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Animation Media for Elementary School Students: Efforts to Improve Numeracy Skills

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Abstract: Mathematics is essential for developing students' problem-solving skills, as many real-life issues can be addressed through mathematical models. However, the 2018 PISA survey ranked Indonesia 72nd out of 78 countries in numeracy, with an average score of 379. In schools, mathematics is often taught using fewer engaging methods, which may lower students' interest and performance. Video-based media is considered effective for elementary students, offering a more enjoyable learning experience. This study aims to improve the numeracy skills of Grade 3 students at SDN 14 Lubuklinggau using animated video media featuring the character Loomie. The research employed classroom action research (CAR) following the Kemmis and Taggart model, conducted in two cycles: planning, action, observation, and reflection. The topic was 2D shapes. The pre-test average score was 13.5. In Cycle 1, the post-test average rose to 63, showing improvement but still below expectations. In Cycle 2, the average increased significantly to 80. These findings indicate that animated video media can effectively enhance students' numeracy skills. Thus, incorporating animation into mathematics instruction can be a promising strategy to improve student engagement and academic outcomes, especially in early grades.

Keywords: Animation media; Elementary school; Numeracy skills

Introduction

Education plays a crucial role in ensuring societal progress and prosperity. It equips individuals to contribute effectively to their communities and serves as a key route out of poverty by improving career opportunities (Reyes, 2024). A nation's strength depends on the quality of its education, which should develop competent, critical, creative, and innovative human resources (Fauziah et al., 2022). In response, the government continuously strives to enhance educational quality by refining the national curriculum (Nugraha, 2022; Trisna Amelia Putri et al., 2022). These curriculum improvements aim to enrich students' learning experiences, with the Merdeka Curriculum currently being implemented as part of this ongoing innovation. The curriculum currently used in Indonesia is Merdeka curriculum (Mahany et al., 2022). The Merdeka curriculum developed the previous curriculum, which focused on improving students' literacy and numeracy skills (Adelia & Putri, 2024).

Numeracy is a person's ability to use, understand, and apply various numbers, symbols, and calculation operations of basic mathematical concepts in everyday life, which are presented in the form of graphs, tables, and charts, and is a skill that must be mastered in the 21st century (Andriatna et al., 2024; Handayani, 2024). Math is one of important lesson because besides demanding the ability to think and reason with students, many problems in life can presented and completed in mathematical models, and the goal of learning mathematics in elementary schools is to equip students to become independent learners (Sofyan et al., 2021).

Many mathematics learning methods still tend to be monotonous, causing students to feel bored and lose interest in learning (Pangga & Armansyah, 2023). Field data also reveal that Indonesia's numeracy skills remain low (Kamal et al., 2024). Based on the 2018 PISA survey results, Indonesia's numeracy was ranked 72 out of 78 countries, with an average mathematics score of 379 Indonesian students. This score is still far below the

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average of participating countries, reaching 478. Another TIMSS Trends in International Mathematics Science Study 2015 survey stated that Indonesia's mathematics score was 397, with an average TIMSS score of 500. Numeracy literacy refers to a student's ability to understand and use numbers in daily life, including mathematical reasoning, formulating, applying, and interpreting concepts to solve real-world problems (Adelia & Putri, 2024). This skill involves using various numerical forms and symbols, analyzing data from different representations (such as graphs or tables), and interpreting results to make predictions and informed decisions (Hossain et al., 2023; Sunarti et al., 2024). This issue presents a challenge for both educators and the government in enhancing students' numeracy abilities.

Improving students' numeracy skills requires problem-solving-based and student-centered learning approaches that promote active and creative participation (Alwi Hilir, S.Kom., 2021; Kamal et al., 2024). The development of technology can help teacher to use technology as a teaching media (Hapsari & Hanif, 2019; Srimala et al., 2023; Supriatna et al., 2020). This makes educators have to take advantage of technological advances in learning in schools. This utilization can be in using technology-based learning media in animated videos (Barak et al., 2011; Özdemir et al., 2024). It is known that animation or cartoons are one of the forms of visual entertainment that most people remember. Using animated videos can help educators illustrate the material to be delivered (Bito & Ismail, 2021; Utaminingsih & Kassymova, 2024). With these learning videos, students will feel more enthusiastic and not bored when participating. Learning videos increase students' interest in learning, especially if the video uses animated characters (Alaa et al., 2020; Ploetzner, 2024). This study aims to improve the numeracy skills of Grade 3 students at SDN 14 Lubuklinggau using animated video media featuring the character Loomie

Based on the explanation above, it is necessary to innovate learning approaches, especially to enhance elementary students' numeracy literacy in the topic of 2D shapes. One suitable approach is video-based learning using animated video media. This research focused on applying Animation Media and its implications in enhancing students' numeracy skills at SDN 14 Lubuklinggau.

Method

1. Time and Place of Research

The research was conducted in the 2022/2023 academic year, precisely in March to April 2023. This research was conducted at SDN 14 Lubulinggau that located at Jl. Letkol Atmo, Sukajadi, Kec. Lubuklinggau Barat I, Lubuklinggau City, South Sumatra Province.

2. Tools and Material

a. Tools

The tool used in this study was stationary and a projector to display learning videos.

b. Material

The materials used in this study are modules, animated videos containing explanatory videos on 2D shapes materials, and instruments. The instruments used are worksheets given to students in the form of pre-tests and post-tests. The instrument used in this study is a test sheet related to the material taught. This test sheet will be used as an evaluation test, consisting of 8 essay questions and 2 HOST questions distributed to individual students. The test conducted in this classroom action research aims to measure students' understanding of Mathematics on 2D shapes material.

c. Research methods

Classroom Action Research (CAR) is a systematic and reflective process where teachers identify and address problems within their own classrooms to improve teaching and learning outcomes (Ranti Batubara et al., 2022). This Classroom Action Research (CAR) focuses on the main problem of numeracy that occurs at SDN 14 Lubuklinggau. with the research subjects being grade 3 students of SDN 14 Lubuklinggau.

Classroom Action Research (CAR) was conducted to improve students' numeracy skills. Based on researchers' observations, SDN 14 Lubuklinggau from the needs analysis results performed on March 3, 2023, gave results that, on average, had a low numeracy level. This research was conducted by assisting 3rd grade students with 2D shapes teaching materials. Students who were previously only given material through educator explanations were then given learning using animated videos in learning. The uniqueness of this research compared to previous research is the use of animated videos in learning about 2D shapes material that has never been applied at SDN 14 Lubuklinggau. Thus, the researcher took the initiative to research this and took the research title

Data collection techniques used in implementing this research include planning, implementing actions, observation, and reflection (Sugiaryo, 2023). The subjects were analyzed in this study, and the data was obtained using the student needs analysis test technique. The stages of implementing CAR are commonly referred to as the Kemmis and Mc. Taggart models.

3. Research stages

The stages of implementing CAR are commonly referred to as the Kemmis and Mc. Taggart models can be seen in the following picture:

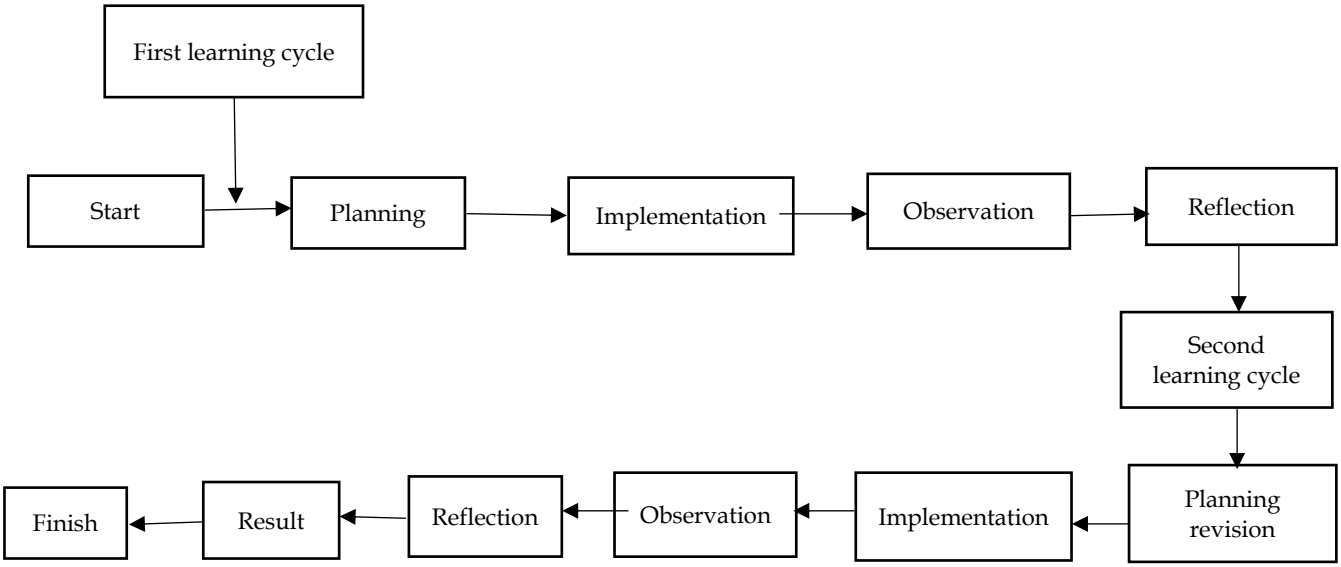

Figure 1. Stages of PTK Implementation

According to Kemmis and Mc, the stages of classroom action research (CAR). Taggart above can be described as follows (Yuntawati & Aziz, 2022) :

a. Cycle I
   1) Classroom Action Planning
      a) Educators determine the sub-material to be taught, namely the material on 2D shapes, and then design the Teaching Module and other instruments.
      b) Create and prepare animated video media,
   2) Implementation of Class Action. Conducting Cycle I Learning and Testing
   3) Observation. Observing the activities of students and educators during learning.
   4) Reflection. This study conducted an analysis of all data collected in cycle I. After reflecting on the implementation of learning and analyzing the shortcomings that occurred in cycle I, the researcher considered all evaluations and improvements as a follow-up to the planning in Cycle II later.

b. Cycle II
   1) Classroom Action Planning: (a) Analyze the results obtained during cycle I, which will be used as material for improvement in cycle II; (b) Prepare animation media and observation sheets by paying attention to the shortcomings that occurred in cycle I.
   2) Implementation of Class Action. Conducting learning by applying animated video media and tests that refer to deficiencies and considering improvements to deficiencies that occurred in cycle I.
   3) Observation. Observe all activities during the learning
   4) Reflection. The results obtained in the observation process in cycle II are collected into one to be analyzed and evaluated, which will get one conclusion from the results of cycle II, where it is expected from the test results in cycle II to obtain student learning outcomes to improve their numeracy skills by using animated video media.

4. Data analysis

The quantitative data in this study were obtained through pretest and post-test scores conducted in each cycle. First, the pretest results were collected to determine the initial level of students' numeracy literacy before the implementation of the learning intervention. After the learning process in each cycle, a post-test was administered to measure students' progress. The scores from both the pretest and post-test were then accumulated and analyzed. To assess the overall improvement, the average score for each cycle was calculated. This average provides a clear picture of the effectiveness of the learning approach applied. The formula used to calculate the average value is presented as follows:

$$\text{Mean } (x) = \frac{\Sigma x}{n} \quad (1)$$

Result and Discussion

This classroom action research begins with analyzing students' needs using the lecture method when given 2D shapes material. After being given the material, students were asked to work on questions, and the average student learning outcomes were 13.5. Based on the analysis carried out, it is known that the low learning outcomes of students are influenced by several things, such as the lack of student focus on teacher learning and the learning model used using conventional methods so that the learning activities carried out have not been able to achieve learning objectives.

Cycle I

Planning Stage

At the beginning of the first cycle, the researcher took the initial step through the planning stage. At this stage, the researcher determined the material, designed the teaching module, observation sheets, and animation media, and created test instruments. Before entering the action stage, the attachments had been discussed and studied.

Learning Stages

The intended action stage is to implement learning using animated videos. In cycle I, three face-to-face meetings or 3 lesson hours were carried out. The implementation of learning at SDN 14 Lubuklinggau lasted for 1 lesson hour, which was 35 minutes. So, if we calculate in this first cycle, it takes approximately 105 minutes with a breakdown of 3 (meetings) x 35 (one lesson hour) for the effectiveness and efficiency of this PTK objective.

In cycle I, meeting I, learning is carried out using animation media, and at the beginning of learning, students are given relaxation with ice breaking. In cycle I, meeting II, learning takes place using character animation media by motivating so that they are more active in education. In cycle I, meeting III, learning is carried out using animation media with class conduciveness or class discipline so that students pay attention to the material being taught.

Observation and Analysis Stage

At the observation and analysis stage, students use observation sheets that aim to record the results of observations during the action, observe the suitability of the learning process created, and conduct evaluations to see the action's success level. The level of success of the action in cycle I can be seen by comparing the results of the pretest conducted at the first meeting of the cycle I with the results of the post-test conducted at the third meeting of the cycle.

Table 1. Results of Cycle I Test

Description	Mark		Average
	Pretest	Post-Test	
Average value	61	65	63
The highest score	50	60	
Lowest Value	10	20	

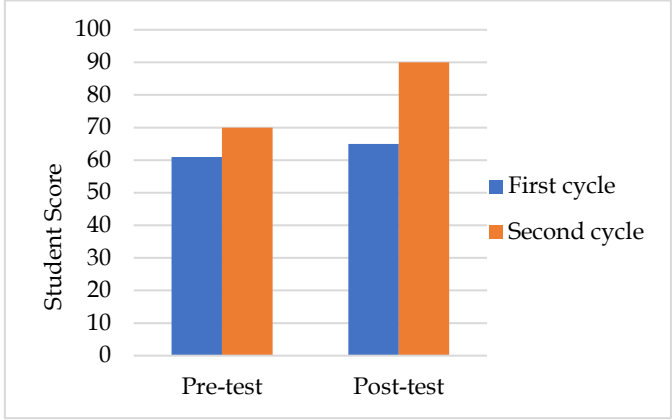

Figure 2. Cycle I Learning Outcome Graph

The pretest in cycle I was conducted at the first meeting and showed that 19 students in Class 3 had an average learning outcome of 61, and the lowest score was 10. In the post-test conducted at the third meeting of cycle I, the average learning outcome of students was 65, and the lowest score was 20. Based on the data obtained in cycle I, it is known that students' total average learning outcome is 63. This illustrates that participants' learning outcomes in the KPK and FBP materials are still lacking.

Reflection Stage

The results obtained after the implementation of the action illustrate that students' average learning outcomes are 63. Therefore, evaluation and analysis were carried out in cycle I because the majority of students were not able to work on the 2D shape questions, as evidenced by the individual scores obtained in the post-test of cycle I, which recorded that there were students who got a score of 20. This will be improved and enhanced in cycle II.

Cycle II

Planning Stage

Planning in cycle II designs and analyzes improvements in learning outcomes in cycle I, creates sub-materials, creates teaching modules, and prepares media and learning resources through animated videos, more enjoyable learning scenarios, test instruments, and observations. In learning activities, educators first use the lecture method and then display animated videos to strengthen students' understanding of the 2D shape material.

Learning Actions

The action in cycle II was implemented in 3 meetings or 3 lesson hours. One lesson hour at SDN 14 Lubuklinggau is equivalent to 35 minutes, so it takes 105 minutes in cycle II. A teaching module is needed to facilitate the implementation of the action.

Cycle II meeting I learning is carried out using animation media using ice-breaking treatment, providing motivation, and distributing animated videos to students' parents or guardians so they can study at home. In cycle II meeting II, learning is carried out using animation and treatment used as the first meeting of cycle II and added with conditioning or class discipline so that students pay attention to the material being taught. In the third meeting of cycle II, the animation and treatment given are the same as those used in the second meeting of cycle II and added with therapy as a special approach to students with low learning outcomes of 2D shape material.

Observation and Analysis Stage

The observation stage is carried out simultaneously with the implementation of the action. All students' and educators' activities are recorded. After that, students' learning outcomes are analyzed and evaluated. The level of success of the action in cycle II can be seen by comparing the results of the pretest conducted at the first meeting of cycle II with the results of the post-test conducted at the third meeting of cycle II.

Table 2. Test Results in Cycle II

Description	Mark		Average
	Pretest	Post-Test	
Average value	70	90	80
The highest score	80	100	
Lowest Value	50	70	

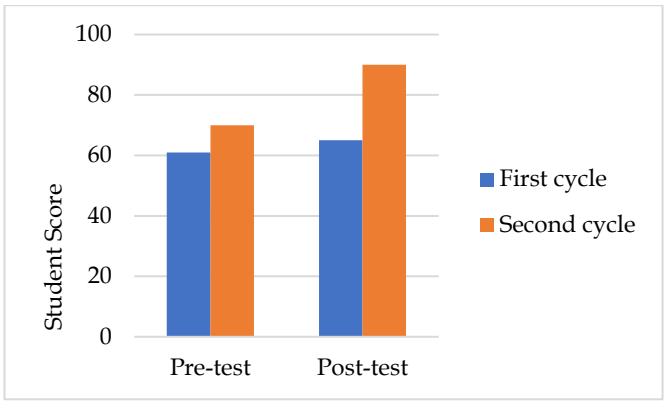

Figure 3. Graph of student learning outcomes in cycle 2

The pretest results in cycle II showed that 19 Class III students had an average learning outcome of 70, with the lowest score of 50 and the highest score of 80. Meanwhile, in the post-test of cycle II, the average learning outcome of students was 90, with the lowest score of 70 and the highest score of 100. So in t, the pretest and post-test of cycle II, the average learning outcome of students was 80. These results indicate a significant increase in students' reasoning on the material of 2D shapes after the application of animation media.

Reflection Stage

Based on the data obtained, some information is known as follows: 1) Educators have implemented the learning scenario well during the learning process. 2) The shortcomings in cycle I have been corrected in cycle II by using various, more varied treatments to show improvement.

Table 3. Recapitulation of overall learning results of the test

Description	Total Average Value
Needs Analysis	13.5
Cycle I	63
Cycle II	80

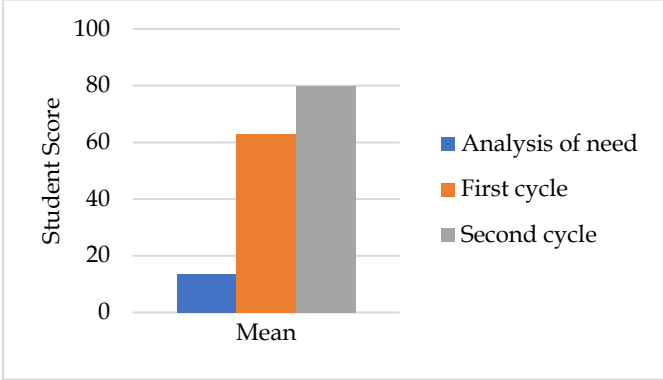

Figure 4. Graph of the overall average test scores

This research was conducted through two cycles; each cycle was conducted thrice for 35 minutes per meeting. During the observation stage, data was found from the research object, showing that most students still had difficulty working on practice questions on the 2D shaped material given by the educator. In addition, there are still students who have not optimally understood the concept of the material delivered by the educator without using animation media.

Class 3 of SDN 14 Lubuklinggau, in the initial test of the needs analysis stage, had an average score of 13.5. This indicates that student learning outcomes are still low. In this case, educators must create a fun and meaningful learning atmosphere. Learning can be done by using learning media to make it easier for students

to understand the 2D shape material. One of the media that fits the characteristics of Class 3 of SDN 14 Lubuklinggau is using animated video media.

The application of animated media in learning activities has been proven to provide many benefits for students in improving their learning experiences and outcomes. The application of animated cartoons and multimedia applications has been proven to improve elementary school students' knowledge and understanding of complex science concepts so that it can reduce misconceptions (Hapsari & Hanif, 2019). Animated videos in science learning increase students' motivation, self-efficacy, interest, and usefulness in everyday life (Barak et al., 2011). Other studies show that students who learn with animated media have better academic achievement than if they use conventional learning models (Liu et al., 2024; Özdemir et al., 2024).

Cycle I in this study showed an increase in student learning outcomes from the initial test of the needs analysis stage. Cycle I was influenced by the improvement design that had been carried out on several problem findings and solutions were obtained. Educators, when explaining the steps for working on 2D shapes with the sequence in the teaching module that had been developed. Students who had low scores in learning mostly participated actively. If there was something they did not understand, they immediately asked the educator so that other students who did not ask also understood when the teacher gave their presentation; they all listened.

Learning is carried out in the classroom. Educators provide oral and written explanations regarding the meaning of Planar Building Material, but some students still do not understand the subject matter presented. After delivering the material and providing sample questions, students are given post-test 1 questions. The lowest score was 40, while the highest score was 80. Cycle I has an average of 63.

Students with the lowest score of 40 were given treatment so that those who initially did not understand the concept of Planar Geometry Material understood. To improve the existing scores in class 3 of SDN 14 Lubuklinggau, educators prepared several things that would be used to carry out cycle II. The learning outcomes of students in cycle II have succeeded in achieving the success criteria that have been set. Cycle II has the lowest score of 70, while the highest score is 100, so an average of 80 is obtained.

This shows that cycle II experienced an increase in the average value, so it can be stated that cycle II was successful. The following are the values of cycle II. the average value of the initial test learning outcomes was 13.5. Then, in cycle I, the average learning outcome was 63, and there was an increase in the average learning outcome of cycle II to 80. These data show an increase in students' average learning outcomes from pre-action and after being given action. The average learning outcomes of students have achieved the predetermined success criteria. From this study, it can be concluded that using digital video media can improve student learning outcomes regarding the concept of 2D shape Material in Class 3 of SDN 14 Lubuklinggau. The research findings show that student learning outcomes have increased in each cycle using animated video media. This study is supported by Trisnani & Puji Utami's (2020) findings that visual media can improve student learning outcomes. Through visual media, students can observe and understand so that they are actively involved during the learning process.

Animation media is a suitable tool for elementary school learning because it can help improve students' understanding, motivation, and academic presentation. Here are some strategies that can be used in its implementation:

1. Interactive multimedia
   Implementing animated media in learning can help increase student involvement in learning activities (Supriatna et al., 2020).
2. Digital storytelling
   Using animation in digital storytelling can effectively communicate content education, making it clear and easy for students to understand (Srimala et al., 2023).
3. Augmented reality
   Merge animation with augmented reality can give learning experience more deeply, especially in eye lessons like biotechnology (Umamah & Mahmudi, 2020).

The challenges and solutions that can be applied to this activity are as follows:

1. Potential misunderstanding
   Although animation can be handy, some researchers warn that animation can sometimes hinder meaningful learning or cause misunderstanding If Not designed truly (Barak et al., 2011)
2. Design and development
   Effective animation requires careful design and development, including stage pre-production, such as creating a board story and designing characters (Aprianto & Saputro, 2020).

Conclusion

Based on the study's results, it can be concluded that using animation media in the 2D shape material has improved the learning outcomes of Class 3 students of SDN 14 Lubuklinggau. This increase can be seen

from the rise in the initial test scores, cycles I and II. This is supported by the results of the observation sheet when the action was carried out. Students seemed interested in the media presented, so they paid more attention and observed the video. Students were also enthusiastic about working on the 2D shape Material questions after learning animated video media. The average score from the initial test was 13.5, then the average score for learning outcomes in cycle I was 63, and the average score for learning outcomes in cycle II increased to 80. This shows that cycle II improved the learning outcomes of Class 3 students at SDN 14 Lubuklinggau.

Author Contributions

Conceptualization, E.R.; methodology, E.R.; software, E.R.; validation, R.F.; formal analysis, E.R.; investigation, E.R.; resources, R.F.; data curation, E.R.; writing—original draft preparation, E.R.; writing—review and editing, R.F.; visualization, E.R.; supervision, R.F.; project administration, R.F. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest

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