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# Development of learning video comparison using Palembang *jumputan* context to determine students' mathematical reasoning

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## Abstract

The importance of learning videos on comparison materials in the context of Palembang *jumputan* fabric as a starting point for learning so that students have good mathematical reasoning ability. The purpose of this research is to produce a learning video on comparison using the context of Palembang *jumputan* fabric that is valid and practical and to determine the potential effect of using a learning video on comparison using the context of Palembang *jumputan* fabric on students' mathematical reasoning ability. This research uses the *Pendidikan Matematika Realistik Indonesia* (PMRI) and collaborative learning approaches. This type of research is a design research type of development study. The subjects of this study were 37 seventh-grade students at Srijaya Negara Junior High School, Palembang. The data collection techniques were observation, tests, and interviews, which were analyzed descriptively. This research produced a learning video on comparison material using the context of Palembang *jumputan* fabric that was valid and practical, and the potential effect of using learning videos on students' mathematical reasoning skills was classified as good, with an average value of 67.52. Using learning videos on comparison materials in the context of Palembang *jumputan* fabrics makes students' mathematical reasoning skills classified as good.

**Keywords:** comparison; learning video; mathematical reasoning; Palembang *jumputan*

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## Introduction

Comparison material is very important in mathematics or in real life (Saputri, 2019). This is because comparison material is useful in everyday life, for example in making maps and location plans (Agnesti & Amelia, 2020). In making a food using a comparison of the amount of flour and sugar shows one of the comparison concepts that are often found in everyday life (Hamidah et al., 2017). Students can gain experience and challenges in solving non-routine problems in comparison material related to real life (Dewantara, 2018). From these various opinions, it can be seen that the importance of comparison material for students.

However, in fact comparison material is still considered difficult by seventh grade students where student test results are still below the KKM (Sari, 2020). Students still have difficulty in distinguishing value comparison from inverse value comparison (Nufus et al., 2022). Students think that comparison material needs to memorize a lot of formulas, making it difficult to find solutions (Izzabella & Amin, 2017). Students are also still mistaken in making their mathematical models (Larasati & Mampouw, 2018).

The difficulty experienced by students in learning comparison material is due to learning only using books, so a medium is needed in the form of a learning video (Malianor et al., 2022). Teachers also still use the lecture method by giving formulas directly to students, so students become passive in learning activities (Kunta et al., 2023). Students only listen to the explanation and record the material delivered by the teacher, so the interaction between students is lacking (Asia & Slamet, 2021). Learning activities like this make students less interested in participating in learning.

One of the abilities that students must have in learning comparison material is mathematical reasoning ability (Saputri et al., 2017). Mathematical reasoning ability enable students to understand concepts and solve problems (Putri et al., 2022). In learning mathematics, mathematical reasoning skills are very important in order to solve mathematical problems and provide conclusions based on existing truths (Windiyarti et al., 2022). Therefore, mathematical reasoning ability need to be possessed by students.

Based on research conducted by Windiyarti et al. (2022), it was found that students' mathematical reasoning ability on comparison material were in the low category with an average percentage score of 55.03. Students in Indonesia on average can answer correctly questions that require reasoning only 17% (Saputri et al., 2017). The low mathematical reasoning ability of students is caused by most teachers who still use traditional approaches in learning mathematics (Kusuma, 2023). Math learning will be more fun if it is related to everyday life (Khoirunnisa & Putri, 2022).

The use of the Realistic Mathematics Education (RME) approach can improve mathematical reasoning ability because it starts with a real context (Palinussa et al., 2021). In Indonesia, RME is known as *Pendidikan Matematika Realistik Indonesia* (PMRI). In the PMRI approach, learning activities begin with sharing tasks that contain leveled questions, then working on jumping tasks that contain problems with higher levels of difficulty (Nurazizah & Zulkardi, 2022). The use of context is included in the characteristics of PMRI (Agusta, 2021). Learning in the PMRI approach starts from real events that have been experienced by students

(Mubharokh et al., 2022). The use of contextual problems makes students more familiar with the problems given, so that it can help students learn to identify comparisons in everyday life (Utari, 2017). One of the typical cultural contexts of Palembang is Palembang *jumputan* fabric which has its own characteristics and peculiarities both in terms of color and motif (Dewi et al., 2022). From the explanation above, Palembang *jumputan* fabric can be used as a context in learning on comparison materials.

One of the most influential fields in the 21st century is education. 21st century learning in the field of education is needed in order to create a 21st century generation that has various abilities, one of which is collaboration (Mardhiyah et al., 2021). In collaborative learning, students discuss and work in a small group in solving problems given by the teacher where all group members must actively discuss (Parwati & Mulyati, 2021). Collaborative learning is learning in groups where each group member provides opinions, ideas, experiences, information, ability, and abilities so that all group members can understand (Putri & Silalahi, 2018). Students say "Please Teach Me" or similar sentences to their friends who understand (Sato, 2014). Students are formed into 4 people in each group (Nabila & Putri, 2022). Collaborative learning consists of two tasks, namely sharing tasks which are individual tasks in a small group that contain basic material, and jumping tasks which contain problems to improve students' abilities (Fatimah et al., 2018). For students, learning becomes fun when combining collaborative learning and PMRI approach (Nabila & Putri, 2022). Therefore, collaborative learning and PMRI approach can be applied together.

Technological advances are very influential in the world of education (Ismi & Ain, 2021). Along with the development of increasingly advanced technology, it requires an innovation that can make students easily understand learning materials (Malianor et al., 2022). So that the world of education is not outdated, teachers are asked to make the right learning media for students in 21st century learning (Farida, 2019). Through the help of learning media, it is easier for students to understand comparison material (Diantika & Mampouw, 2021). Media can also make the implementation of learning more fun, easier, and not boring (Puspita et al., 2023). Learning videos can be used as media because students can more easily understand learning materials and achieve learning objectives (Nuritha & Tsurayya, 2021). Learning videos can also make students have good mathematical reasoning ability (Nabila & Putri, 2022). In the learning process, video media is needed as a complement (Rahmawati & Putri, 2022). This learning video contains images, text, animation, and sound, so that it can make students interested in participating in learning activities (Widyastuti et al., 2022). Based on these various opinions, learning videos are also needed in learning activities.

The importance of learning videos on comparison material with the context of Palembang *jumputan* fabric as a starting point for learning so that students' mathematical reasoning skills are good. There is previous research on the use of learning videos to determine students' mathematical reasoning ability in various materials by Khoirunnisa and Putri (2022) on integer material, while research by Nabila and Putri (2022) on number pattern material. Previous research that discusses comparison material in various contexts has been conducted by Utari (2017) with the context of empek-empek recipes, while research by Palinusssa et al. (2021) used a rural context. Research that discusses *jumputan* fabric has been conducted by

Septimiranti et al. (2022) on the material of the sine and cosine rules. However, in previous studies there has been no research that combines learning videos, comparison materials, Palembang *jumputan* fabric context, and mathematical reasoning ability. Therefore, researchers want to conduct research on "Development of learning video comparison using Palembang *jumputan* context to determine students' mathematical reasoning". This research aims to produce a learning video on comparison material using Palembang *jumputan* context that is valid and practical, and to determine the potential effect of using a learning video on comparison material using Palembang *jumputan* context on students' mathematical reasoning ability. This research also uses the PMRI approach and collaborative learning. This research is expected to be an innovation in mathematics learning that can facilitate students in understanding comparison materials and to be able to solve everyday problems related to comparison materials.

## Methods

The purpose of this research is to produce a learning video on comparison using the context of Palembang *jumputan* fabric that is valid and practical, and to determine the potential effect of using a learning video on comparison using the context of Palembang *jumputan* fabric on students' mathematical reasoning ability. This research also uses PMRI and collaborative learning approach. This type of research is design research type development studies. The subjects of this study were 37 seventh grade students at Srijaya Negara Junior High School, Palembang, South Sumatra, Indonesia. The research instruments and learning devices made have been validated by three mathematics education lecturers and one mathematics teacher at Srijaya Negara Junior High School Palembang. There are three indicators of mathematical reasoning ability and descriptors used in this study which can be seen in Table 1.

**Table 1.** Indicator and descriptor of students' mathematic reasoning ability

| Indicator | Descriptor |
|-----------|------------|
| Make a conjecture | Students are able to express the information obtained from the given problem |
| Mathematical manipulation | Students can convert problem sentences into mathematical language to find solutions to problems |
| Draw a conclusion | Students can write conclusions that are accepted by reasoning and in accordance with the problem |

Table 1 shows that there are three indicators of mathematical reasoning ability used in this study, namely make a conjecture, mathematical manipulation, and draw a conclusion. The learning video development procedure used in this study consists of two stages, namely the preliminary stage and the formative evaluation stage (Bakker, 2018). In the preliminary stage, there are three stages, namely preparation, analysis, and design. The formative evaluation stage consists of self-evaluation, expert review, one to one, small group, and field test (Zulkardi, 2002).

Data collection techniques used in this study were observation, tests, and interviews. Observations were made directly and through video recordings during learning using learning videos on comparison materials using the context of Palembang *jumputan* fabric. Test questions containing two description questions were given to students to see the indicators of mathematical reasoning ability that emerged. Interviews were conducted with two male students and one female student to obtain additional information or data regarding students' test answers.

Observation data was analyzed descriptively, which describes and describes the situation of student activities during learning, such as student expressions when experiencing difficulties and when students convey the knowledge they have gained. The interview data was analyzed descriptively, namely the researcher re-listened to the recording during the interview, then the results were written into the interview transcript which contained only the necessary conversations. The test data that has been obtained will be analyzed descriptively using the following steps: (1) making the answer key along with the scoring rubric; (2) checking students' answers based on the answer key; (3) determining the score of the students' answers according to the scoring guidelines. Table 2 shows the scoring guidelines used in this study.

**Table 2.** Scoring guidelines for students' mathematical reasoning ability

| Score | Scoring Indicator |
|---|---|
| 4 | Perfect answer, correct and complete solution |
| 3 | Correct answer, but there is one error in the solution |
| 2 | Almost correct answer, but there is more than one error/deficiency in the solution |
| 1 | Incorrect answer, but there is one correct explanation |
| 0 | Incorrect answer, completion does not contain any response |

In Table 2 there are scoring indicators from each of these scores which are used to determine the score on each indicator of mathematical reasoning ability. The scores of students' answers were converted into grades. Table 3 shows the categories of mathematical reasoning ability based on the scores obtained by students.

**Table 3.** Categories of qualitative scores for students' mathematical reasoning ability

| Value | Categories |
|---|---|
| 81 – 100 | Very good |
| 61 – 80 | Good |
| 41 – 60 | Enough |
| 21 – 40 | Less |
| 0 – 20 | Very less |

In Table 3 there are five value categories, namely very good, good, enough, less, and very less which are used to group each student's score. For each value, the frequency will be obtained, then find the average using the group data average formula. The average obtained will be categorized back into Table 3.

# Results

The results obtained from this research are learning videos on comparison materials using the context of Palembang *jumputan* fabrics that are valid and practical, and have a potential effect in the use of learning videos on comparison materials using the context of Palembang *jumputan* fabrics on students' mathematical reasoning ability. Researchers developed a learning video on comparison materials using the context of Palembang *jumputan* fabrics through two stages, namely the preliminary stage and the formative evaluation stage.

## Preliminary stage

The Preliminary stage consists of three stages, namely preparation, analysis, and design.

### Stage 1: Preparation

At this stage, researchers need to prepare several things as follows: (1) preparing drafts of research instruments consisting of observation sheets, grids and test question cards, mathematical reasoning ability test questions, test question assessment rubrics, and interview guidelines, (2) preparing drafts of learning devices, (3) observing the research site by contacting the school, namely the mathematics teacher to ask about the research time and research subjects, and (4) taking care of research letters or other needs.

### Stage 2: Analysis

Researchers analyzed five components, namely students, curriculum, content, media, and context. Analysis of students in learning mathematics has the aim of knowing the characteristics of students, so it is obtained that the ability of students is heterogeneous based on information from teachers. The curriculum used is the independent curriculum. The comparison material was chosen in this study because it is very related to real life and is found in grade VII. The teacher only uses powerpoint as media, so a learning video is needed. The context used is Palembang *jumputan* fabric because during the coloring process there is a comparison of the amount of dye used, so it is in accordance with the comparison material.

### Stage 3: Design

Researchers created an initial learning video design called a prototype that focused on content, construct, and language. The initial prototype that has been made by researchers can be seen in the following link: https://bit.ly/3QqhWTG

## Formative evaluation stage

The formative evaluation stage consists of five stages, namely self-evaluation, expert review, one to one, small group, and field test.

### Stage 1: Self-evaluation

Researchers evaluated the learning video that had been made, so there were several things that had to be revised, namely as follows: (1) improve the sentences in the sharing task, (2) fix typos in the instructions section, (3) add a jumping fabric image to the jumping task, (4) add the Sriwijaya University logo, and (5) extend the duration of the learning video. After the

learning video is revised, the product is said to be prototype 1 which can be seen in the following link: https://bit.ly/47mfGnj

### Stage 2: Expert review

A total of four validators, namely Mrs. Siti Nurhalizah, S.Pd., Dr. Refi Elfira Yuliani, S.Si., M.Pd., Dr. H. Muslimin Tendri, M.Pd., and Mrs. Nur Elisyah, S.Pd., M.Pd. provided comments and suggestions regarding the prototype 1 that had been made. The comments and suggestions from the validators are as follows: (1) add an explanation of the context of Palembang *jumputan* fabric, (2) delete the numbers in the table contained in the sharing task, (3) the learning outcomes must be made complete, (4) improve the color display in the video to make it more attractive, (5) improve the sentence layout, (6) add video duration, and (7) add the original voice of the researcher.

### Stage 3: One to one

In the one-to-one stage, prototype 1 was tested with three seventh grade students who have heterogeneous abilities to find out the difficulties and opinions of students regarding the learning video that has been made. The results of observations and interviews with the three students are as follows: (1) the sentence in the second problem is still difficult to understand, (2) the writing on the video is clear and the video is good, and (3) the video is still too fast. After the product was revised based on suggestions from validators and students, a valid prototype 2 was obtained in terms of content, construct, and language. Prototype 2 can be seen in the following link: https://bit.ly/49mYhwB

### Stage 4: Small group

At the small group stage, prototype 2 was tested on six students who were divided into two groups, each group consisting of three students with heterogeneous abilities. The results of observations and interviews at the small group stage are as follows: (1) the sentences and tables in the first problem are still difficult to understand, (2) the photos in the sharing task are still not clearly visible the color of the fabric, and (3) the video sound is still too small. After the product was revised, a valid and practical prototype 3 was obtained. Prototype 3 can be seen in the following link: https://bit.ly/3QKKTLy

### Stage 5: Field test

At the field test stage, two meetings were held. In the first meeting, the teacher divided students into 10 groups consisting of 3-4 students with heterogeneous abilities in each group. Then, the teacher showed a learning video of comparison material using the context of Palembang *jumputan* fabric which contained sharing task and jumping task problems, and students were asked to work on these problems in groups. The learning video given to students was valid and practical. In the second meeting, students worked on mathematical reasoning ability test questions containing two problems individually.

**Sharing task**

The sharing task problem uses the context of Palembang *jumputan* fabric so that students can know that math is very related to everyday life. In the sharing task problem there are tiered

questions, so that it can guide students to write down the information in the problem, solve the problem by making a mathematical model, and make a conclusion. Figure 1 shows the sharing task problems contained in the learning video.



**Figure 1.** A sharing task problem using the context of Palembang *jumputan* fabric

In Figure 1 which contains the sharing task problem, students are asked to answer questions from points a to e. In point a, students are asked to make information obtained from the problem regarding the comparison in the *jumputan* fabric dyeing process. In point b, students are asked to complete the table. In point c, students are asked to make a graph of the relationship between black dye and green dye. In point d, students are asked to explain whether the coloring ratio obtained is always the same for each column. Finally, in point e, students are asked to make a conclusion related to the relationship between the amount of black dye and green dye. The following is the answer to point a to point e by one of the students from group 4 which can be seen in Figure 2.
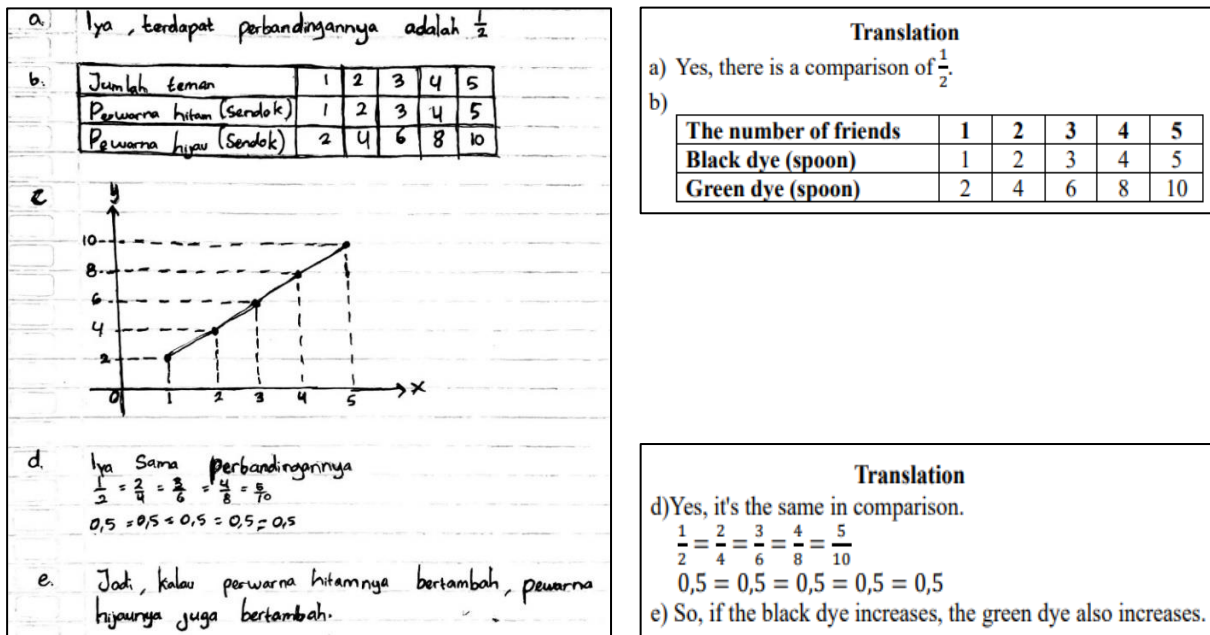
a) Yes, there is a comparison of $\frac{1}{2}$.

b)

| The number of friends | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Black dye (spoon) | 1 | 2 | 3 | 4 | 5 |
| Green dye (spoon) | 2 | 4 | 6 | 8 | 10 |

**Translation**

d)Yes, it's the same in comparison.

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10}$$

$$0,5 = 0,5 = 0,5 = 0,5 = 0,5$$

e) So, if the black dye increases, the green dye also increases.

**Figure 2.** Answer points a-e sharing task (group 4)

In Figure 2, it can be seen that the answer obtained by the student from group 4 is correct and precise. The student received a score of 4 because he had raised the indicator of conjecture perfectly, namely writing information that there is a comparison of the problem. Furthermore, the student has converted the problem sentence into mathematical language by making tables and graphs completely and correctly, so he has raised the second indicator perfectly by getting a score of 4. In the third indicator, students scored 4 because they had made conclusions that were in accordance with the problem. So, the score obtained by these students is maximum, namely 12. In point d, the student from group 4 changed the form of comparison expressed in fractions into decimal numbers, so it can be seen that each column has the same value, which is 0.5. This is different from the explanation made by group 5. The following is the student answer from group 5 which can be seen in Figure 3.
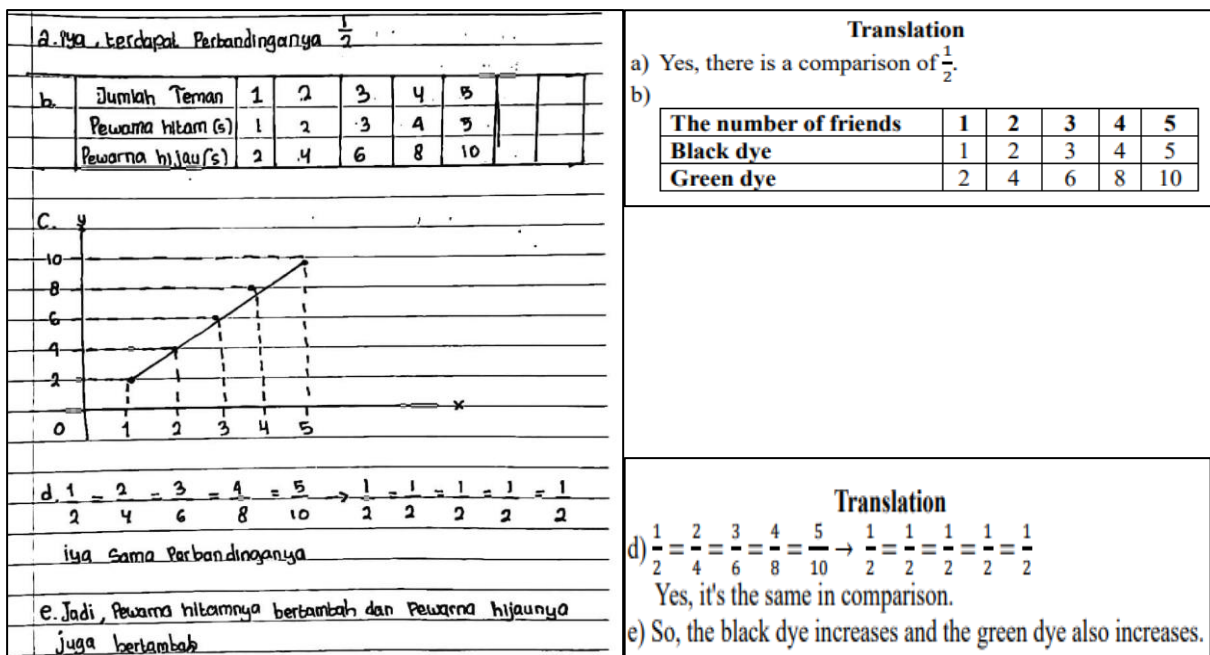


**Translation**

a) Yes, there is a comparison of $\frac{1}{2}$.

b)

| The number of friends | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Black dye | 1 | 2 | 3 | 4 | 5 |
| Green dye | 2 | 4 | 6 | 8 | 10 |

**Translation**

d) $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} \rightarrow \frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$

Yes, it's the same in comparison.

e) So, the black dye increases and the green dye also increases.

**Figure 3.** Answer points a-e sharing task (group 5)

In Figure 3, it can be seen that the student's answer from group 5. In point d, the student simplified the comparison obtained from each column in table b. The answers made by students from group 5 show that all three indicators have appeared, so the total score obtained is 12.

**Jumping task**

The use of the Palembang *jumputan* fabric context in the jumping task is so that students can know that math is very related to everyday life. There is only one problem, and there are no tiered questions in the problem. Figure 4 shows the jumping task problem in the learning video.



**Figure 4.** A jumping task problem using the context of Palembang *jumputan* fabric

In Figure 4, which contains a jumping task problem, students are looking for solutions regarding the number of additional craftsmen needed so that the order can be completed on time. Of the 10 groups, there were only 4 groups that managed to answer the jumping task problem correctly, namely group 2, group 4, group 7, and group 9. Figure 5 shows the completion of the jumping task by students from group 2.



**Figure 5.** Jumping task answers (group 2)

The student's answer from group 2 in figure 5 shows that the student got a score of 4 because he had raised the indicator of conjecture perfectly, namely writing the right information

from the problem. Furthermore, the student has converted the problem sentence into mathematical language by making tables and graphs completely and correctly, so he has raised the second indicator perfectly by getting a score of 4. Then, the student has written the right conclusion, so he gets a score of 4 for the third indicator. So, students from group 2 have raised all three indicators, so the score obtained by these students is the maximum, namely 12. The solution steps made by group 2 are not the same as group 7, but the results obtained are still the same. The following are the answers of students from group 7 which can be seen in Figure 6.

| | **Translation** |
|---|---|
| 15 hari = 10 orang Pengrajin. | 15 days = 10 craftsmen |
| Pengerjaan selama 7 hari berarti sisa waktu = 15 - 7 = 8 hari | Working for 7 days means the remaining time = 15 - 7 = 8 days |
| 8 hari = 10 orang pengrajin | 8 days = 10 craftsmen |
| Pengerjaan dihentikan selama 3 hari berarti sisa waktu = 8 - 3 = 5 hari | Work stopped for 3 days means the remaining time = 8 - 3 = 5 days |
| 5 hari = x orang Pengrajin | 5 days = $x$ craftsmen |
| $\frac{8}{5} = \frac{x}{10}$ | $\frac{8}{5} = \frac{x}{10}$ |
| 8.10 = 5.x | $8.10 = 5.x$ |
| 80 = 5x | $80 = 5x$ |
| $\frac{80}{5} = x$ | $\frac{80}{5} = x$ |
| x = 16 | $x = 16$ |
| Pengrajin tambahan = 16 - 10 = 6 orang pengrajin. | Additional craftsmen = 16 - 10 = 6 craftsmen |
| Jadi, pengrajin tambahan yang dibutuhkan adalah 6 orang Pengrajin. | So, the additional craftsmen needed are 6 craftsmen. |

**Figure 6.** Jumping task answer (group 7)

In Figure 6, we can see the answers of students from group 7. The answers made by students from group 7 show that all three indicators have appeared, so the total score obtained is 12.

**Test question number 1**

Students find the total money that must be paid to buy Palembang *jumputan* fabric which is 15 meters long by using data tables and graphs. The following is the display of the question shown in Figure 7.

**Figure 7.** Test question number 1 using the context of Palembang *jumputan* fabric

Based on the results of students' answers to test question number 1, three heterogeneous students were selected. Figure 8 shows the answers to test question number 1 made by RA students.



**Figure 8.** RA students' answers to test question number 1

It can be seen in Figure 8 that the answers obtained by RA students are correct and precise. Based on the results of the interview, it can be seen that RA students have understood test question number 1. RA students have written the information contained in the problem, namely

the price of 3 meters of fabric is 240,000, so they get a score of 4 for the indicator of making a conjecture. RA students have translated the problem into mathematical form by completing the table and making the graph completely and correctly, so they have raised the mathematical manipulation indicator by getting a score of 4. On the indicator of drawing a conclusion, RA students got a score of 4 because they had made the right conclusions. So, RA students get the maximum score, which is 12. Furthermore, the answers to test question number 1 that have been made by PN students can be seen in Figure 9.



| | Translation | | | | |
|---|---|---|---|---|---|
| | 3 meter | 6 meter | 9 meter | 12 meter | 15 meter |
| Length of the jumputan fabric | | | | | |
| The price of jumputan fabric | Rp240.000,00 | Rp480.000,00 | Rp720.000,00 | Rp960.000,00 | Rp1.200.000,00 |
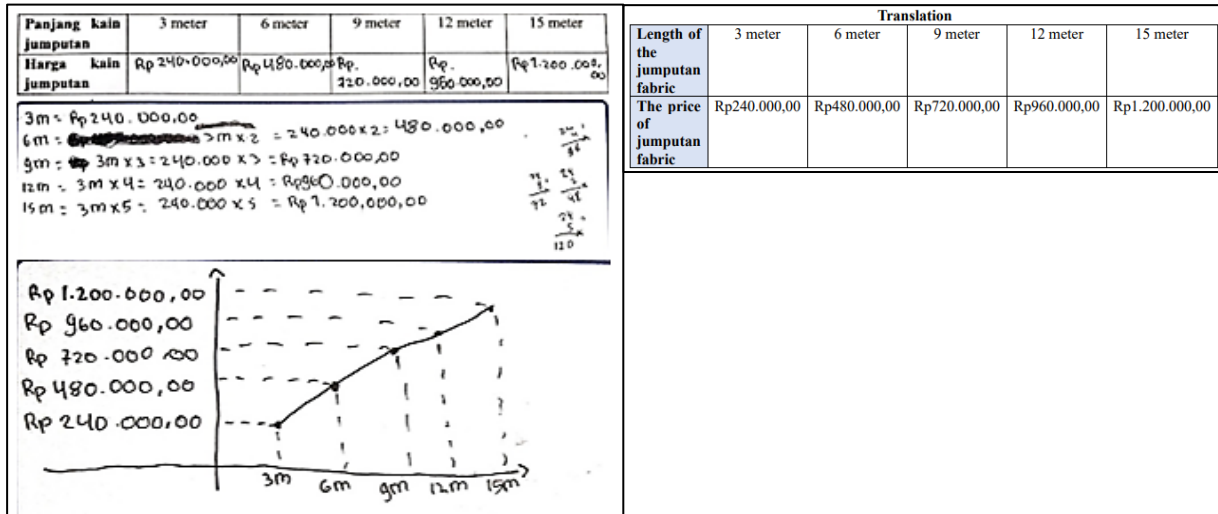
**Figure 9.** PN students' answers to test question number 1

Based on PN students' answers in Figure 9, it shows that PN students have understood test question number 1, but they did not write the conclusion. From the results of the interview, student PN said that he forgot and did not know that the conclusion had to be written. PN students have raised the indicators of making conjectures and indicators of mathematical manipulation perfectly. So for test question number 1, PN students only obtained a score of 8. Furthermore, the answers that have been made by MI students for question number 1 can be seen in Figure 10.



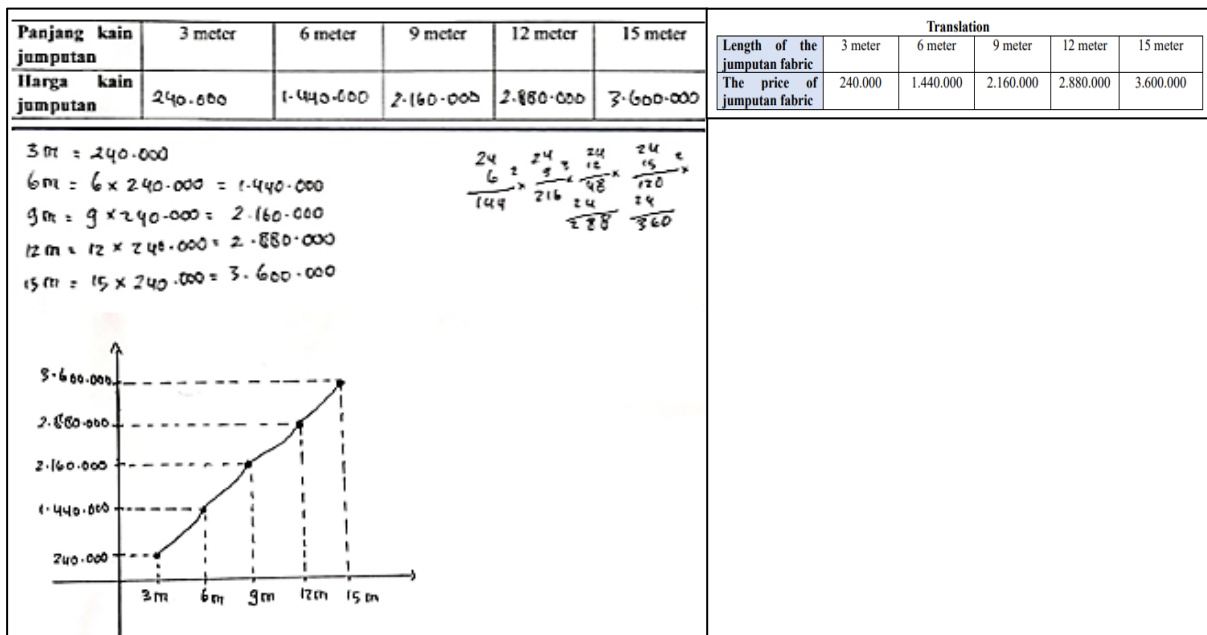| | Translation | | | | |
|---|---|---|---|---|---|
| | 3 meter | 6 meter | 9 meter | 12 meter | 15 meter |
| Length of the jumputan fabric | | | | | |
| The price of jumputan fabric | 240.000 | 1.440.000 | 2.160.000 | 2.880.000 | 3.600.000 |

**Figure 10.** MI students' answers to test question number 1

Based on the results of MI students' answers in Figure 10, it shows that MI students get a score of 4 for the first indicator because they have made information from the problem. In the second indicator, MI students have tried to solve the problem but still not right, so they get a score of 1. This is supported by the results of the interview that MI students made a mistake when looking for the price of the *jumputan* fabric by directly multiplying it by 240,000. MI students scored 0 for the third indicator because they did not make a conclusion. The total score obtained by MI students is 5.

**Test question number 2**

Question number 2 asks students to find how long it takes and how many craftsmen are needed to complete the order. The following is testing question number 2 which can be seen in Figure 11.

| | **Translation** |
|---|---|
| **Soal Tes Nomor 2** <br> Rina adalah seorang pemilik toko kain jumputan di Palembang. Berikut ini adalah gambar beberapa kain jumputan Palembang yang dijual oleh Rina. <br><br> Rina mendapatkan pesanan kain jumputan Palembang yang diperkirakan dapat diselesaikan oleh 12 orang pengrajin dalam waktu 20 hari. Tentukan berapa lama waktu yang dibutuhkan untuk menyelesaikan pesanan tersebut apabila dikerjakan oleh 8 orang pengrajin! Lalu, jika pelanggan Rina menginginkan pesanannya dapat diselesaikan dalam waktu 15 hari, maka berapa pengrajin yang dibutuhkan untuk menyelesaikan pesanan tersebut? | Rina is a jumputan fabric shop owner in Palembang. The following are pictures of some of the Palembang jumputan fabric sold by Rina. Rina received an order of Palembang jumputan fabric that is estimated to be completed by 12 craftsmen in 20 days. Determine how long it will take to complete the order if it is done by 8 craftsmen! Then, if Rina's customer wants her order to be completed within 15 days, then how many craftsmen are needed to complete the order? |

**Figure 11.** Test question number 2 using the context of Palembang *jumputan* fabric

Based on the results of students' answers to test question number 2, three students were selected, each with high, medium, and low abilities. Figure 12 shows the answer to test question number 2 that has been made by RA students.

| | **Translation** |
|---|---|
| 12 Orang Pengrajin = 20 Hari <br> 8 Orang Pengrajin = ... hari <br> ... Orang Pengrajin = 15 hari <br><br> $12 \times 20 = 240$ <br><br> $\dfrac{240}{8} = 30$ hari <br><br> $\dfrac{240}{15} = 16$ orang Pengrajin <br><br> Kesimpulan = Waktu yg dibutuhkan oleh 8 orang Pengrajin adalah 30 hari, dan waktu yg dibutuhkan oleh 16 orang Pengrajin adalah 15 hari | 12 craftsmen = 20 days <br> 8 craftsmen = ... days <br> ... craftsmen = 15 days <br> $12 \times 20 = 240$ <br> $\dfrac{240}{8} = 30$ days <br> $\dfrac{240}{15} = 16$ craftsmen <br> Conclusion = the time required by 8 craftsmen is 30 days, and the time required by 16 craftsmen is 15 days. |

**Figure 12.** RA students' answers to test question number 2

It can be seen in Figure 12 that the answers obtained by RA students are correct and precise. Based on the results of the interview, it can be seen that RA students have understood test question number 2. RA students have written the information contained in the problem, namely 12 craftsmen take 20 days, so they get a score of 4 for the indicator of make a conjecture. RA students have translated the problem into mathematical form completely and correctly, so they have raised the mathematical manipulation indicator by getting a score of 4. In the indicator of drawing conclusions, RA students got a score of 4 because they had made the right conclusion. So, RA students get the maximum score, which is 12. Furthermore, the answers to test questions number 2 that have been made by PN students can be seen in Figure 13.



**Figure 13.** PN students' answers to test question number 2

Based on the answers of PN students in Figure 13, it shows that PN students have understood the problem, but they did not write the conclusion. From the results of the interview, PN students said that he forgot and did not know that the conclusion had to be written. PN students have raised the indicators of making conjectures and indicators of mathematical manipulation perfectly. So, for test question number 2, PN students only got a score of 8. Furthermore, the answers made by MI students for question number 2 can be seen in Figure 14.
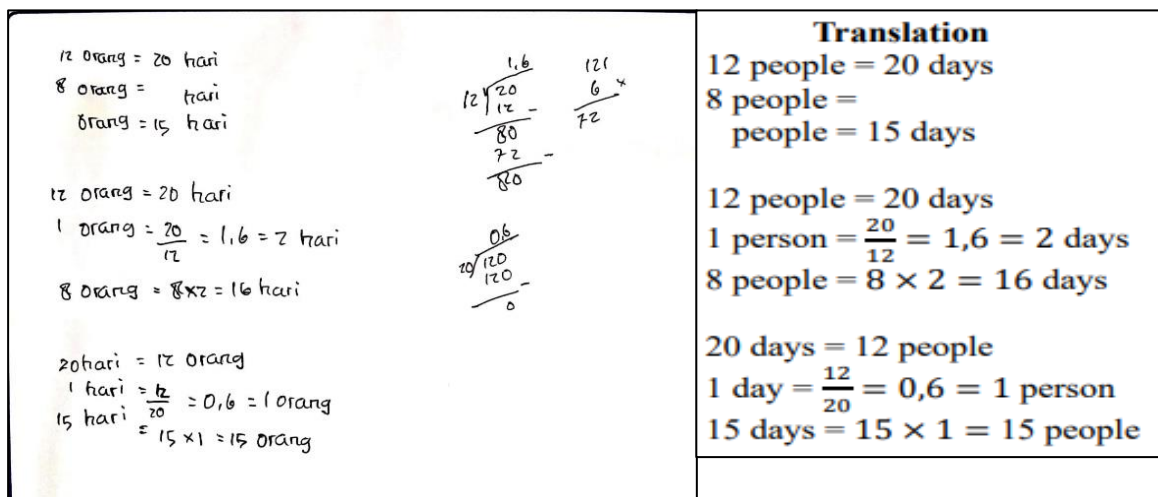
**Figure 14.** MI students' answers to test question number 2

Based on the results of MI students' answers in Figure 14, it shows that MI students get a score of 4 for the first indicator because they have made information from the problem. In the second indicator, MI students have tried to solve the problem but still not right, so they get a score of 1. This is supported by the results of the interview that MI students made mistakes when looking for 1 person and 1 day where the solution used the concept of value comparison, this problem should have been solved by means of inverse value comparison. MI students received a score of 0 for the third indicator because they did not make a conclusion. The total score obtained by MI students is 5.

Based on the test questions that have been given, the results of student test answers will be analyzed and calculated based on indicators of mathematical reasoning ability. The following is the emergence of indicators of students' mathematical reasoning ability which can be seen in Table 4.

**Table 4.** The occurrence of indicators of students' mathematical reasoning ability on comparison material

| Indicator | Total Students Who Fulfill | |
|---|---|---|
| | Test Number 1 | Test Number 2 |
| Make a conjecture | 37 | 35 |
| Mathematical manipulation | 36 | 34 |
| Draw a conclusion | 25 | 24 |

Table 4 shows that students least often bring up the indicator of draw a conclusions. Furthermore, the qualitative value of students' mathematical reasoning ability on comparison material can be seen in table 5.

**Table 5.** Qualitative value of students' mathematical reasoning ability in comparison material

| Value | $f_1$ | $f_2$ | $f_{total}$ |
|---|---|---|---|
| 81-100 | 10 | 10 | 20 |
| 61-80 | 13 | 14 | 27 |
| 41-60 | 13 | 10 | 23 |
| 21-40 | 1 | 3 | 4 |
| 0-20 | 0 | 0 | 0 |

Note:

$f_1$: Total students on test number one

$f_2$: Total students on test number two

$f_{total}$: $f_1 + f_2$

Table 5 shows that most students get scores in the 61-80 range, which is 27 students. Furthermore, the average mathematical reasoning ability of students on the comparison material that has been obtained can be seen in table 6.

**Table 6.** Average of students' mathematical reasoning ability in comparison material

| Value | $f_{total}$ | $x_i$ | $f_{total} \cdot x_i$ | Average |
|---|---|---|---|---|
| 81-100 | 20 | 90,5 | 1810 | 67,52 |
| 61-80 | 27 | 70,5 | 1903,5 | |
| 41-60 | 23 | 50,5 | 1161,5 | |
| 21-40 | 4 | 30,5 | 122 | |
| 0-20 | 0 | 10 | 0 | |
| Total | 74 | | 4997 | |

Table 6 shows that the mathematical reasoning ability of seventh grade students of Srijaya Negara Junior High School Palembang after the implementation of learning using learning videos on comparison material with the context of Palembang *jumputan* fabric is good with the average obtained is 67.52.

## Discussion

This research developed a learning video on comparison material using the context of Palembang *jumputan* fabric. The characteristics of the learning video made by the researcher are that it uses the context of Palembang's unique culture, namely Palembang *jumputan* fabric, which contains sharing task and jumping task activities, and uses the researcher's original voice. Learning videos can make students interested in learning because they contain images, text, animation, and sound (Widyastuti et al., 2022). The learning video created has been adapted to collaborative learning because it contains sharing tasks and jumping tasks. Collaborative learning consists of two tasks, namely sharing tasks which are individual tasks in a small group containing basic material, and jumping tasks which contain problems to improve student abilities (Fatimah et al., 2018). The learning video created has also been adapted to the characteristics of the PMRI approach. The use of context is included in the characteristics of PMRI (Agusta, 2021). The use of contextual problems makes students more familiar with the problems given, so that it can help students to learn to identify comparisons in everyday life (Utari, 2017). One of the typical cultural contexts of Palembang is Palembang *jumputan* fabric which has its own characteristics and peculiarities both in terms of color and motif (Dewi et al., 2022). During the coloring process of *jumputan* fabric, there is a comparison of the amount of dye used. This means that Palembang *jumputan* fabric can be used as a context in learning comparison materials made into learning videos.

## Valid and practical learning videos

This research produced a learning video on comparison material using the context of Palembang jumputan fabric that is valid and practical. Before designing the learning video, researchers first analyzed five components, namely students, curriculum, content, media, and context. The learning video that has been designed, called the prototype, will be evaluated by the researchers themselves. After the learning video is revised, the product is said to be prototype 1. Furthermore, it was validated and tested on three heterogeneous students at the one to one stage. One of the comments from validators and students is that the learning video is still too fast, so it is necessary to add video duration. This is in line with Ismi and Ain (2021) that the video is too fast. After the learning video was revised based on comments and suggestions from validators and students, a valid prototype 2 was obtained. Furthermore, prototype 2 was tested on six students who were divided into two groups with heterogeneous abilities at the small group stage. One thing that must be improved from the results of the small group trial is the photo on the sharing task because it is still not clearly visible the color of the fabric. This is in line with the opinion of Ismi and Ain (2021) that the image quality is still not optimal. Therefore, the product will be revised again, so that a valid and practical prototype 3 is obtained.

## Potential effects of using learning videos

This study was conducted to determine the potential effect of using learning videos on comparison materials using the context of Palembang *jumputan* fabric on students' mathematical reasoning ability. At the field test stage in the first meeting, learning was carried out using a learning video on comparison material with the context of Palembang *jumputan* fabric which contained sharing task and jumping task problems, and students were asked to work on these problems. In the second meeting at the field test stage, students were given two mathematical reasoning ability test questions which aimed to determine students' mathematical reasoning abilities. The test questions made have adjusted to the characteristics of the PMRI approach and indicators of mathematical reasoning ability. The following will explain the occurrence of its indicators obtained from the research results.

### *Make a conjecture*

From the results of student test answers, it can be seen that in test question number 1 there were 37 students who raised the indicator of conjecture, while 35 students for test question number 2. The appearance of this indicator can be seen by students being able to express the information obtained from the problem given. This agrees with Rahmawati and Putri (2022), namely students are able to bring up indicators of making conjectures if students are able to write down information contained in the problem.

### *Mathematical manipulation*

From the students' test answers, it was found that in test question number 1 there were 36 students who raised the indicators of mathematical manipulation, while 34 students for test number 2. In the second indicator, students are able to solve problems by converting them to

mathematical language. This agrees with Khoirunnisa and Putri (2022) who say that in this indicator students change the problem into mathematical form and find a solution.

### *Draw a conclusion*

The indicator of drawing conclusions in this study is an indicator that rarely appears with 25 students who bring up the indicator on test question number 1, and 24 students on test question number 2. PN students have actually been able to draw conclusions based on the results of the interview, but PN students are not used to it. The appearance of this indicator is seen if students can write conclusions that are accepted by reason and in accordance with the problem. This agrees with Nurazizah and Zulkardi (2022) who said that students can make logical conclusions in accordance with the problem.

So, the implementation of the research that has been carried out shows the potential effect of using learning videos on comparison material using the context of Palembang *jumputan* fabric on the mathematical reasoning ability of seventh grade students of Srijaya Negara Palembang Junior High School is good even though there are still students who have not raised the indicators of their mathematical reasoning ability perfectly.

## Conclusion

The learning video on comparison material using the context of Palembang *jumputan* fabric developed is valid and practical with the characteristics of the video using the context of Palembang's distinctive culture, namely Palembang *jumputan* fabric which contains sharing task and jumping task activities, and uses the original voice of the researcher. The results showed that the potential effect of using learning videos on comparison material using the context of Palembang *jumputan* fabric on the mathematical reasoning ability of seventh grade students of Srijaya Negara Junior High School Palembang was good with an average value of 67.52. Indicators of make a conjecture often appear, while indicators of draw a conclusions rarely appear.

In this research, teachers can utilize learning videos and apply the PMRI and collaborative learning approaches to the learning process so that students are more interested because learning is carried out in groups and is related to real problems. For other researchers, they can use the context of Palembang *jumputan* fabric in other materials and can create more optimal learning videos by minimizing the text in the learning videos.

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## Conflicts of Interest

## Funding Statement

## Author Contributions

**Siti Nabila:** Developing learning videos, collecting and analyzing data; **Ratu Ilma Indra Putri:** Advisor and director in developing learning videos; **Zulkardi:** Advisor and director in developing learning videos.

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