Development of Learning Media Based on PLORA Animation Videos on Students' Thinking Skills Social Arithmetic Material Class VII Junior High School

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Abstract

The laziness and coverage of the material as well as the boredom of students when watching learning videos need a solution. This study aims to develop PLORA animated video-based learning media on students' thinking skills of class VII social arithmetic material. This research applies Research and Development (R&D) research and development procedures by applying the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). This media was developed with 3D animation video PLORA software to improve students' thinking skills. The research was conducted at SMPN 20 South Tangerang City. The practicality test of PLORA animation-based learning media was analyzed through a small class test with 5 students and a large class test with 28 students and 1 mathematics teacher. The results showed that the average validity test score by material and media experts was 83.76% and 92.37% so that overall validation obtained very valid criteria. The results of the small class trial showed a positive response from the subject and the results of the large class trial students obtained a score of 85.11% with very practical criteria and the teacher obtained a score of 80% with practical criteria. The development of PLORA animated video-based learning media on students' thinking skills in class VII junior high school social arithmetic material can be said to be valid and practical to be applied in the implementation of the mathematics learning process.

Kata kunci: Learning Media, Animated Video, Social Arithmetic Material.

Pengembangan Media Pembelajaran Berbasis Video Animasi PLORA pada Kemampuan Berpikir Siswa Materi Aritmatika Sosial Kelas VII SMP

Abstrak

Rasa malas dan cakupan materi yang banyak serta kebosanan siswa pada saat menonton video pembelajaran perlu suatu solusi. Penelitian ini bertujuan untuk mengembangkan media pembelajaran berbasis video animasi PLORA pada kemampuan berpikir siswa materi aritmatika sosial kelas VII. Penelitian ini menerapkan prosedur penelitian dan pengembangan Research and Development (R&D) dengan mengaplikasikan model ADDIE (Analysis, Design, Development, Implementation, Evaluation). Media ini dikembangkan dengan video animasi 3D software PLORA untuk

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meningkatkan kemampuan berpikir siswa. Penelitian dilaksanakan di SMPN 20 Kota Tangerang Selatan. Uji kepraktisan media pembelajaran berbasis animasi PLORA dianalisis melalui uji kelas kecil dengan 5 siswa dan uji kelas besar dengan 28 siswa dan 1 guru matematika. Hasil penelitian menunjukkan bahwa rata-rata skor uji kevalidan oleh ahli materi dan media sebesar 83,76% dan 92,37% sehingga secara keseluruhan validasi memperoleh kriteria sangat valid. Hasil uji coba kelas kecil menunjukkan respon yang positif dari subjek dan hasil uji coba kelas besar siswa memperoleh skor 85,11% dengan kriteria sangat praktis dan guru memperoleh skor 80% dengan kriteria praktis. Pengembangan media pembelajaran berbasis video animasi PLORA pada kemampuan berpikir siswa materi aritmatika sosial kelas VII SMP dapat dikatakan valid dan praktis untuk diterapkan dalam pelaksanaan proses pembelajaran matematika.

Kata kunci: Media Pembelajaran, Video Animasi, Materi Aritmatika Sosial.

INTRODUCTION

Formally studying is carried out at school. The school becomes a place for the implementation of the process of teaching and learning activities. Currently, the process of teaching and learning activities cannot be carried out directly at school. The learning process is currently taking place online. The online learning process requires the help of technology such as smartphones, computers, and notebooks. (Erni, Vebrianto, Mz, & Thahir, 2020) argue that online-based applications that can be used are Google Classroom, Edmodo, Ruang Guru, Rumah Belajar, WhatsApp, Quiper, Microsoft Teams, Google Meets, and Moodle. The use of this technology can make it easier for teachers to communicate with students (Anshori, Sodiq, 2013). But in reality the use of this technology cannot run well. Students choose not to participate in the learning process due to limited internet quota. Teachers must also use other technologies so that the learning process can run well. Another technology that can be used is the use of learning media. Learning media is used as a tool in supporting a good learning process (Winda & Dafit, 2021).

According to Degeng in (Yusantika, Suyitno, & Furaidah, 2018) there are classifications of learning media including audio media, visual media, and audiovisual media. In this online learning process, teachers choose to use audiovisual media. This media was chosen because audiovisual media contains elements of sound and images. One example of audiovisual media is learning videos. Learning videos contain elements of sound and images. Mathematics is one of the subjects that requires audiovisual learning

media because it helps students to understand the material more easily so as to minimize students' assumptions that mathematics is difficult, boring, has a complicated level of difficulty, because mathematics has a deductive and abstract nature (Iswiranti, Ngatman, & Triyono, 2017). In accordance with the results of research has proven that learning using technology-adjusted media can improve students' mathematical performance (Ziden, Ismail, Spian, & Kumutha, 2011)

The ability to think to solve problems in Indonesia is still relatively low as shown by the results of the TIMSS study in 2015 showing that Indonesian students have not shown satisfactory achievements. The mathematical literacy of Indonesian students is only able to rank 44 out of 49 countries, with a score of 397 and still below the international average score of 500. Science literacy ranks 45th out of 48 countries with a score of 397 and still below the international average score of 50 (Mullis, Ina V.S, Martin, Michael O., Foy, Pierre, & Hooper, Martin, 2015). Meanwhile, the results of the PISA study in 2018, placed Indonesia ranked 70 out of 78 countries for science literacy with a score of 396 and an average international score of 489. Reading literacy ranked 72nd out of 78 countries with a score of 371 and an average international score of 487. Mathematical literacy ranked 72 out of 78 countries with a score of 379 and an international average score of 489 (Pusat Penilaian Pendidikan Balitbang Kemdikbud, 2019). This condition is in line with the results of observations and interviews with mathematics teachers at SMPN 20 which stated that social arithmetic material has a considerable scope of material to learn, besides that students are often confused when writing formulas. This is due to the use of media that seems monotonous and boring because it only displays the concepts not accompanied by giving examples of problems related to problems that exist in everyday life. Therefore, it is necessary to develop interesting and fun media.

The use of media that is adapted to technological developments will be able to improve students' thinking performance in solving problems. In accordance with the results of research has proven that learning using technology-adjusted media can improve students' mathematical performance (Ziden *et al.*, 2011). One form is multimedia based on 3D animation videos that are favored by all circles, especially students (Sarassati, Amrullah, & Saipullah, 2018). The presentation of mathematical material in 3D

animation involves problems faced by students in everyday life so that mathematics learning is connected to reality, relevant to society, closer to the child's experience (Kartika, Wahyuni, Sinaga, & Rajagukguk, 2019).

Some research on the development of learning media can help students understand the material during the learning process (Oktavianingtyas, Salama, Fatahillah, Monalisa, & Setiawan, 2018). (Oktavianingtyas *et al.*, 2018) Developing learning media in the form of animated stories assisted by Lectora Inspire and Plotagon is able to assist students in understanding value comparison material and turning around value. Next (Safitri, Retnawati, & Rofiki, 2020) develop animated films that are used to support the development of student interest in mathematics learning. Research (Islam & Fahmi, 2018) Develop interactive educational mathematics learning media using Macromedia Flash 8. Research (Putri, Abdurahman, Andrian, Angraini, & Effendi, 2022) same with research (Islam & Fahmi, 2018) that the development of interactive learning with Macromedia Flash 8 can help students understand the material of awakening and congruence. (Kurnia, Marzal, & Zurweni, 2022) develop multimedia mathematics learning with a Problem-Based Learning based Tutorial model on social arithmetic material. Research (Pujiastuti, Utami, & Haryadi, 2020) develop interactive mathematics learning media based on local wisdom and 21st century skills using AndroMath. Based on previous studies, no or still rare research has developed a combination of plotagon and filmora media with the output produced in the form of learning videos. This learning video can be downloaded so that students can watch learning videos anytime and anywhere offline. Therefore, this study aims to develop learning media based on PLORA animation video animation on students' thinking skills in learning mathematics social arithmetic material in grade VII Junior High School.

RESEARCH METHODS

This research uses R&D (*Research and Development*) method. The development model used in this study is the ADDIE model (*Analysis, Design, Development, Implementation, Evaluation*). Sezer in (Rayanto, Yudi Hari & Sugianti, 2020) said that the ADDIE model is an approach that emphasizes the analysis of each component that interacts with each other by coordinating according to existing phases. The phase in question starts from the analysis stage then continues to the design stage, then to the

development stage after that to the implementation stage and finally the evaluation stage. The purpose of the researchers chose to use the ADDIE model is to develop learning media in the form of 3D animation videos by utilizing the use of plotagon and filmora software.

The subjects in this study amounted to 33 grade VII students of SMPN 20 South Tangerang City. The instruments in this study consisted of validation sheets for material experts and media experts in the form of student and teacher response questionnaires. The data analysis techniques used are quantitative and qualitative data analysis. Data collection techniques use questionnaires as a tool to provide ratings and comments from respondents. The calculation of the media validity test is as follows:

The formula used to calculate the validity of learning media is as follows according to (Prihanto, S. Dhita Agoes & Yunianta, Tri Nova Hastri, 2017):

$$V = \frac{assessment\ result\ score}{maximum\ score} \times 100\%$$

Information :

$V = Validity\ score\ assessment\ percentage$

The results of the validity value that have been obtained are then interpreted into a validity scale as follows :

Table 1. Learning Media Validity Scale

Percentage	Criterion	Information
$x > 80\%$	Highly Valid	No revision required
$60\% < x \leq 80\%$	Valid	Slight revision
$40\% < x \leq 60\%$	Quite Valid	Revisions to taste
$20\% < x \leq 40\%$	Less Valid	Things revised
$x \leq 20\%$	Invalid	Remade products

Source: (Rustandi, Andi, Asyril, & Hikma, Nurul, 2020)

Furthermore, the formula for calculating the percentage of practicality of learning media according to (Prihanto, S. Dhita Agoes & Yunianta, Tri Nova Hastri, 2017) are as follows :

$$P = \frac{assessment\ result\ score}{maximum\ score} \times 100\%$$

Information :

$P = Practicality\ score\ assessment\ percentage$

When the practicality score has been obtained, it is interpreted into a practicality scale as follows :

Table 2. Scale of Practicality of Learning Media

Percentage	Criterion	Information
$x > 80\%$	Very Practical	No revision required
$60\% < x \le 80\%$	Practical	Slight revision
$40\% < x \le 60\%$	Quite Practical	Revisions to taste
$20\% < x \le 40\%$	Less Practical	Things revised
$x \le 20\%$	Impractical	Remade products

Source: (Rustandi, Andi *et al.*, 2020)

The indicators of thinking ability used in this study are: basic clarification, the bases for a decision, inference, advanced clarification, supposition and integration, Ennis in (Arif, Cahyono, & Zaenuri, 2020).

The entire stage of developing PLORA animated video-based learning media on students' thinking skills of social arithmetic material carried out in the study is presented in Figure 1. Especially for the evaluation stage, its implementation is integrated with other stages both the analysis, design, and development stages. Therefore, explanations related to the evaluation stage are not specifically described but are integrated with explanations in other stages.
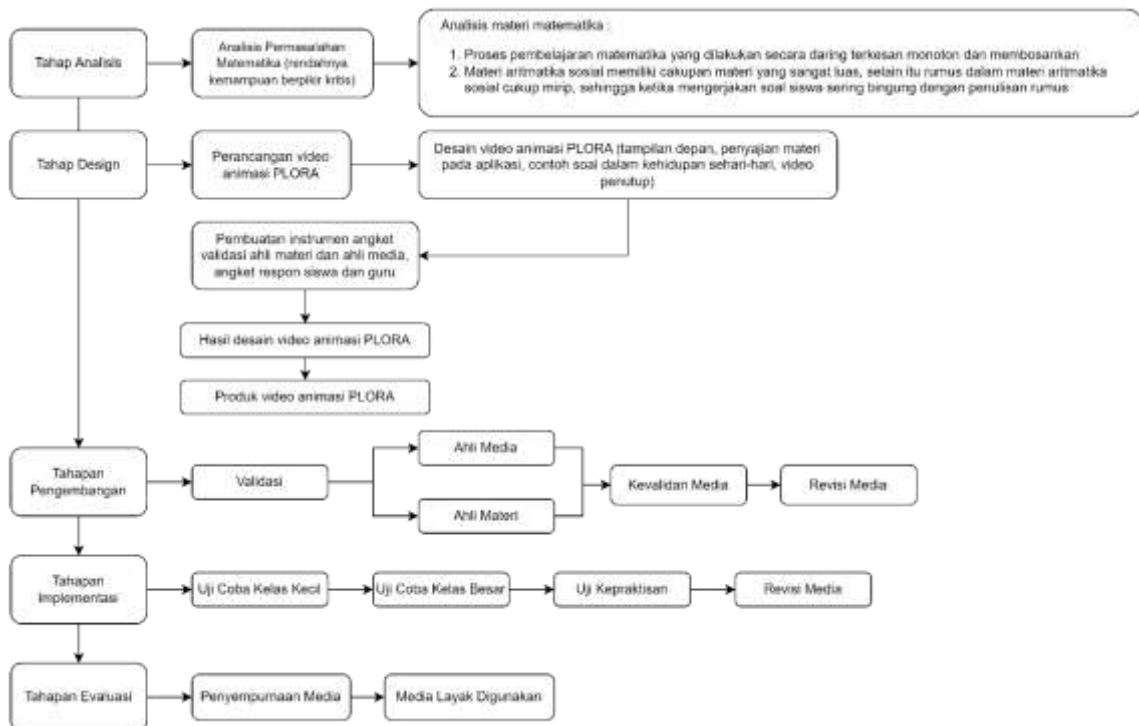

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Figure 1. Stages of Development of PLORA Animation Video-Based Learning Media on Student Thinking Skills Social Arithmetic Material

RESULTS AND DISCUSSION

The product of this research and development is a learning media based on PLORA animation videos, social arithmetic material. The results of a series of studies that have been conducted are as follows:

Based on the results of the analysis related to problems in mathematics learning, several results were obtained as follows: (1) The process of learning mathematics carried out online seems monotonous and boring; (2) Social arithmetic material has a very wide scope of material, besides that the formulas in social arithmetic material are quite similar, so when doing problems students are often confused with writing formulas. Based on the problem points presented, it is concluded that based on these problems, PLORA animation video-based learning media is needed in learning social arithmetic material.

Based on the results of the analysis stage, then proceed to the design stage. Some of the things done and obtained from the design stage are as follows: (1) PLORA animation design (front view, presentation of material on the application, examples of problems in everyday life, and closing video); (2) Validity questionnaire instruments for material experts and media experts, as well as student and teacher response questionnaires.

The development phase begins with the creation of PLORA animation videos based on pre-compiled designs. Some of the results of making PLORA animation video are presented in Figure 2 to Figure 9.

Figure 2. Front View

In Figure 2, PLORA's animated video was made on filmora using a new opener 20 background which contains the title of the thesis along with the identity of the researcher.

Figure 3. Opening Video

Figure 3 is the opening video. The background of this opening video was made in the plotagon by taking the stage scene. In this opening video, there is an animated character who serves as a presenter. The presenter opens by saying greetings, introducing themselves, greeting the audience, reminding them to always comply with the PROKES, and explaining the material to be discussed in the video.

Figure 4. Material Display Example

In Figure 4 the presenter discusses social arithmetic material. The screen next to the presenter is used to explain the meaning of social arithmetic. In this case, the beauty, attractiveness and interactivity in a learning medium is a means so that students are not bored in following lessons and the biggest effect is expected that students can be motivated and facilitate in receiving lesson material (Fanny in Kuswanto & Radiansah, 2018).

Figure 5. Examples of Problems in Daily Life

Figure 5 is an example of a sales and purchase material problem, where there is a seller and a buyer. They are doing buying and selling activities. The buying and selling activity involves bargaining activities. In addition, there is an example of profit material, where it can be seen that there are 2 women who are discussing the business they will make. They discussed how much profit they would get from doing a business buying and selling bags. Animated films have visual and audio forms that can clarify abstract knowledge to be more concrete (Damayanti ini Safitri et al., 2020).
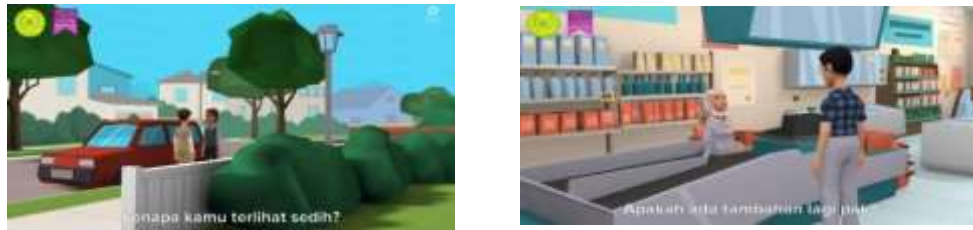

Figure 6. Examples of Problems in Daily Life

Figure 6 is an example of a loss. In the video, you can see 2 men having a conversation. The conversation tells the story of a man who had to sell his motorcycle because he needed money. The man actually got a loss from the sale of his motorcycle. In addition, there are examples of discounts, where sellers and buyers are making buying and selling transactions. In the conversation, the buyer asks the cashier guard about discounts on the goods purchased. In this case, animated videos allow students to no longer memorize abstract mathematical concepts to real (Khairani & Febrinal, 2016).
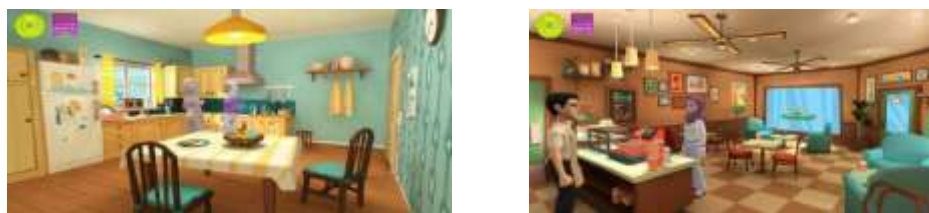

Figure 7. Examples of Problems in Daily Life

Figure 7 is an example display of gross, net, tare problems. In this video, you can see the mother and daughter chatting about groceries. In this conversation, the son asked how much tare from one of the groceries the mother bought. In addition, there is an example of a tax problem, where there is a café employee and a customer who are having a conversation. The customer is making a payment at the cashier. In the conversation, the customer asks about the total price to be paid along with VAT.

Figure 8. Examples of Problems in Daily Life

Figure 8 is an example of a single interest, where there are bank employees and bank customers chatting. Bank customers want to save at the bank and are asking about the bank's single interest. The video displayed is more varied with interesting and colorful images that can increase the learning appeal of students (Agustien, Umamah, & Sumarno, 2018).
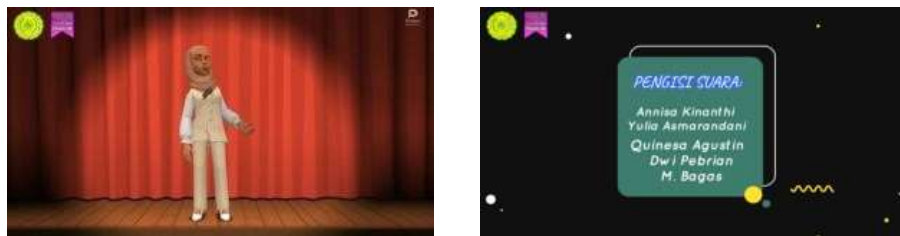

Figure 9. Closing Video and Voice Actor Name

Figure 9 is the closing video and the name of the voice actor. The closing video thanked you for watching the video from beginning to end.

Products that have been developed are then validated by material experts and media experts. Researchers get an assessment from validators as follows :

Table 3. Material Expert Assessment Results

Number.	Aspects	Result Score (%)	Validity Categories
1.	Content Eligibility	83,33	Very Valid
2.	Contextual Assessment	80	Valid
3.	Language Eligibility	88	Very Valid
Overall Assessment		**83,76**	**Highly Valid**

Based on the results of the material expert assessment in Table 3, it was obtained that the feasibility aspect of the content received a score of 83.33% with a very valid category, the contextual assessment aspect received a score of 80% with a very valid

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category, and the language feasibility aspect received a score of 88% with a very valid category. Overall, the results of the material expert assessment obtained an average score of 83.76% with a very valid category. However, this category of very valid results cannot be separated from the input or suggestions submitted by validators.

Table 4. Media Expert Assessment Results

Number.	Aspect	Result Score (%)	Validity Categories
1.	Feasibility Graph	90,47	Very Valid
2.	Media Quality	90	Very Valid
3.	Layout Media	96,66	Very Valid
Overall Assessment		**92,37**	**Very Valid**

In addition, based on the results of the assessment of media experts in Table 4, the graphic feasibility aspect obtained a score of 90.47% which was in the very valid category, the media quality aspect obtained a score of 90% which was in the very valid category, and the media layout aspect obtained a score of 96.66% which was in the very valid category. Overall, the results of the media expert assessment received an average score of 92.37% with a very valid category. However, this category of very valid results cannot be separated from the input or suggestions submitted by validator. After conducting a validity test on the learning media, the PLORA animation video that has been carried out shows that the media has met the valid criteria. After that, continued with field trials. The results of field trials revealed that the media for PLORA's animated video learning media. These results were obtained from the results of filling out small class test questionnaires and large class tests.

Based on the results of the questionnaire in the small class trial, it received a positive response from students. In this small class trial, there were no suggestions or comments on improving PLORA's animated videos. Here are the results of the small class trial comments:

Table 5. Small Class Trial Student Response

Number.	Indicator	Suggestions / Comments
1.	Material	Yes, very interesting
2.	Language	Yes, easy to understand and clear
3.	Interest	Yes, lessons made easy and fun
Conclusion		**No response to PLORA animation video repair**

Based on the results of the questionnaire related to the response of small class trial students in Table 5, material indicators were obtained, namely interesting, language indicators that were easy to understand and clear, and interest indicators that were easy and fun. These three indicators can be concluded that the response of small class trial students is positive, that is, there is no response that shows researchers to make improvements related to PLORA's animated video learning media.

Next, a large class trial was conducted. The large class trial involved 28 students as well as 1 math teacher. Here are the results of the responses of large class trial students :

Table 6. Large Class Trial Student Response

Number.	Indicator	Result Score (%)	Category
1.	Material	84,04	Very Practical
2.	Language	86,25	Very Practical
3.	Interest	84,85	Very Practical
Average Overall Score		**85,11**	**Very Practical**

Based on the results of the large class trial questionnaire in Table 6, the material indicator obtained a score of 84.04% in the very practical category, the language indicator obtained the highest score of 86.25% in the very practical category, and the interest indicator obtained a score of 84.85% in the very practical category. Overall, it can be concluded that the average score obtained is 85.11% in the very practical category.

Table 7. Large Class Trial Teacher Response

Number.	Indicator	Result Score (%)	Category
1.	Material	80	Practical
2.	Language	80	Practical
3.	Interest	80	Practical
Average Overall Score		**80**	**Practical**

Based on the results of teacher response questionnaires from large class trials in Table 7, material indicators, indicators of conformity with student development, and media quality indicators obtained a score of 80% with the category obtained, namely practical. Overall, it can be concluded that the teacher response questionnaire obtained a score of 80% and was included in the practical category. Based on the results of the student response questionnaire in Table 5 obtained a positive response from the research subject and also in Table 6 obtained a very practical category from the research subject, in this case it can be concluded that PLORA animation videos can improve students' thinking skills in social arithmetic material. The results of validity tests and practical tests

that have been carried out, PLORA animation videos on social arithmetic material for grade VII junior high school students can be used in mathematics learning. The results of this study are in line with (Oktavianingtyas *et al.*, 2018) About the development of learning media in the form of animated stories assisted by Lectora Inspire and Plotagon proves that these learning media can help students understand the material of value comparison and value reversal. Rohendi in (Safitri *et al.*, 2020) Animated films can be used as an alternative for teachers to teach abstract objects to students, to be more concrete. Animation can also be used as a supporting medium in online learning or distance learning. Febliza and Afdal in (Putri *et al.*, 2022) Learning media can be used to overcome student boredom. If students are interested in what they do, they will enjoy teaching and learning and understanding the material provided.

CONCLUSION

Based on the results of research on the development of PLORA animated video-based learning media on students' thinking skills, social arithmetic material obtained an average validity test score by material experts of 83.76% with a very valid category, then for media experts a score of 92.37% with a very valid category. In the small class trial stage, students responded positively to the PLORA animation video and in the large class trial stage got a score of 85.11% in the very practical category, then for the large class trial teacher response got a score of 80% in the very practical category. So that PLORA animation videos and students' thinking skills on social arithmetic material are declared worthy of use because they are valid and practical in the mathematics learning process both online and face-to-face.

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