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Development of Learning Video Reflection Using Palembang Songket Context to Determine Students' Mathematical Reasoning

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Abstract

Students must have strong mathematical thinking skills after seeing reflection learning videos with a Palembang songket context. The study aims to create a valid and practical learning video, and to understand the potential impact of students' mathematical reasoning abilities on Palembang songket setting through reflection material. This study employs PMRI and a collaborative learning approach. Design research is used to conduct development studies. While the subjects were 28 students from class IX.B with varying capabilities. Data were gathered by observation, exams, and interviews. The learning videos on reflection material using the context of Palembang songket is valid and practical, and students' mathematical reasoning skills have been classified as good with an average value of 65.81 following the implementation of learning using learning videos, with the most frequent indicator appearing as making conjectures and the least frequent indicator appearing as drawing conclusions. The difficulty of this study is the absence of compelling learning videos offered. Students can improve their mathematical reasoning skills by watching learning videos about reflection material with the context of Palembang Songket.

Keywords: Learning Video, Mathematical Reasoning, Palembang Songket, Reflection

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INTRODUCTION

Geometry is one of the crucial topics in mathematics that is closely related to students' daily activities (Malasari et al., 2020). Geometry transformation is one of those topics in geometry. Geometry transformation refers to any kind of change, such as a shift in position, a change in size, or a change in shape in the geometry plane (Rahman et al., 2022). According to Roebyanto (2014), reflection is the displacement of geometric shapes or objects with the distance between the beginning point and the point of displacement using a mirror with the same value. The result of reflection depends on the axis that becomes the mirror in the cartesian plane. All points that experience reflection will be moved using mirroring properties on a flat mirror (Jamil, 2019).

However, the learning outcomes on geometry transformation materials are still low because they have not reached the passing grade (Sukenti, 2023). In addition, students are still passive which causes their ability in geometry transformation material is still relatively low (Hutajulu et al., 2023). Students still do not understand how to reflect a shape (Maulani & Zanthy, 2020). This is also because students still have struggle to solve problems (Tasman et al., 2016).

Several factors that cause learning geometry transformation material on reflection is still relatively low, states that students only receive information passively from the teacher through the learning method alone and make students less active (Nurdyansyah & Fahyuni, 2016). Another factor also comes from the way teachers deliver material to students who are bored (Sabrina et al., 2017).

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Students only race against the concepts given by the teacher and do not master them (Jamaluddin et al., 2020). Then, learning process that is only centered on the teacher (Tasman et al., 2016).

Geometry transformation is one of the mathematics topics that can help the development of students' reasoning skills (Pertiwi & Siswono, 2021). Mathematical reasoning is a basic skill that can form a student's mathematical knowledge. Students' learning process in learning mathematics is influenced by their mathematical reasoning ability (Tukaryanto et al., 2018). This is because every mathematical problem must be solved through a reasoning process, which can be understood and trained by solving mathematics problems (Hidayati & Widodo, 2015).

The importance of mathematical reasoning is not in line with students' reasoning abilities in learning. In fact, more than 50% of students were classified as low in reasoning (Aprilianti & Zanthy, 2019). The low reasoning ability of students can be caused by several factors, such as still having difficulty in understanding basic concepts, being accustomed to routine calculations, and not being able to translate problems into mathematical models (Isnaeni et al., 2018). This low ability also comes from communication between teachers and students to explore concepts or materials to use reasoning from a problem (Gee, 2020). This is also because in working on problems, teachers give the students examples of the same problems in learning so that students only imitate and do not reason (Putri et al., 2019).

To improve the mathematical reasoning on geometry transformation material can be done by connecting content with real-world situations and providing more specific examples (Lydiati, 2020). This is in line with PMRI, or Indonesian version of realistic mathematics education. PMRI allows students to make direct connections between formal mathematics and real-world experiences by utilizing real-world contexts and activities (Dewi & Agustika, 2020). PMRI can be used to help students understand the subject matter (Meitrilova & Putri, 2020). If the learning process uses real-world contexts or objects, learning will be more meaningful (Wijaya, 2012).

According to Samo (2017), cultural factors should allow students to learn and work through mathematics problems in the context of daily life. One of the contexts used is Palembang songket fabric. Songket fabric is part of Indonesian culture in South Sumatera. This songket fabric has a variety of very interesting motifs and patterns. Palembang songket is a typical cultural used in sacred events, and it is interesting to cultivate and promote to students related to the songket that Palembang has a distinctive traditional fabric. Songket comes from the Malay and Indonesian language, sungkit, which means "to hook" or "to pry" (Viatra & Triyanto, 2014). There are several types of Palembang songket motifs, namely the pucuk rebung motif, lepus motif, latitude motif (Sari & Putri, 2022) and Chinese flowers, cantik manis, pulir and others (Devella et al., 2020).

Preserving Indonesian culture is important in the 21st century (Pratiwi & Asyarotin, 2019). Collaborative skills are one of the key competencies of 21st century skills. To be accustomed to socializing and ready to work with anyone in the future, collaborative skills must be utilized (Oktaviani, 2022). To maximize each student's potential, students were asked to solve sharing tasks and jumping tasks through collaborative learning (Putri & Zulkardi, 2019). When learning in groups, students can

share ideas (Karimah et al., 2019). Students are taught to say "Please Teach Me" when asking questions in the context of collaborative learning (Sato, 2014).

To improve communication between teachers and students, learning media is a way to facilitate the teaching and learning process by using a tool as a delivery medium (Hada et al., 2021). The media prepared by the teacher must be visually appealing (Surur et al., 2018). Learning video can be used as a learning tool because it encourages students to share their original ideas (Febriani, 2017). Learning videos can be considered an effective learning resource because they clearly and concisely present concepts (Wisada et al., 2019).

Previous research on reasoning ability has been conducted by Khoirunnisa & Putri (2022) with integer material and Yusdiana & Hidayat (2018) with limit function material. While research focusing on reflection were conducted by Lestari et al., (2021) with the context of the sam poo kong temple in Semarang. The utilization of Palembang songket fabric in research were conducted by Sari & Putri (2022) and Devella et al., (2020) on rotation material. Utilizing learning videos in research were conducted by Pamungkas & Koeswanti (2022). However, there is still little research that develops videos using the context of Palembang songket fabric used in learning and assessment. The novelty of this study is the development of learning videos on reflection material using the cultural context of Palembang songket fabric with PMRI and collaborative learning. Therefore, the aim of this study is to develop a valid and practical learning video and to determine its potential effect on students' mathematical reasoning abilities.

METHODS

The purpose of this study is to develop a valid and practical learning video on reflection material using the Palembang songket fabric context, as well as to determine the potential effects of using learning videos on reflection material with the Palembang songket fabric context on students' mathematical reasoning skills. Therefore, this study used design research with the type of development studies. There are two stages of this research: preliminary and formative evaluation (Bakker, 2018). The formative evaluation stage includes self-evaluation, expert review, one-to-one, small group, and field test (Zulkardi, 2002).

There was one video that contained sharing tasks and jumping tasks and used reflection material, this is because reflection is related to everyday life, for example when looking in the mirror, this can make it easier for students because it is in line with their daily lives. The instruments used were (1) observation sheets, (2) test question grids, (3) test question cards, (4) test questions, (5) test question assessment rubrics and (6) interview guidelines. Three mathematics education academics and one mathematics teacher from Srijaya Negara JHS Palembang validated the research instruments and learning devices that were developed.

There were two meetings in this research. During the first meeting, students were shown a learning video that includes an explanation of Palembang songket fabric, sharing activities, and jumping exercises, and they are divided into groups of three to four persons each. In the second meeting, students were given two test questions about the context of Palembang songket fabric, along with reflection materials. This form of research is called design research or development studies. This study also employed the PMRI technique and collaborative learning. The topics used were 28 in class IX.B in the odd semester at Srijaya Negara JHS Palembang during the 2023/2024 school year. This research was done offline. This study used three indicators of mathematical reasoning ability as seen in Table 1.

Table 1. Indicators and descriptor of mathematical reasoning ability

Indicator	Descriptor
Make a conjecture	Students might express the information gathered from the provided problem
Mathematical manipulation	Students can answer difficulties by converting them from sentence form into mathematical form
Draw a conclusion	Students are able to reach conclusions that are consistent with the situation and can be accepted through reasoning

Data was collected through observation, test, and interviews. Observation is conducted through analyzing the video recordings during students' learning using learning videos on reflection material in Palembang songket fabric context. The test questions included two description questions to identify markers of mathematical reasoning ability based on student responses, and interviews were done to supplement the information from previous student responses.

Results of observation data were analyzed and using descriptive methods by describing activities that occurred during the learning process, for example seeing the expression of students' difficulties when working on problems. Meanwhile, the results of the test data were analyzed in three stages, namely making the answer key and rubric, checking student answers, and determining scores. The following is the scoring rubric given in Table 2:

Table 2. Scoring guidelines

Score	Scoring Indicator
4	Provide a thorough and correct solution.
3	Correct answer, but there is one important error in the solution.
2	Almost accurate response, but with multiple serious errors/deficiencies
1	The solution is incomplete but includes at least one right argument.
0	Incorrect answer/there is no response.

After making the scoring rubric in Table 2, the researcher assessed students' answers through these scores. Then, to analyze the answers to student test questions in determining the category of mathematical reasoning ability, the value of the answers to student test questions will be converted

based on qualitative value categories. The following categories are shown in Table 3 (Hasan & Iqbal, 2009).

Table 3. Categories of qualitative scores

Score	Category
81-100	Very good
61-80	Good
41-60	Enough
21-40	Less
0-20	Very Less

After being assessed, students' reasoning categories were grouped according to the categories in Table 3. Then, the next thing was to total the results by calculating the average of grouped data. After calculating, then it can be categorized as seen in Table 3. Interview data were analyzed using a descriptive method. The researcher listened to the interview recording, then the researcher compiled important dialogs into the interview transcript.

RESULTS AND DISCUSSION

The findings included a valid and practical learning video on reflection material using Palembang songket fabric context, as well as the potential effect on mathematical reasoning ability when using learning videos on reflection material using Palembang songket fabric context.

Preliminary Stage

The preliminary stage consists of preparation, analysis, and design. The preparation stage consisted of observing the research site, preparing learning devices and research instruments, contacting the school, determining research subjects with subject teachers, and taking care of research letters.

The analysis stage consists of five components, namely, students (to find out the abilities and characteristics of students based on information from teachers), curriculum (2013 curriculum), content (reflection material), media (using learning videos, because teachers are used to using media in the form of power points) and context (Palembang songket fabric).

Researchers made a learning video of reflection material in the context of Palembang songket fabric. Here is the initial prototype link that has been made: https://bit.ly/49p4A2Q.

Formative Evaluation Stage

Self-evaluation

In self-evaluation, products that had been made and designed in the previous stage will be reviewed or re-evaluated by the researchers themselves if problems arise and other things arise. The results of the evaluation by researchers were two revisions, namely: (1) Adding duration and (2) Editing

video titles. The results of the last self-evaluation were referred to as Prototype 1. Here is the link to prototype 1 that had been made: https://bit.ly/3SueTg2.

Expert Review and One to One

Mrs. Nur Elisyah, S.Pd., M.Pd, Mrs. Siti Nurhalizah, S.Pd., Mr. H. Muslimin Tendri, M.Pd, and Mrs. Refi Elfira Yuliani, S.Si., M.Pd. provided the following comments and suggestions during the expert review stage such as adding the original voice, explaining the Palembang songket fabric in the video, clarifying and providing a source for some images, slowing down the video, and enlarging the writing on question number 2.

It was tested one-to-one with three students of varying abilities. From the results of observations and interviews, it was suggested to enlarge the text and slow down the video. The revision results at the expert review and one to one resulted in a valid prototype 2. Here is the link to prototype 2 that has been made: https://bit.ly/3slOkyQ.

Small Group

It was tested on six students divided into two groups with varying ability. The results from observations and interviews suggested improving the writing and some colors on the background, improving some sounds, extending the duration, and improving the question pictures. The result of this stage was called prototype 3 which was valid and practical. Here is the link to prototype 3 that had been made: https://bit.ly/3Mw28hf.

Field Test

In the field test, there were two meetings conducted to this research. In the first meeting, the teacher divided the class into nine groups, each group consisting of three to four students with heterogeneous ability levels. Then, the teacher provided a video that contained questions regarding the reflection material and the context of Palembang songket fabric. Students were asked to complete sharing tasks and also jumping tasks in groups. Students were given a learning video that had been valid and practical. In the second meeting were given mathematical reasoning ability test questions.

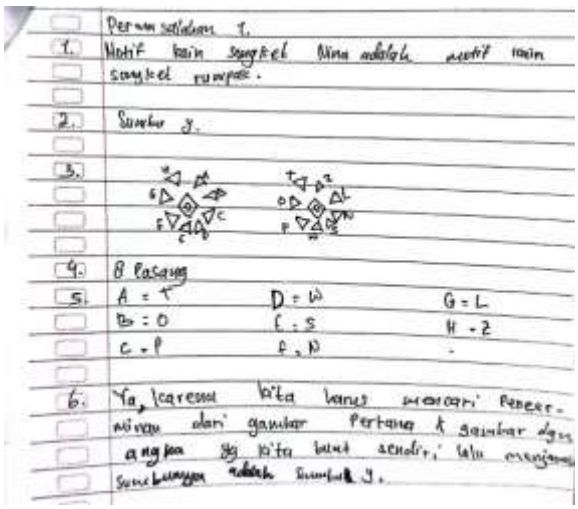
The researcher relateds a real context, one of which was the context of Palembang songket fabric. This problem consisteds of several tiered questions that can help students to write down the details of the problem, apply mathematical models to solve it, and draw a conclusion. Here is Figure 1 about the problem displayed in the learning video.

Translated into English:

1. What is the information in the question?
2. What axis is mirrored in the the following figure?
3. Draw it again and fill in the sketch by giving different letters to the triangles.
4. How many pairs of mirroring results are there?
5. What are the pairs of mirroring letters?
6. Is it clear that there is "Mirroring" material in this problem? If so, please explain.

Figure 1. Sharing task problems on reflection material with Palembang songket fabric context

Figure 1, asked questions on sharing task issues in the order listed from point 1 to point 6. Students were asked for any information they might have about the topic at the first point. Students were asked to respond with what the axis means in Point 2. Students were instructed to redo the sketch at point three, filling in each triangle with a different letter. Students were asked to count how many pairs of reflection results there were in Point 4. Students were asked to identify any pairs from the reflection in point number five, and they had to draw conclusion about the reflections in question in point number six. The following are the responses to points 1 through 6 from group 1 that are displayed in Figure 2**.**

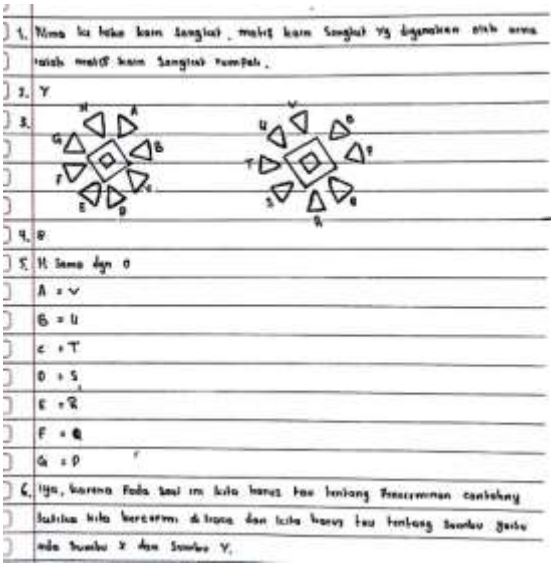


Translated into English:

1. The songket Nina motif is a songket Rumpak motif.
2. The y-axis
4. 8 pairs
6. Yes, because we have to find the mirroring of the first image and the image with the number that we made ourselves and then answer that the axis is the y-axis.

Figure 2. Sharing task answer (Group 1)

In Figure 2, there is an answer from one of the students in group 1, for the conjecture indicator, the student reached a score of 4 because the student can express what is known from the problem correctly and precisely from question number 1. For the mathematical manipulation indicator, students can answer all questions correctly and precisely from questions number 2 to 5, therefore the score was 4. Finally, on the indicator of draw a conclusion, students got a score of 4 because they had answered correctly and precisely from question number 6. So, group 1 gets a score of 12.

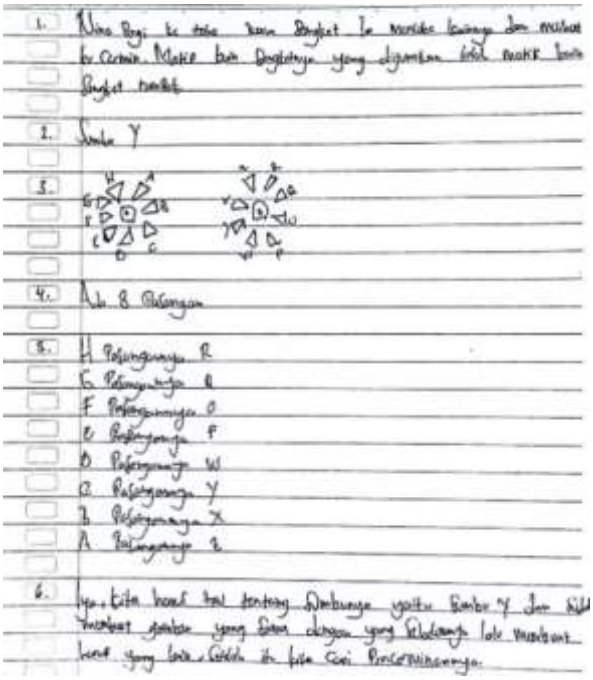


Translated into English:

1. Nina goes to the songket cloth shop, the motif used by Nina is the songket rumpak motif
5. H equals O
6. Yes, because in this problem we have to know about mirroring, for example when we look in the mirror and have to know about the axes, namelny the x-axis and the y-axis.

Figure 3. Sharing task answer (Group 3)

Figure 3 shows one of the students in group 3. The answer from group 3 shows that for the conjecture indicator, they got a score of 4 because they had described the information correctly and precisely in question number 1. In the mathematical manipulation indicator, students can answer questions correctly and precisely in numbers 2 to 5 so that had 4 score. Then, in number 6, students can draw a conclusion, with a 4 score. The total score obtained was 12.



Translated into English:

1. Nina went to the songket shop. She tries it on and looks in the mirror. The songket motif she used is the songket rumpak motif.
2. Y-axis
4. There are 8 pairs
   H is the pair R
   G is the pair Q
   F is the pair O
   E is the pair P
   D is the pair W
   C is the pair Y
   B is the pair X
   A is the pair Z
6. Yes, we have to know about the axis which is the Y axis and have made the same drawing as the next one, then make another letter, after that we find the mirroring.

Figure 4. Sharing task answer (Group 4)

Figure 4 is one of the student answers from group 4. The student can put forward information from the problem according to question number 1, so the student had 4 score on indicator of making a conjecture. Then, in questions 2 to 5, students can answer questions correctly and precisely, so students

got a score of 4. In question 6, students were asked to draw conclusion and had answered correctly, so they got 4 points. Then the total obtained by group 4 was 12 points.

The Palembang songket fabric serves as the context for this second problem. It was utilized because students can relate their problems to mathematics since it is frequently linked to real-world situations. This was the second installment of the reflective video learning material that made use of the Palembang songket fabric's context.

Translated into English:

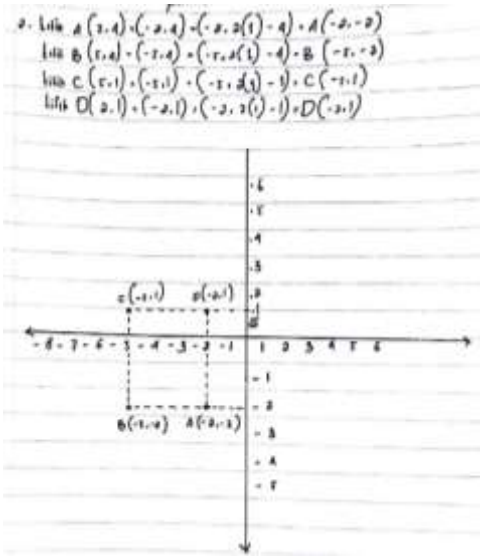
Ms. Nanda went to a mall with her family. There was an exhibition of fabrics, one of them was songket. Here is one of the illustrations of songket fabric that she saw.

Translated into English:

Determine the result of reflection on the y-axis and then plot the result in cartesian coordinates.

Figure 5. Jumping task problems on reflection material with Palembang songket fabric context

In Figure 5 there was a jumping task problem. The student's task in this problem is to calculate the reflection's outcome against the y axis and move on to y = 1. Additionally, the student was required to make the outcome in cartesian coordinates. The student's solution to the Jumping Task issue was provided here.

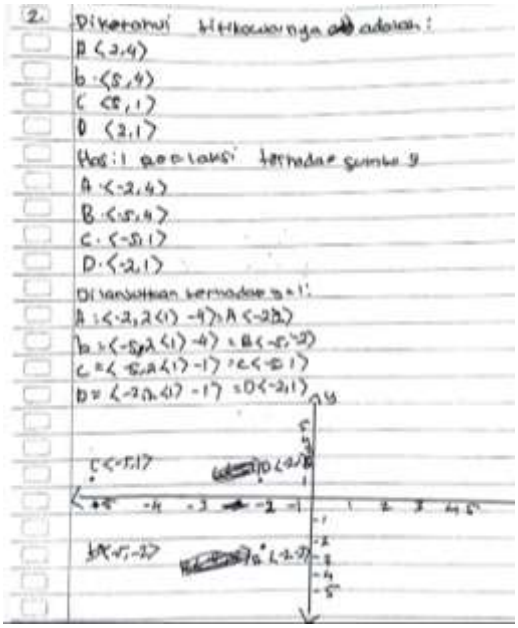


Translated into English:

Point A (2,4) = (-2,4) = (-2, 2(1)-4) = A (-2, -2)
Point B (5,4) = (-5,4) = (-5, 2(1)-4) = B (-5, -2)
Point C (5,1) = (-5,1) = (-5, 2(1)-1) = C (-5, 1)
Point D (2,1) = (-2,1) = (-2, 2(1)-1) = D (-2, 1)

Figure 6. Jumping task answer in Group 2

Figure 6 is the answer from one of the students in group 2. For the conjecture indicator, the student had answered correctly, this can be seen from the student who had written each initial coordinate point correctly so he got 4 points. In the mathematical manipulation indicator, the student had completed correctly and correctly from the requested problem, which was mirrored to y = 1, so he got 4 points. Then, on the indicator of draw a conclusion also got 4 points because the student had written the conclusion of the results into coordinate points as requested in the question. Then, the student got 12 points.

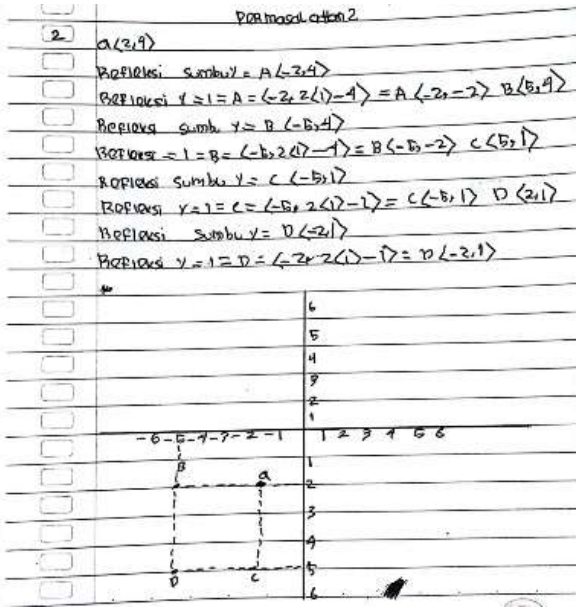


Translated into English:

- The starting point is known:
- The result of reflection about the y-axis
- Continued against y = 1

Figure 7. Jumping task answer in Group 5

Figure 7 is the answer from one of the students from group 5. For the conjecture indicator, the student received a score of 4 because he had written the initial coordinates correctly and precisely. As for the mathematical manipulation indicator, the student also received a score of 4 because he had answered the question correctly and the formula used was correct. Then for the indicator of draw a conclusion, the student got a score of 4 because he had written the final coordinates into the cartesian coordinates. Then the score obtained was 12.



Translated into English:

A (2,4)
Reflection of y-axis = A (-2,4)
Reflection of y = 1 = A = (-2, 2(1)-4) = A (-2, -2)

B(5,4)
Reflection of y-axis = A (-5,4)
Reflection of y = 1 = A = (-5, 2(1)-4) = B (-5, -2)

C(5,1)
Reflection of y-axis = A (-5,1)
Reflection of y = 1 = A = (-5, 2(1)-1) = C (-5, 1)

D(2,1)
Reflection of y-axis = A (-2,1)
Reflection of y = 1 = A = (-2, 2(1)-1) = D (-2, 1)

Figure 8. Jumping task answer in Group 1

Figure 8 is one of the answers from group 1 students. In the conjecture indicator, the student received a score of 4 because he had written back information, namely the initial coordinates of the problem correctly and precisely. While in the mathematical manipulation indicator, the student got 4 points because he had answered and used the formula correctly and correctly. While in the indicator of drawing a conclusion, the student still had a mistake in writing the last coordinate point into cartesian coordinates, so he gets 1 point. Therefore, the student received 9 points.

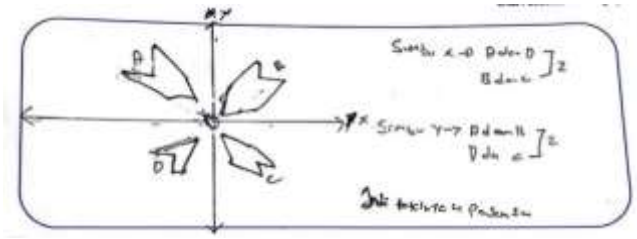
Next, there are two mathematical reasoning ability tests given to students.

Translated into English:

Ms. Nanda went to a mall with her family. There was an exhibition of fabrics, one of which was songket. Here is an illustration of one of the songket fabrics that she saw. Draw a picture of the results of mirroring the x and y axes in the picture and name and also, count the number of pairs!

Figure 9. Test question number 1 on reflection material with Palembang songket fabric context

In Figure 9, test question number 1 contains questions about the results of mirroring the x-axis and y-axis in the image and was asked to name and calculate the number of pairs. The following are the answers from students with high, medium and low abilities in Figure 10, Figure 11, and Figure 12.

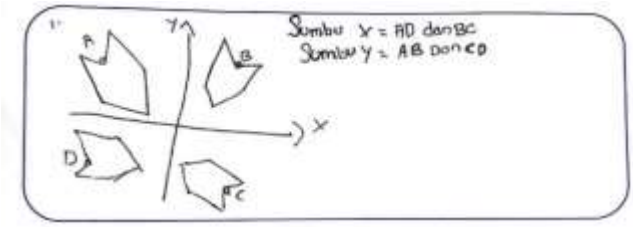


Translated into English:

X-axis = A and D (there are 2)
B and C
Y-axis = A and B (there are 2)
D and C
So, 4 pairs in total

Figure 10. MR student's answer on question number 1 (High)

In Figure 10, MR students had 4 score from the indicator for submitting a hypothesis because it was evident that they had completely and accurately rewritten the information on the question, that is, they had rewritten the picture to indicate the location of the x and y axis. The student then wrote all of the reflections on the axis x, including A, D, and B, as well as C. The reflections on the y axis, on the other hand, were A, B, and D and C. MR received 4 score on the mathematical manipulation indicator. Then, the student got a score of 4 on the draw a conclusion indicator because he had made the correct conclusion, namely 4 pairs with 2 pairs each. So, the total score obtained was 12.

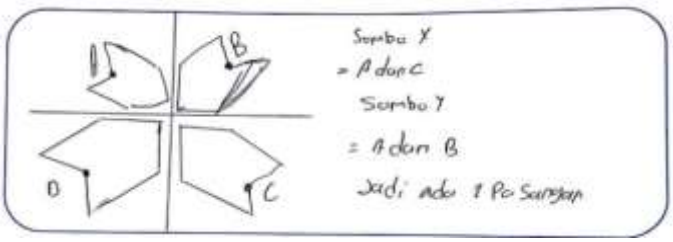


Translated into English:

X-axis = AD and BC
Y-axis = AB and CD

Figure 11. SF student's answer on question number 1 (Medium)

Figure 11 shows the answer of student SF. When an SF student submitteds an indicator, it is assumed that they had rewritten the question completely and accurately. They had recreated the picture to accurately write the layout of the axis x and y. Based on this, the SF student receiveds a score of 4 for the conjecture indicator. Next, SF students accurately and completely identified the reflections on the x axes, which were A and D as well as B and C. Similarly, they identified the reflections on the y axes, which were A and B as well as C and D, in the mathematical manipulation indicator. SF received a score of 4 on the mathematical manipulation indicator as a result. There are indicators for the conclusion after that. The SF student received a score of 0 for the response above because the student did not write a conclusion at all. As a result, the first question awarded the SF student 8 points.

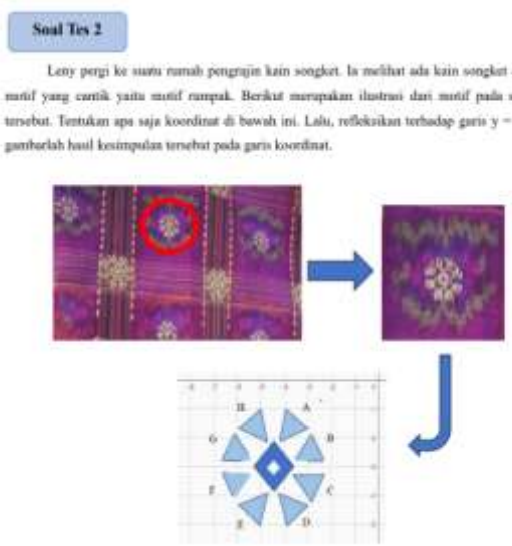


Translated into English:

X-axis
=A and C
Y-axis
=A and B
So, there are 2 pairs

Figure 12. RR student's answer on question number 1 (Low)

Figure 12 depicts the answer from student RR. RR students received a score because, as can be seen from the indicators for making conjectures, they had rewritten the information in the question, but it was incomplete and incorrect because they had not noted the locations of the x- and y-axes accurately. Then, indicators of mathematical manipulation included the fact that RR students had not accurately and fully indicated what the reflections on the x- and y-axes were. Students from RR provided incorrect answers for the x axis, A and C. On the other hand, there was only one right answer for the y-axis reflection, and it was A or B. Therefore, the mathematical manipulation indicator gave RR students a score of 1. There are indicators for conclusion after that. Although student RR wrote a conclusion in the response above, there were still mistakes in the response, thus the student only received a score of 1. As a result, SF students received 4 points for answering Question 1.



Translated into English:

Leny went to a songket craftsman's house. She saw a songket cloth with a beautiful motif, the rumpak motif. Here is an illustration of the motif on the songket. Determine what are the coordinates below.Then, reflect the line y = -x and draw the conclusion on the coordinate line.

Figure 13. Test question number 2 on reflection material with Palembang songket fabric context

Figure 13 shows test question 2, where this question determines the initial coordinates, then reflects on y = -x and makes the point into the coordinate line. The following are the answers from students with high, medium and low abilities in Figure 14, Figure 15, and Figure 16:

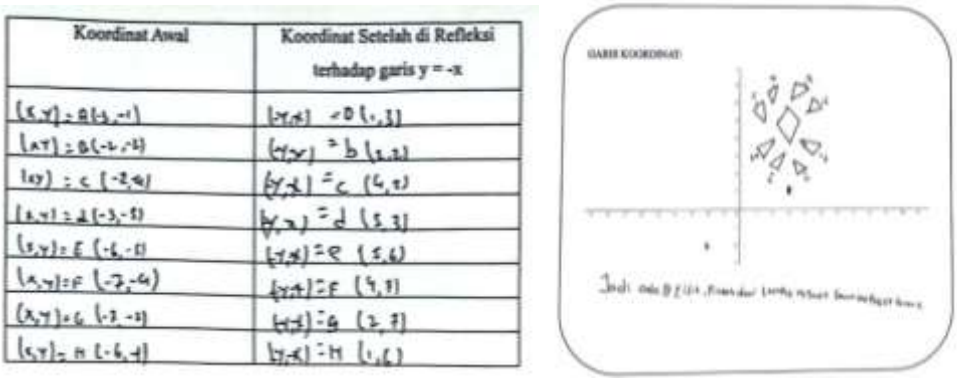


Figure 14. MR student's answer on question number 2 (High)

Figure 14 is the answer from student MR. The MR student receives four points for the indicator of make a conjecture, because it is evident that he has rewritten the information in the question completely and accurately. Specifically, he is able to write down all of the initial coordinates from point A to point H. Additionally, MR students recorded the coordinate results for the mathematical manipulation indicator in the Cartesian coordinate line following reflection on the line y = -x. Since MR students wrote every response accurately and completely from point A to point H, they received 4 points. Then, MR students received four points for writing their conclusion accurately and completely in response to the indicator of draw a conclusion. Therefore, MR Students receive 12 points for answering question number 2.

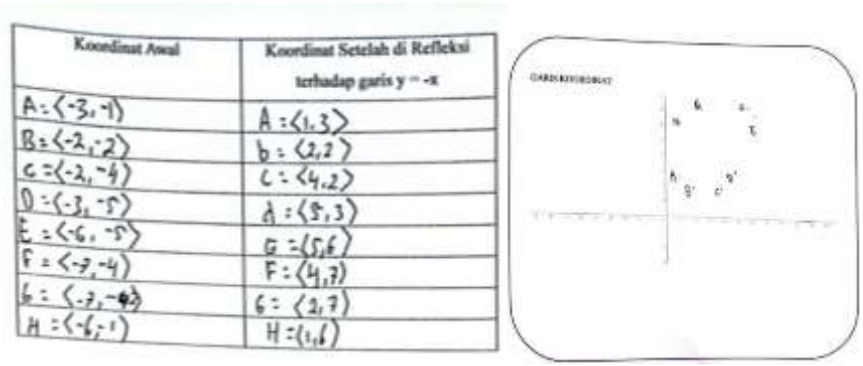


Figure 15. SF student's answer on question number 2 (Medium)

Figure 15 shows the answer of student SF. As can be seen, the indicator of make a conjecture that the student from SF has rewritten the question entirely and accurately, which involves reconstructing the image so that the x- and y-axes positions can be recorded. The student has 4 score from the indicator of making a conjecture. Next, in order to demonstrate mathematical manipulation, SF students have also fully and accurately indicated the reflections on the x-axis, which are A, D, B, and C, as well as the reflections on the y-axis, which are A, B, C, and D. SF students receive a score of 4 on the mathematical manipulation indicator as a result. There are indicators for conclusion after that. The SF student received 0 score for the response above because the student did not write a conclusion at all. As a result, the first question awarded the SF student 8 points.

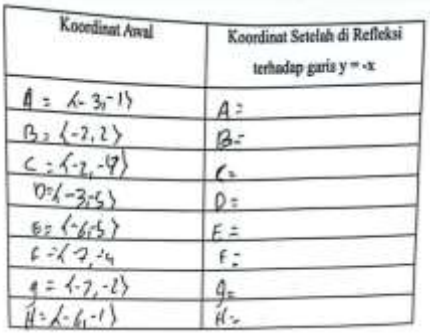


Figure 16. RR student's answer on question number 2 (Low)

The following is student RR's answer in Figure 16. While it is evident that student RR has completely rewritten the question, there is one mistake at point B, where the correct value should be B = (-2, -2). Despite this, student RR receives three points for the making a conjecture indicator. Additionally, as a sign of mathematical manipulation, student RR did not draw any pictures on the coordinate line or record the results of the coordinates after reflection on the line y = -x. As a result, Student RR receives a zero. Then, RR students received zero points for the indicator of drawing a conclusion because they failed to record their conclusion. Thus, Student RR received 3 points for answering question number 2.

The exam findings revealed that 28 students in test question number 1 showed indicators of making a conjecture, 25 showed indicators of mathematical manipulation, and 17 showed indicators of drawing a conclusion. In test question number two, 28 students demonstrated indicators of making a conjecture, 23 displayed indicators of mathematical manipulation, and 13 displayed indicators of drawing a conclusion. Table 4 shows the emergence of students' mathematical reasoning markers.

Table 4. The occurrence of Student Mathematical Reasoning Indicators

Indicator	Total students who complied	
	Test Question 1	Test Question 2
Make a conjecture	28	28
Mathematical manipulation	25	23
Draw a conclusion	17	13

In Table 4, the most appeared in the making a conjecture indicator with 28 students in question 1 and 28 students also in question 2, but the least appeared was the draw conclusion indicator with 17 students in question 1 and 13 students in question 2. After calculating each number of students who brought up the indicators in Table 4 above, then calculate the value. Table 5 is a qualitative calculation of students' mathematical reasoning ability.

Table 5. Qualitative assessment of students' mathematical reasoning ability

Value	f_1	f_2	f_{total}
81-100	12	9	21
61-80	8	7	15
41-60	4	7	11
21-40	2	2	4
0-20	2	3	5

Information:

f_1: Total students on number 1

f_2: Total students on number 2

f_{total}: $f_1 + f_2$

After calculating the number of students in Table 5, the next is to calculate the final average to find out what the category is. Table 6 is the average of students' mathematical reasoning ability.

Table 6. Average Mathematical Reasoning Ability of Students

Value	f_{total}	x_i	$f_{total.}\ x_i$	Average
81-100	21	90,5	1900,5	65,81
61-80	15	70,5	1057,5	
41-60	11	50,5	555,5	
21-40	4	30,5	122	
0-20	5	10	50	
	56		3685,5	

Students of class IX.B Srijaya Negara JHS Palembang had good mathematical reasoning ability. The average was 65,81 after receiving the learning video of reflection material using the context of Palembang songket fabric, cooperative learning method, and PMRI approach, as shown in Table 4, Table 5, and Table 6.

Learning Video (Valid and Practical)

The learning video utilized for this study included reflection questions with a Palembang songket fabric context. Learning videos can be used as a teaching tool because it encourages students to think creatively (Febriani, 2017). This study had been modified to take into account the tenets and features of both PMRI and collaborative learning. Two mathematics problems were included in one of the learning video's contents. This is related to PMRI because it is connected to actual issues. PMRI allows students to make a direct connection between real-world experiences and formal mathematics by using real-world contexts or activities (Dewi & Agustika, 2020). The learning videos used had two tasks: sharing and jumping tasks. In order to maximize each student's potential, group learning requires that students ask questions about learning sharing tasks and jumping tasks using collaborative learning (Putri & Zulkardi, 2019). The problems given to students were problems related to mirror reflection and had been illustrated from pictures and there were also problems that relate to the cartesian plane. This is in accordance with Jamil (2019) who says that the reflection results come from the mirror on the cartesian plane and the point will experience a displacement using the mirroring properties. This problem's content was tied to the context in which it was applied Palembang songket fabric, specifically.

Three phases of the research had been finished by the researchers: preparation, analysis, and design. In this research, five components have been analyzed thus far: the student analysis, curriculum analysis, content analysis, media analysis and context analysis. The researcher then created the video's opening. The researcher then reviewed and edited the previously created learning videos during the self-evaluation phase. Researchers validated the instrument with three math teachers and lecturers from SMP Srijaya Negara's class IX during the expert review phase. The one-to-one phase comes next, in which three students with a range of skill levels served as the trial's subjects. The learning video was deemed

valid once the researcher made revisions based on the feedback from the expert review and one-on-one phases. This is a translation of Mashuri & Budiyono's (2020) assertion that the development of learning media can be improved using validation. The following step is small group, where six students are split into two groups of three members each with a range of abilities so they can assess the usefulness of the instructional video. The evaluation phase, which included expert review, one-on-one interviews, small groups, and self-evaluation, has now been finished by the researchers. The reflection material learning video that used Palembang songket fabric as a context was deemed valid and practical based on the explanation provided above. The learning video of reflection material that uses Palembang songket fabric as a context is considered valid and practical based on the explanation given above with the learning video criteria, namely (1) there was a song that accompanies the researcher's original voice (2) the duration of the video is 4 minutes, and (3) the video contains an explanation of songket fabric, sharing tasks and jumping tasks.

Potential Effects of Developed Learning Videos

There were two meetings in the field stage. In the first stage, students were asked to work on problems in groups. In the second stage, they were given a learning video containing sharing tasks and jumping tasks on reflection material with the context of Palembang songket fabric. Students were given a two-problem test during the second meeting. The purpose of this second meeting was to find out how good their mathematical reasoning skills were. Both test questions had been adapted to PMRI and mathematical reasoning ability. Both of these questions related to mirror reflections. The second problem related to the problem given by producing to the cartesian plane. This is also stated by Jamil (2019) that the point experiences displacement by using the mirroring properties and the reflection results come from the mirror on the cartesian plane. The indicators of making a conjecture, mathematical manipulation, and drawing a conclusion were the indicators used.

Making a Conjecture

In questions number 1 and 2 there were 28 students who could make a conjecture. This is because students were able to identify important information in the video provided. This is consistent with Nusantara et al., (2024) assertion that, in an indicator of making conjecture, students can examine the specific information obtained from the problem given.

Mathematical Manipulation

There were 25 students who could show mathematical manipulation indicator in problem 1 and 23 students who can show mathematical manipulation indicator in problem 2. Students can come up with this indicator because through learning videos students can estimate how problems can be solved.

This is in accordance with Jannah et al., (2020) who said that indicators of mathematical manipulation will increase if students are given problems that allow them to estimate how the problem will be solved.

Drawing a Conclusion

Only 17 students from problem 1 and 13 students from problem 2 could show the indicator of drawing a conclusion. However, some students did not write a conclusion. They did not write conclusions because they forgot. In addition, they feel they have found the final answer without needing to interpret it back into verbal language. So, it can be concluded that students are not used to writing conclusions every time they solve problems. Sulistiawati et al., (2018) findings says which found that Students sometimes do not write their conclusions because they have found the results without having to interpret them.

Although some students had not demonstrated the indicators perfectly, the use of learning videos on reflection material with Palembang songket fabric context had been deemed beneficial to the mathematical reasoning ability of students in class IX.B at Srijaya Negara JHS Palembang.

CONCLUSION

Learning videos on reflection material with Palembang songket context had been declared valid and practical. With its characteristics, namely using researcher's original voice accompanied by a song, sharing task, and jumping task, an explanation of Palembang songket fabric. Furthermore, the developed learning videos focus on reflection material, utilize the Palembang songket context, and the level of difficulty of application and reasoning. The potential effect obtained through the test showed a value of 65.81 which stated that students' reasoning skills were good, with the most frequent making a conjecture indicator and the least frequent is drawing a conclusion indicator. Future research can develop interactive learning videos to better engage students in interacting among students.

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