price - Buy Price

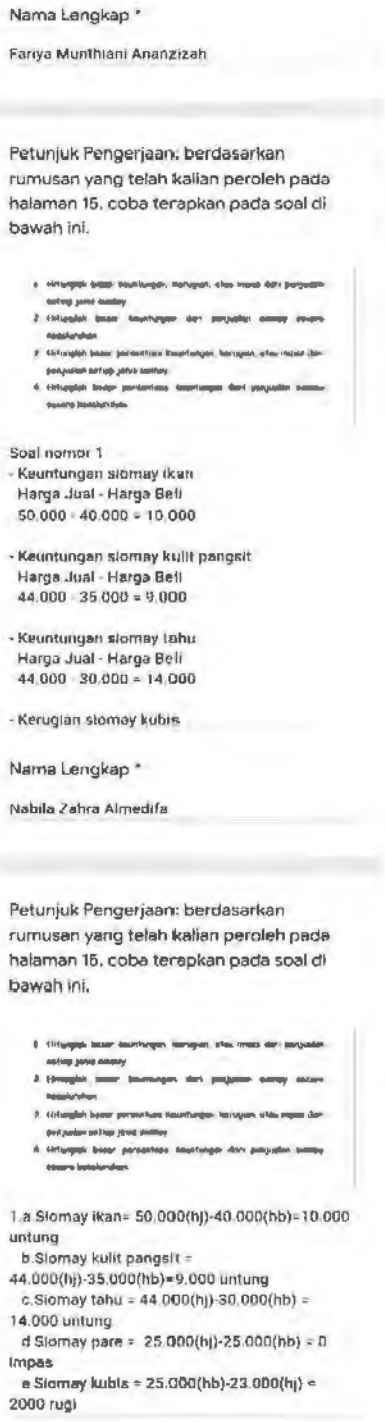
Percentage of profit = $\frac{Profit\ (Rp)}{Buy\ price} \times 100\%$

Loss = Buy Price - Selling Price

Percentage of loss = $\frac{Loss\ (Rp)}{Buy\ price} \times 100\%$

Break-even = Sale Price - Buy Price

Percentage of Break-even = = $\frac{\text{Breakeven } (Rp)}{Buy\ price} \times 100\%$



Nama Lengkap *

Fariya Munthiani Ananzizah

Petunjuk Pengerjaan: berdasarkan rumusan yang telah kalian peroleh pada halaman 15, coba terapkan pada soal di bawah ini.

Soal nomor 1
- Keuntungan siomay ikan
Harga Jual - Harga Beli
50.000 - 40.000 = 10.000

- Keuntungan siomay kulit pangsit
Harga Jual - Harga Beli
44.000 - 35.000 = 9.000

- Keuntungan siomay tahu
Harga Jual - Harga Beli
44.000 - 30.000 = 14.000

- Kerugian siomay kubis

Nama Lengkap *

Nabila Zahra Almedifa

Petunjuk Pengerjaan: berdasarkan rumusan yang telah kalian peroleh pada halaman 15, coba terapkan pada soal di bawah ini.

1.a Siomay ikan= 50.000(hj)-40.000(hb)=10.000 untung
b.Siomay kulit pangsit = 44.000(hj)-35.000(hb)=9.000 untung
c.Siomay tahu = 44.000(hj)-30.000(hb) = 14.000 untung
d Siomay pare = 25.000(hj)-25.000(hb) = 0 impas
e Siomay kubis = 25.000(hb)-23.000(hj) = 2000 rugi

Full Name

Fariya Munthiani Ananzizah

Manual Work: Based on the formula you have obtained on page 15, try applying in the question below.

1. Calculate the profit, loss, or breakeven of the sale of each type of siomay.
2. Calculate the profit from the overall siomay sale.
3. Calculate the large percentage of profit, loss, or breakeven from the sale of each type of siomay.
4. Calculate the large percentage of profit from the overall siomay sale.

Problem number 1

- Advantages of fish siomay = sale price - buy price = 50,000 – 40,000 = 10,000

- Benefits of skin dumpling siomay = sale price - buy price = 44,000 – 35,000 = 9,000

- Advantages of tahu siomay = sale price - buy price = 44,000 – 30,000 = 14,000

- Disadvantages of cabbage siomay = buy price - selling price = 25,000 – 23,000 = 2,000

- Breakeven bitter melon siomay = 25,000 - 25,000 = 0

Full Name

Nabila Zahra Almedifa

Manual Work: Based on the formula you have obtained on page 15, try applying in the question below.

1. Calculate the profit, loss, or breakeven of the sale of each type of siomay.
2. Calculate the profit from the overall siomay sale.
3. Calculate the large percentage of profit, loss, or breakeven from the sale of each type of siomay.
4. Calculate the large percentage of profit from the overall siomay sale.

1.a. Fish siomay = 50,000 – 40,000 = 10,000 profit

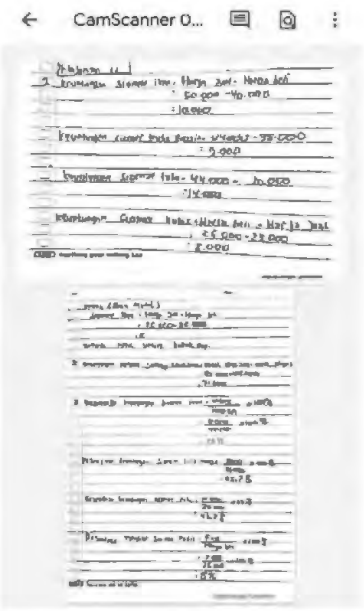
b. Skin dumpling siomay = 44,000 – 35,000 = 9,000 profit

c. Tofu siomay = 44,000 – 30,000 = 14,000 profit

d. Bitter melon siomay = 25,000 – 25,000 = 0 breakeven

e. Cabbage siomay = 25,000 – 23,000 = 2,000 loss

Figure 9: Examples of Student Activity Results in Learning 2



Gabriella Geneveva Rosemarry

Petunjuk Pengerjaan: periksalah kebenaran jawaban halaman 11 dengan menggunakan rumus yang telah disediakan. Ambil salah satu jawaban dari nomor 1 halaman 16 untuk disubstitusikan pada rumus yang telah disediakan.

1. Harga jual lebih besar dari harga beli, maka UNTUNG

Siomay kulit pangsit
Harga Jual = Harga Beli + Untung
44.0000 = 35.000 + 9.000
44.000 = 44.000
Ruas kanan sama dengan ruas kiri

Jadi, "Harga jual lebih besar dari harga beli, maka UNTUNG" dinyatakan benar

Page 16

4. Profit siomay fish = selling price - purchase price = 50,000 - 40,000 = 10,000

Benefits of siomay skin dumplings = 44,000 - 35,000 = 9,000

Siomay tofu profit = 44,000 - 30,000 = 14,000

Profit of cabbage siomay = buy price - selling price = 25,000 - 23,000 = 2,000

Breakeven (Reverse Capital)
Siomay pare = sale price - buy price = 25,000 - 25,000 = 0
meaning no profit and no loss.

5. Total siomay sales profit = total selling price - total purchase price = 186,000 - 155,000 = 31,000
6. Percentage of fish siomay profit $= \frac{profit}{purchase\ price} \times 100\% = \frac{10.000}{40.000} \times 100\% = 25\%$

Percentage of benefits of skin dumpling siomay $= \frac{9.000}{36.000} \times 100\% = 25{,}7\%$

Percentage of profit tahu siomay $= \frac{14.000}{30.000} \times 100\% = 46{,}7\%$

Percentage of loss of cabbage siomay $= \frac{lose\ out}{purchase\ price} \times 100\% = \frac{2.000}{25\,000} \times 100\% = 8\%$

Gabriella Geneveva Rosemarry

Manual Work: Check the correctness of the answer on page 11 by using the formula provided. Take one of the answers from page 1 number 16 to substitute in the formula provided.

2. The selling price is greater than the purchase price, then _____

The statement means:

Selling Price = Buy Price + Profit

or

Buy Price = Sell Price – Profit

Based on the calculation results in the previous activity, try to double-check using one of the above formulas. If the result of the right field is the same as the left field, then your hypothesis is correct.

1. The selling price is greater than the purchase price, then PROFIT.

Siomay skin dumplings

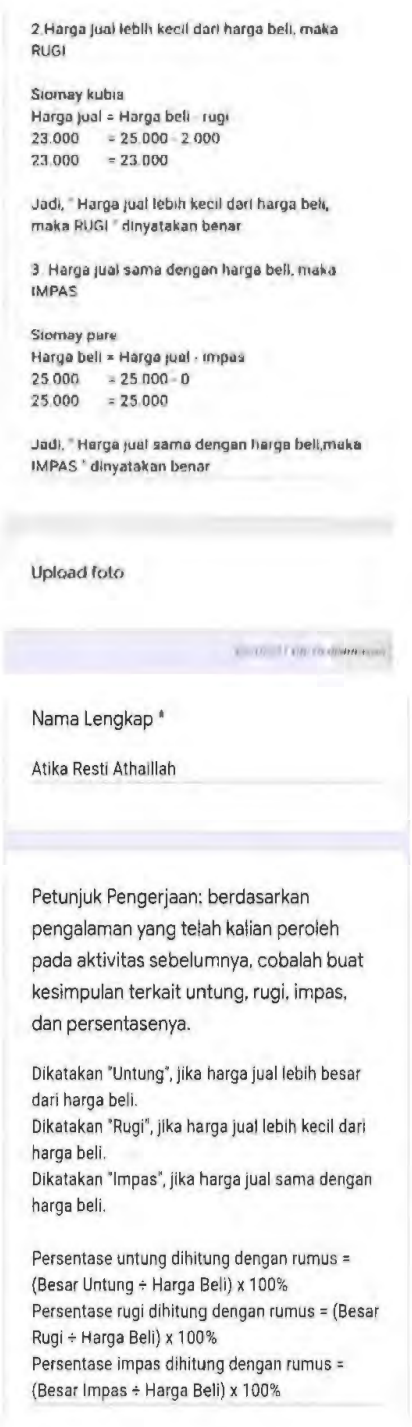
Selling Price = Buy Price + Profit

44,0000 = 35,000 + 9,000

44,000 = 44,000

The right field is the same as the left field.

So, "The selling price is greater than the purchase price, then PROFIT" is stated correctly.



2.Harga jual lebih kecil dari harga beli, maka RUGI

Siomay kubis
Harga jual = Harga beli - rugi
23.000 = 25.000 - 2.000
23.000 = 23.000

Jadi, " Harga jual lebih kecil dari harga beli, maka RUGI " dinyatakan benar

3. Harga jual sama dengan harga beli, maka IMPAS

Siomay pare
Harga beli = Harga jual - impas
25.000 = 25.000 - 0
25.000 = 25.000

Jadi, " Harga jual sama dengan harga beli,maka IMPAS " dinyatakan benar

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Nama Lengkap *

Atika Resti Athaillah

Petunjuk Pengerjaan: berdasarkan pengalaman yang telah kalian peroleh pada aktivitas sebelumnya, cobalah buat kesimpulan terkait untung, rugi, impas, dan persentasenya.

Dikatakan "Untung", jika harga jual lebih besar dari harga beli.
Dikatakan "Rugi", jika harga jual lebih kecil dari harga beli.
Dikatakan "Impas", jika harga jual sama dengan harga beli.

Persentase untung dihitung dengan rumus = (Besar Untung ÷ Harga Beli) x 100%
Persentase rugi dihitung dengan rumus = (Besar Rugi ÷ Harga Beli) x 100%
Persentase impas dihitung dengan rumus = (Besar Impas ÷ Harga Beli) x 100%

2. The selling price is less than the purchase price, hence the LOSS.

Cabbage siomay

Selling price = Buy price - loss

23,000 = 25,000 – 2,000

23,000 = 23,000

So, " The selling price is less than the purchase price, then the LOSS " is declared correct.

3. The selling price is equal to the purchase price, then BREAKEVEN

Bitter melon siomay

Buy price = Selling price - breakeven

25,000 = 25,000 - 0

25,000 = 25,000

So, " The selling price is equal to the purchase price, then BREAKEVEN " is declared correct.

Full Name

Atika Resti Athaillah

Manual Instructions: Based on the experience you have gained in previous activities, try to make conclusions regarding profit, loss, break-even, and percentage.

It says "Profit", if the selling price is greater than the purchase price.

It says "Loss", if the selling price is less than the purchase price.

It says "Breakeven", if the selling price is equal to the purchase price.

Profit percentage is calculated by formula = (Profit Amount ÷ Buy Price) x 100%

The percentage loss is calculated by the formula = (Large Loss ÷ Buy Price) x 100%

Breakeven percentage is calculated with the formula = (Breakeven ÷ Buy Price) x 100%

Figure 10: Examples of Student Activity Results in Learning 3

1. Diketahui
- Membeli 2 karung tepung
- Berat tepung 25kg / karung
- Harga tepung karung 1 = 180.000
- Harga tepung karung 2 = 186.000
- Tepung di jual kembali dalam kemasan 1kg
- Ingin mendapat keuntungan 25%

Ditanya
Harga jual perkg tepung

Jawaban
Total berat tepung = 25 kg + 25 kg = 50kg
Total harga tepung = 180.000+ 186.000 = 366.000
keuntungan = 25/100 x 366.000 =91.500
Seluruh harga jual = 366.000 + 91.500 = 457.500
harga 1 kg tepung = 457.500: 50 kg = 9.150

Jadi harga jual tepung per 1 kg adalah 9.150

Harga jual 1 kg tepung adalah 9.150 , karena harga tersebut telah mendapat keuntungan 25%

2. Diketahui
- Modal = 250.000
- Harga jual perbungkus = 3.000
- Besar kerugian

Ditanya
Banyak nasi teri pedas yg terjual pada hari itu

Jawaban
Kerugian = 35/100 x 250.000 = 87.000

1. Information
- Buy 2 sacks of flour
- Weight of flour 25 kg / sack
- Price of sack flour 1 = 180,000
- Price of sack flour 2 = 186,000
- Flour resale in packs of 1 kg
- Want to get 25% profit

Question
Selling price per kg of flour

Answer
Total weight of flour = 25 kg + 25 kg = 50 kg
Total price of flour = 180,000 + 186,000 = 366,000
Profit = 25/100 x 366,000 = 91,500
All selling price = 366,000 + 91,500 = 457,500
Price of 1 kg of flour = 457,500 : 50 kg = 9,150
So, the selling price of flour per 1 kg is 9,150
The selling price of 1 kg of flour is 9,150, because the price has benefited 25%

2. Information
- Capital = 250,000
- Selling price of wrapper = 3,000
- Huge losses

Question
How many of spicy anchovy sold that day

Answer
Loss = 35/100 x 250,000 = 87,000
= 250,000 - 87,500 = 162,500
Lots of spicy anchovies sold = 162,500 : 3,000 = 54
So, the spicy anchovy rice sold is 54 packs

Diketahui:
Pinjaman uang untuk modal usaha sebesar Rp120.000.000,00 di bank Makmur selama 1 tahun
Pinjaman diangsur setiap bulan selama setahun dengan nominal yang sama
Keseluruhan nominal yang harus dibayarkan = Rp148.800.000,00

Ditanya:
Besar bunga pada setiap bulan adalah = ? %

Penyelesaian:
Bunga = Keseluruhan nominal yang harus dibayarkan - Pinjaman uang = Rp148.800.000,00 - Rp120.000.000,00 = Rp28.800.000,00
Besar bunga pada setiap bulan = 28.800.000 ÷ 12 bulan = Rp2.400.000,00
Persentase bunga setiap bulan = (Besar bunga setiap bulan ÷ Pinjaman uang) × 100 % = (2.400.000 ÷ 120.000.000) × 100% = 2%

Jadi, besar bunga pada setiap bulan adalah 2%

Besar bunga pada setiap bulan adalah 2% karena besar angka bunga pada setiap bulan adalah sebesar Rp2.400.000,00 dan pinjaman yang untuk modal usaha adalah sebesar Rp120.000.000,00

Information:
Loan of money for business capital of Rp120,000,000 at Bank Makmur for 1 year
Loans are paid monthly for a year with the same amount
Total amount payable = IDR148,800,000

Question:
The amount of interest on each month is = ? %

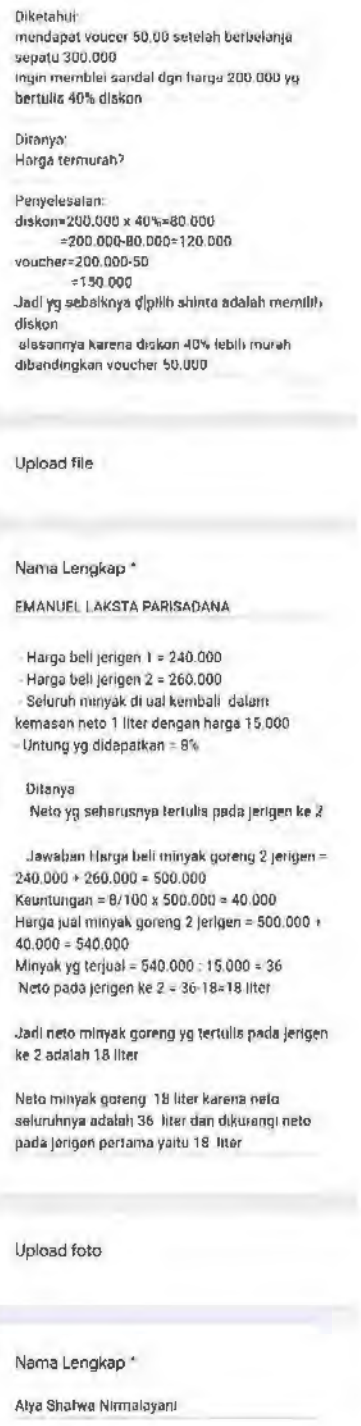
Answer:
Interest = Total amount payable - Money loan = IDR 148,800,000 - IDR120,000,000 = IDR 28,800,000

Interest amount per month = 28,800,000 ÷ 12 months = IDR 2,400,000

Percentage interest per month = (Interest rate each month ÷ Money loan) × 100 % = (2,400,000 ÷ 120,000,000) × 100% = 2%

So, the interest rate on each month is 2%

The interest rate on each month is 2%, because the interest rate in each month is IDR 2,400,000 and the loan for business capital is IDR 120,000,000



Diketahui:
mendapat voucer 50.00 setelah berbelanja sepatu 300.000
ingin membeli sandal dgn harga 200.000 yg bertulis 40% diskon

Ditanya:
Harga termurah?

Penyelesaian:
diskon=200.000 x 40%=80.000
=200.000-80.000=120.000
voucher=200.000-50
=150.000
Jadi yg sebaiknya dipilih shinta adalah memilih diskon
alasannya karena diskon 40% lebih murah dibandingkan voucher 50.000

Upload file

Nama Lengkap *

EMANUEL LAKSTA PARISADANA

Information:
We got 50.00 vouchers after shopping for 300,000 shoes
We want to buy sandals at a price of 200,000 written 40% discount

Question:
Which one the cheapest price?

Answer:
Discount = 200,000 x 40% = 80,000
= 200,000 - 80,000 = 120,000

Voucher = 200,000 – 50 = 150,000

So, Shinta should be chosen a discount.
The reason is because the discount is 40% cheaper than the voucher 50,000.

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Full Name
Emanuel Laksta Parisadana

- Harga beli jerigen 1 = 240.000
- Harga beli jerigen 2 = 260.000
- Seluruh minyak di ual kembali dalam kemasan neto 1 liter dengan harga 15.000
- Untung yg didapatkan = 8%

Ditanya
Neto yg seharusnya tertulis pada jerigen ke 2

Jawaban Harga beli minyak goreng 2 jerigen = 240.000 + 260.000 = 500.000
Keuntungan = 8/100 x 500.000 = 40.000
Harga jual minyak goreng 2 jerigen = 500.000 + 40.000 = 540.000
Minyak yg terjual = 540.000 : 15.000 = 36
Neto pada jerigen ke 2 = 36-18=18 liter

Jadi neto minyak goreng yg tertulis pada jerigen ke 2 adalah 18 liter

Neto minyak goreng 18 liter karena neto seluruhnya adalah 36 liter dan dikurangi neto pada jerigen pertama yaitu 18 liter

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Nama Lengkap *

Alya Shafwa Nirmalayani

1. Information
- Buy 2 jerry cans of cooking oil
- Net jerry can 1 = 18 liters
- Purchase price of jerry cans 1 = 240,000
- Purchase price of jerry cans 2 = 260,000
- All oil in selling back in net packaging 1 liter with a price of 15,000
- Profit = 8%

Question
Net that should be written on the 2nd jerry can

Answer
Buy price cooking oil 2 jerry cans = 240,000 + 260,000 = 500,000
Profit = 8/100 x 500,000 = 40,000
Selling price of cooking oil 2 jerry cans = 500,000 + 40,000 = 540,000
Oil sold = 540,000 : 15,000 = 36
Net on jerry cans 2 = 36-18=18 liters

So, net cooking oil written on the 2nd jerry can is 18 liters

Net cooking oil 18 liters because the net is entirely 36 liters and reduced net on the first jerry can is 18 liters

Upload Photo

Full Name
Alya Shafwa Nirmalayani

Figure 11: Examples of Results of Student's Exercise Problem Activities in Learning 4

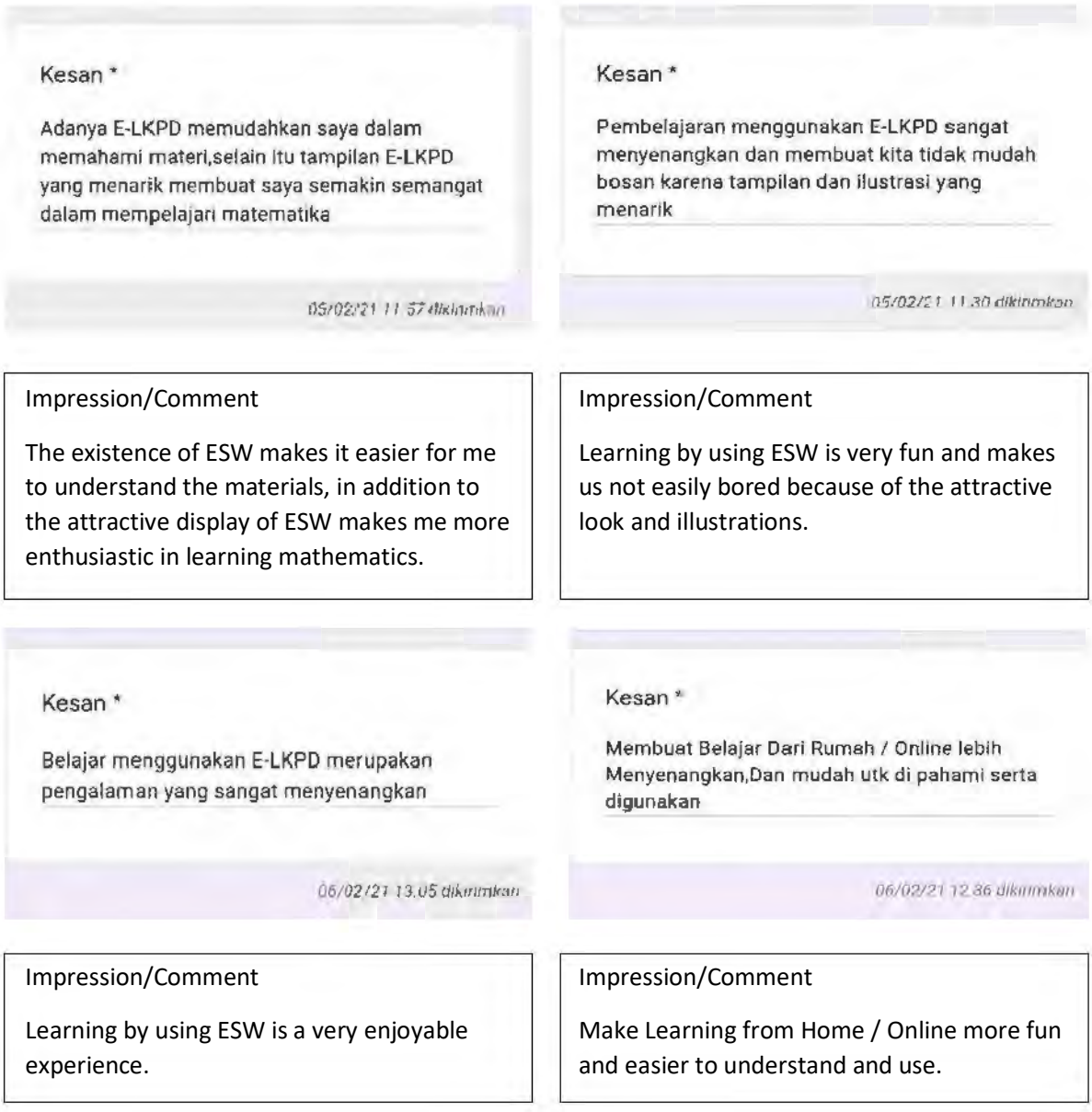

Figure 12: Examples of Students' Impressions of Electronic Student Worksheets

Appendix 2. Pre-test and the post-test translated in English for assess the students' mathematics critical thinking ability

Students' Mathematics Critical Thinking Test

1. A trader buys two sacks of rice from a different wholesaler. The weight of rice in each sack is 25 kg. The price of rice in the first and second sacks sequentially is IDR 245,000 and IDR 255,000. The traders plan to resell the rice in new 1 kg packages. If the trader wants a profit of 20%, the selling price for each kg of rice is ....
2. The chicken soup trader spends IDR 600,000 in capital to buy ingredients. Chicken soup is sold at IDR 8,000 per portion. At that time, the chicken soup shop was not as popular as usual, so the traders suffered a loss of 8%. Many of the portions of chicken soup sold at that time were ....
3. In the context of the 25th anniversary, Jaya stores provide shopping vouchers of IDR 50,000 for visitors who have shopped more than IDR 350,000. Shopping vouchers are valid for one day for purchases of goods worth at least IDR 150,000. At that time, Rena bought a bag for IDR 400,000, so she got a shopping voucher. Rena returned to shopping to take advantage of the opportunity. She chose a t-shirt for IDR 200,000, which reads a 30% discount. Rena cannot use coupons and discounts simultaneously, so she has to choose one. To make it cheaper, Rena should choose ....
4. Mrs. Nita borrows business capital from the Makmur bank to develop her culinary business for IDR 36,000,000. Regular installments are paid every month for one year with the same nominal value. After calculating, it turned out that the amount of money deposited until the loan was paid off reached IDR 44,640,000. The amount of interest for each month is ... %.
5. Mr. Makmur buys two sacks of flour with the same brand at wholesaler Jaya. The flour weight in the two sacks is different. He purchased the first sack for IDR 175,000 with the words net 25 kg and tare 95 g, and the second sack for IDR 35,000 only says tara 20 g while the net writing has been erased. The flour has been resold at IDR 8,400 in a new package which reads net 1 kg and tara 5 g. The sale of all flours generates a profit of 20%. The net weight that should be written on the second sack is ....