

## Development of Learning Videos to Support Middle School Students' Numerical Literacy Skills

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### Abstract

In general, students' numeracy literacy skills are still low. Therefore, teachers need to provide a stimulus for students in learning by using interesting media and unique and distinctive ways of exposure. One of the media that can be used by teachers is a mathematics learning video. This study aims to produce and determine the feasibility (validity, practicality, and effectiveness) of instructional video media that supports numeracy literacy skills for eighth grade students of a junior high school in Jambi, Indonesia. This study uses the ADDIE (Analyze, Design, Develop, Implement, and Evaluate) model. Based on the results of the research, the material validation analysis obtained a percentage of 74.6% (quite valid) and the media validation analysis obtained a percentage of 83% (quite valid). The practical aspect seen from the results of the teacher assessment questionnaire analysis obtained a percentage of 93.4% and the one-on-one evaluation questionnaire analysis (9 students of class VIII) obtained a percentage of 90% (very practical). The effectiveness is seen based on the results of the numeracy literacy test, where the percentage of students' completeness is 90% and the results of the questionnaire analysis of student responses to small group evaluations are 94% (very effective). Based on the data, the learning animation video has met the indicators (valid, practical, effective). Based on the results of this study, teachers should consider using learning videos that can support students' numeracy literacy skills in classroom learning. Furthermore, researchers will further study the effectiveness of using instructional videos in quasi-experimental research.

**Keywords:** learning videos, numeracy literacy skills, junior high school students

### INTRODUCTION

The understanding of different students in the learning process requires teachers or educators to be more creative and innovative in delivering material. Innovation and creativity in learning created by teachers will lead to positive attitudes of students in accepting the lessons they are learning (Zain & Putra, 2020). Innovation in learning can be through the use of learning media. According to Asyhar (2012), learning media is anything that can convey or distribute messages from a source in a planned manner, so that a conducive learning environment occurs.

Teachers can stimulate students in learning by using interesting media and unique and distinctive ways of exposure (Putra et al., 2019). Learning videos are one of the media

that can be used by teachers. Learning videos are needed in the continuity of mathematics learning (Trilani & Sudihartinih, 2022). The use of this video can increase students' interest in learning (Saman et al., 2018). Learning videos are anything that allows audio signals to be combined with moving images displayed on a television screen or computer monitor (Daryanto, 2013b; Yaumi, 2018).

Media in the form of video is a suitable media to be used in learning mathematics (Akbar & Komarudin, 2018). The use of video in learning can have a positive impact (Humaidi et al., 2021). The use of video in this learning can make it easier for students to achieve learning goals and mastery of concepts (Andi, 2012; Daryanto, 2013a; Gusmania & Wulandari, 2018; Muliawanti & Kusuma,

2019; Sudjana & Rivai, 1992). The effect of using this learning video is seen in the realm of Bloom's classification, which includes the cognitive, affective, and psychomotor domains (Atikah, 2016).

According to Purwanto & Rizki (2015), contextual-based mathematics learning is an interesting learning resource and has many pictures and is equipped with visualizations in the form of learning videos. Video is able to explain the content more clearly (Batubara & Ariani, 2016). By utilizing videos, real problems can be delivered and then modeled mathematically to be solved (Fitri & Putri, 2020). Therefore, the use of learning videos can support students' numeracy literacy skills (Winarni et al., 2021). Furthermore, Daryanto (2013b) stated that 65% of the information obtained from images can be well absorbed by the audience, and if conveyed through sound, the information can only be absorbed properly by the audience by 40%.

Problem-based daily learning can improve students' numeracy literacy skills (Ambarwati & Kurniasih, 2021; Widiastuti & Kurniasih, 2021). Numerical literacy skills are knowledge and skills to be involved in obtaining, interpreting, using, and communicating various kinds of numbers and symbols related to mathematics and analyzing information displayed in everyday life (Atmazaki et al., 2017). More specifically, Baiduri (2019) defines mathematical literacy skills as the ability to propose, formulate, and solve problems inside and outside mathematics. In line with this, Hidayah (2018) states that the habituation stage of the school literacy movement will make it easier for teachers to start learning by conveying the benefits and applications of materials in everyday life, as well as contextual problems for students according to the chosen theme.

Increasing students' knowledge is in line with increasing students' literacy skills. One of the literacy skills that play a role in increasing students' understanding of mathematical concepts is numeracy literacy skills (Rumiyatun, 2021). However, in general,

students' numeracy literacy skills are still low (Ate & Lede, 2022; Nadjamuddin & Hulukati, 2022). This is also reinforced by the results of the analysis on observations made at a junior high school in Jambi, where the numeracy literacy abilities of 22 students were divided into four groups at the time of learning. There was only 1 group of students who included the category of sufficient numeracy literacy skills, while 3 groups of students were included in the poor category. In addition, based on the student's numeracy literacy test before using video in learning, it showed that only 9 students achieved completeness, while 13 other students did not. This shows that only 40.1% of students have adequate numeracy literacy skills.

Based on this description, this research and development aims to determine whether the developed learning video media is able to support numeracy literacy skills in class VIII junior high school students and to determine the feasibility of using learning video media when applied in the classroom.

## METHOD

This research and development design uses the ADDIE development model. The ADDIE development model is a traceable and systematic framework in organizing a series of design and development research activities (Rusdi, 2018). The development procedures carried out are the analysis stage, the design stage, the develop stage, the implement stage, and the evaluate stages.

The subjects of this study were media validators, material validators, practitioner validators, 9 students of a junior high school in Jambi at class VIII A, and 20 students in class VIII B.

The instruments used for data collection in this study were a validation questionnaire sheet by material experts and media experts, teacher assessment questionnaires, student assessment questionnaires, student response questionnaires, and numeracy literacy test questions for which the questionnaire was made using a Likert calculation scale

developed by Riduwan (2015). The indicators of numeracy literacy ability in the video and numeracy literacy test questions were developed based on the notion of numeracy literacy according to Atmazaki et al. (2017) which includes, (a) the ability to obtain information on various numbers and symbols from practical problems in everyday life, (b) the ability to interpret information, (c) the ability to analyze information and display it in the form of graphs, tables or charts to make decisions, (d) the ability to use data of various numbers and mathematical symbols in solving problems, and (e) the ability to communicate various kinds of numbers and mathematical symbols.

The validity of the learning video is based on the assessment of two validators consisting of a media validator and a material validator. The validation results from the two validators are then calculated, presented, and qualified to the coefficient of validity. Learning videos are considered to be valid if each validation results from the minimum validator is quite valid ( $\geq 70\%$ ).

The practicality of using learning videos is calculated based on the results of filling out teacher assessment questionnaires and student assessment questionnaires. Learning videos are said to be practical if each assessment result from the teacher and students is at least practical enough ( $\geq 70\%$ ).

The effectiveness was measured based on the results of the numeracy literacy test and student response questionnaires. To evaluate the effectiveness, 20 students whose classes have used learning videos, and the percentage is calculated, adjusted to the qualifications of the effectiveness of the learning media. Learning videos are considered to be effective if the percentage of completeness of the students' numeracy literacy test results is at least 70% and the results of filling out the student response questionnaires are at least quite effective ( $\geq 70\%$ ).

## RESULTS AND DISCUSSION

The results of this research and development are in the form of a learning video that supports numeracy literacy skills through the stages of the ADDIE research model.

### Analysis Stage

In the needs analysis stage, it is found that students need a learning process that is factual or they can see. Such a learning process can help students understand what is being explained. Researchers conducted an analysis of the curriculum, where the 2013 curriculum is currently in effect and facilitates students to develop their potential. The next stage of analysis is the analysis of student characteristics. The average student is 11-12 years old, which means that according to Piaget's theory (Ibda, 2015), they are in the concrete operational stage. At this stage students are mature enough to use logical thinking or operations, but only for current physical objects (Ibda, 2015). The last analysis stage is the analysis of the learning environment. The results of the observations provide information that the availability of technology in schools is adequate but has not been properly utilized by teachers and students at the school.

### Design Stage

At the design stage, researchers began to design learning videos that support students' numeracy literacy skills. This design is still conceptual and will underlie the next development process. In this step, the researchers make a product design that will be developed. Then, they proceed to the making of the storyboard. Storyboards are made to make it easier to develop learning videos. The design of video content based on the type of components can be seen in Table 1.

Table 1. Video Content Design

| Design                         | Types |         |       |           |
|--------------------------------|-------|---------|-------|-----------|
|                                | Text  | Picture | Audio | Animation |
| Opening view on video          | X     | X       | V     | V         |
| Display of learning motivation | V     | X       | V     | V         |
| Learning title display         | V     | X       | V     | X         |
| Display of learning basics     | V     | X       | V     | V         |
| Material-related views         | V     | V       | V     | V         |
| Cover view on video            | X     | X       | V     | V         |

### Develop Stage

This learning video is made to support numeracy literacy skills, so that the indicator components of numeracy literacy skills must be included in the learning videos developed. The snippets of video display based on numeracy literacy ability indicators can be seen in Figures 1 to 5.



Figure 1. Display Getting Information in Daily Life/Events

Problem-based learning is able to improve students' numeracy literacy skills (Ambarwati & Kurniasih, 2021; Widiastuti & Kurniasih, 2021). Therefore this learning video shows daily activities in the material used. Figure 1 shows a snippet of a video display that displays daily activities and is often encountered by students in the process of buying and selling goods. Then, by watching the video, it will be known what items have been purchased by the characters in the video so that students can get information from the problem. Solving everyday problems using mathematics is a form of applying mathematical literacy. This shows that mathematics is the basis of other sciences so that the concept is needed in solving everyday life (Anggoro, 2015). In line with what Fitri & Putri (2020) stated, video material can be

delivered by giving real problems to be modeled mathematically and solved.



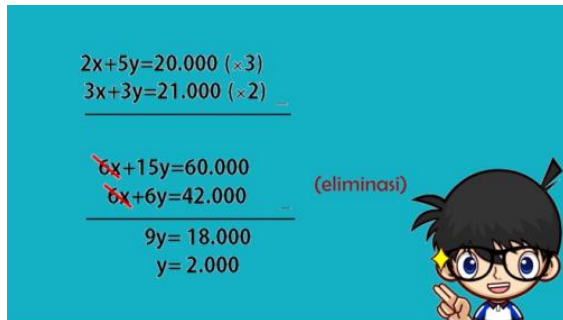
Figure 2. Interpreting What Materials are in the Event

Based on Figure 2, it appears that the video guides the students to determine what the main problem is, for example in the video there is a problem with two children buying soy sauce and eggs. Based on this example, the students are expected to be able to interpret the information they get.

|                  |      |      |
|------------------|------|------|
| $2x + 4y = 8000$ |      |      |
| $x + 5y = 8500$  |      |      |
|                  | Rara | Ina  |
| x (kecap)        | 2    | 1    |
| y (telur)        | 4    | 5    |
| Bayar            | 8000 | 8500 |

Figure 3. Information Displayed in Table Form

Furthermore, after the students are able to interpret the information from the problems they get, they are also expected to be able to analyze the information and put it in the form of tables or graphs. This step is shown in Figure 4.



$$\begin{array}{r}
 2x + 5y = 20.000 \quad (\times 3) \\
 3x + 3y = 21.000 \quad (\times 2) \\
 \hline
 6x + 15y = 60.000 \\
 6x + 6y = 42.000 \quad \text{(eliminasi)} \\
 \hline
 9y = 18.000 \\
 y = 2.000
 \end{array}$$

Figure 4. Model Completion with Elimination Method

Figure 4 is a screenshot of the learning video in the process of making a mathematical model of the problem. Next, students use the model to solve problems. In addition to being able to solve problems well, students must also be able to communicate every step of the solution in a good, structured and clear manner. Figure 5 shows how problems are solved and the results are accumulated and presented.



Figure 5. Accumulating the Results that have been Obtained

The results for validation from material experts and media experts to see the level of media validity are shown in Table 2.

Table 2. Data Validation Results

| Validator       | Amount | Average | % Average | Category    |
|-----------------|--------|---------|-----------|-------------|
| Material expert | 56     | 3.37    | 74.6      | Quite valid |
| Media expert    | 54     | 4.15    | 83        | Quite valid |

According to Table 2, instructional videos that support numeracy and literacy abilities fall under the category of "fairly valid". This is in line with research conducted by Atikah (2016) which states that the use of learning videos affects student learning

outcomes by looking at the realm of bloom classification which includes the cognitive, affective, and psychomotor domains.

The next assessment is to measure the practicality of the media based on teacher and student assessments. According to Table 3, the value is included in the "very practical" category. It can be said that this learning video that supports numeracy literacy skills can be used by both teachers and students.

Table 3. Practical Results Data

|              | Amount | Average | % Average | Category       |
|--------------|--------|---------|-----------|----------------|
| Math teacher | 70     | 4.67    | 93.4      | Very practical |
| Students     | 405.3  | 4.5     | 90        | Very practical |

### Implement Stage

After the video is declared valid and practical, then the effectiveness check is carried out at the implementation and evaluation stages. The results of the implementation and evaluation stages can be seen in Table 4.

Table 4. Effectiveness Result Data

| Instrument                     | Amount                  | Average | % Average | Category       |
|--------------------------------|-------------------------|---------|-----------|----------------|
| student response questionnaire | 936.5                   | 4.7     | 94        | Very effective |
| numeracy literacy test         | 18 students (completed) | -       | 90        | Very effective |

In Table 4, the student response questionnaire scores are 94% and the students' numeracy literacy test results are 90% complete. this result is in the category of very effective. Thus, the learning videos developed are effective to support students' numeracy literacy skills. This is in line with the opinion of Daryanto (2013b) which states that 65% of the information presented through images can be well absorbed by the audience, and if conveyed through sound the information can only be absorbed properly by the audience by 40%. In addition, learning videos are more interesting, easy to understand, and easy to

learn because they are equipped with illustrations and animations that support the material (Wijayanti et al., 2021).

### Evaluate Stages

The feasibility of learning videos that support numeracy literacy skills can be seen in terms of the validity, practicality, and effectiveness of learning videos.

The validation of the material in the learning video to support numeracy literacy is declared quite valid because the learning material in the video is in accordance with the applicable curriculum at a junior high school in Jambi and is supported by the results of a validation questionnaire by the validator. The learning video got a score of 74.6% from material experts, and it is included in the fairly valid category. We can see this from several questionnaire statements that have been filled out by the material validator, where the statement *“learning video contains the concept of Systems of Linear Equations with Two Variables material”* gets 4 points (agree). Thus, the learning video already contains the concept of the Systems of Linear Equations with Two Variables material.

Furthermore, learning videos that support numeracy literacy skills get a score of 83% from media experts with quite valid criteria because this learning video has been made based on the characteristics of students at a junior high school in Jambi who are 11-12 years old on average. The media expert validator also stated that he strongly agreed that the animated images in the video were clearly visible. It can be concluded that according to expert validators, the learning video media is valid and can be continued for testing. This is because the video in terms of design is good, the writing is clear, and the explanation of the material also uses interesting pictures and animations. The use of learning videos affects student learning outcomes by looking at the realm of bloom classification, which includes the cognitive, affective, and psychomotor domains (Atikah, 2016).

Learning videos are tested for practicality by teachers and students. This test is conducted to determine whether the learning video can be used by teachers and students. The practicality test was carried out by the mathematics teacher of a junior high school in Jambi. The results of practitioner validation were 93.4% and included in the very practical category. This can be seen from the results of the assessment questionnaire, the teacher strongly agrees that it is easy to use learning videos. This statement means that this learning video is easy to operate by both researchers and teachers. The teacher also agreed that the use of learning videos made understanding the material easier. This means that learning videos also make the material easier to understand.

In the one-on-one evaluation, a score of 90% was obtained and included in the very practical category criteria. It can be seen from several statements in the student assessment questionnaire. Students strongly agree that learning videos can be used easily. Based on this assessment, students stated that in terms of using the Systems of Linear Equations with Two Variables learning video, it was easy to use. This is in line with the statement of Batubara & Ariani (2016) that learning videos are easy to use and are able to explain content more clearly. Based on the assessment by teachers and students, it can be concluded that the learning videos that support literacy and numeracy skills can be said to be in the very practical category.

To measure the effectiveness of learning videos that support numeracy literacy skills, students' numeracy literacy skills tests are carried out and student response questionnaires are filled out. Based on the student response questionnaire, a score of 94% was obtained and was included in the very effective category. Students strongly agree that the use of learning videos can increase interest in learning. This is in line with the statement of Saman et al. (2018) that learning videos can increase student interest. Students also strongly agree that the examples given in the video

make it easier to do the exercises. This shows that the use of video in learning can have a positive impact (Humaidi et al., 2021).

In addition to looking at student responses, effectiveness is also seen in the results of students' numeracy literacy tests. The effectiveness of this test is based on the KKM score for mathematics in class VIII B, which is 70. Students who do not reach 70 are declared incomplete. On this test, 18 out of 20 class VIII B students who took the test were declared complete. The percentage of students who have completed their studies is 90%. These results are supported by the research results of Astika et al. (2020), where the use of learning videos on Systems of Linear Equations with Two Variables material is effective in learning.

So, based on the results of the numeracy literacy ability test where 90% of students completed and the results of the student response questionnaire, who got the very effective category, it can be said that the learning video that supports numeracy literacy skills is effective. This is in line with Daryanto (2013b), which states that 65% of the information obtained from images can be well absorbed by the audience, and if conveyed through sound, the information can only be absorbed properly by the audience by 40%. Basically, the use of learning videos can facilitate students in learning (Aristiya & Muslim, 2021), making it easier for students to achieve learning goals and mastery of concepts (Andi, 2012; Daryanto, 2013a; Gusmania & Wulandari, 2018; Muliawanti & Kusuma, 2019; Sudjana & Rivai, 1992), and can support students' numeracy literacy skills (Winarni et al., 2021).

## CONCLUSION

Learning media in the form of learning videos that support numeracy literacy skills developed in this study meets the feasibility of a media, because the media meets the requirements, namely the validity criteria. The results of material validation show that the criteria for 74.6% with the validity level are

quite valid and media experts at 83% with a fairly valid level of validity. Fulfilling the practicality criteria in terms of use, based on the results of practitioner validation by mathematics subject teachers of 93.4% with very practical criteria, and based on a one-on-one evaluation of 90% with very practical criteria. Meet the effectiveness criteria, which is more than 80%, precisely in this study students got a complete score of 90% of students in the test results after using the learning video. Then, also based on the student response questionnaire in this small group evaluation class, a score of 94% was obtained, which included the criteria for being very effective. Based on the results of this study, teachers should consider using learning videos that can support students' numeracy literacy skills in classroom learning. Furthermore, researchers will further study the effectiveness of using instructional videos in quasi-experimental research.

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