

Psychological Effects of Visual and Animated Media on Reading Fluency in Early Elementary Students

Axvelgion Revo¹, Tuti Rahmi²

¹Program Studi Psikologi, Fakultas Psikologi dan Kesehatan, Universitas Negeri Padang, Padang, Sumatera Barat, 25173, Indonesia
axvelgionrevo@student.unp.ac.id

²Program Studi Psikologi, Fakultas Psikologi dan Kesehatan, Universitas Negeri Padang, Padang, Sumatera Barat, 25173, Indonesia
tuti.rahmi@fip.unp.ac.id

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ABSTRACT

This study examines the psychological effects of visual images and animated videos on reading fluency among first-grade elementary school students, focusing on cognitive processing. Reading fluency involves not only academic ability but also attention, information processing, and memory integration. The study used an experimental design with the non-parametric Kruskal-Wallis H test to compare three groups: visual image media (Group A), animated video media (Group B), and a control group (Group C). Thirty first-grade students were randomly assigned to the groups. Reading fluency was measured using standardized pretest and posttest assessments. The findings revealed that both visual images and animated videos significantly improved reading fluency compared to the control group ($p < 0.001$). Group A showed the greatest improvement, followed by Group B, while the control group demonstrated minimal change. Psychologically, visual images may support more effective cognitive processing by reducing cognitive load and strengthening dual coding mechanisms, which enhance reading performance. Animated videos, although engaging, may increase cognitive demands at early developmental stages. These findings indicate that the effectiveness of instructional media is closely related to children's cognitive development and information processing capacity in supporting early reading fluency.

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Corresponding Author:

Axvelgion revo

Program Studi Psikologi, Fakultas Psikologi dan Kesehatan, Universitas Negeri Padang Universitas Negeri Padang, Jl. Prof. Dr. Hamka, Air Tawar, Kota Padang, Sumatera Barat, 25173, Indonesia

Email: axvelrevo11@gmail.com

1. INTRODUCTION

Reading fluency is a fundamental skill that plays a crucial role in students' academic success, particularly at the early stage of elementary education (Sugiarsih, 2017). Students who possess adequate reading fluency are better able to understand learning materials across subjects, while those with limited reading skills often face difficulties in academic development (Satriawan et al., 2023; Rochmah 2021). In the Indonesian context, this issue becomes more urgent due to relatively low literacy levels, as reflected in national data and international assessments such as PISA (Widi, 2022.) . Therefore, improving reading fluency at the early grade level is essential to support long-term educational outcomes (Rahmawati & Sianto, 2025.).

Reading is not only a tool for acquiring information but also a means to develop critical thinking, logical reasoning, and creativity (Annisa et al., 2023; Rahmawati & Sianto, 2025.). Previous studies highlight that reading ability is closely related to students' academic achievement and overall learning success (Satriawan et al., 2023; Rochmah, 2021). The use of instructional media has been widely explored as a strategy to improve reading skills, particularly in early education (Windar, 2023; Kartikasari, 2022; Saguni, 2019). Theoretical perspectives such as Dual Coding Theory suggest that combining visual and verbal information enhances learning effectiveness, while Cognitive Load Theory emphasizes the importance of designing instructional materials that do not overload students' cognitive capacity (Ibda, 2015).

Several studies have examined the use of visual images and animated videos in learning (Pasampuri, 2024; Meilani et al., 2022). Visual images are known to support comprehension by providing concrete representations, while animated videos can increase motivation and engagement (Irawan et al., 2023; Sianturi et al., 2024). However, findings from previous research remain inconsistent, as some studies focus more on student engagement rather than measurable improvements in reading fluency (Nuriefer Haliz & Nanggala, 2023).

Despite the growing interest in instructional media, there is still limited empirical research that directly compares the effectiveness of visual images and animated videos within the same experimental framework, particularly in improving reading fluency among first-

grade students (Raharjo, 2019; Atmadi & Tuhfatul Janan, 2024). In addition, many previous studies do not specifically measure fluency outcomes such as accuracy and reading speed (Sianturi et al., 2024; Khansa Nabila et al., 2024). This indicates a research gap that needs further investigation.

This study aims to compare the effectiveness of visual image media and animated video media in improving reading fluency among first-grade elementary students. Furthermore, this study seeks to identify which instructional medium provides a greater impact on students' reading performance.

2. METHOD

This study employed an experimental design using the Kruskal-Wallis H test to compare the effectiveness of visual image media and animated video media in improving reading fluency (Sukron, 2023; Atmadi & Tuhfatul Janan, 2024). The study was conducted at SD Negeri 26 Air Tawar Timur, involving 30 first-grade students who were randomly assigned into three groups: Group A (visual image), Group B (animated video), and Group C (control).

The research procedure began with a pretest to measure students' initial reading fluency. Each group then received different treatments. Group A used visual image media, Group B used animated videos, and Group C followed conventional learning. (Pasampuri, 2024; Meilani et al., 2022). Each intervention session lasted 30 minutes and was conducted three times. After the intervention, a posttest was administered using the same instrument.

The collected data were analyzed using the Kruskal-Wallis H test to determine differences among groups (Sukron, 2023). Post hoc analysis was conducted to identify specific group differences. Figure 1 illustrates the detailed research procedure, starting from problem identification, sample selection, group assignment, pretest, intervention, posttest, data analysis, and conclusion.



Figure 1. Research Flowchart

3. RESULTS AND DISCUSSION

This study was conducted at SDN 26 Air Tawar Timur in Padang City, involving 30 first-grade students as participants. The respondents were randomly assigned to three treatment groups. Group A received an intervention utilizing visual image teaching media, Group B engaged with animated video media, and Group C, serving as the control group, did not receive any specialized intervention and followed conventional learning methods. This

division of groups aims to compare the effectiveness of the two types of teaching media in enhancing students' reading fluency.

Table 1. Descriptive Analysis

Group	N	Pretest					Posttest				
		Min	Max	Mean	Median	SD	Min	Max	Mean	Median	SD
Experiment A	10	55	85	64.00	62.50	8,756	95	100	99.00	100.00	8,756
Experiment B	10	60	70	65.50	65.00	4,378	85	100	89.00	90.00	4,595
Control C	10	45	70	65.50	65.00	7,619	65	80	70.50	70.00	3,689

In Group A, the pretest revealed an initial average score of 64.00 with a median of 62.50, indicating that students' reading abilities prior to the intervention were at a moderate level. The minimum score was 55, and the maximum score was 85, demonstrating considerable variation in students' reading abilities. Following the intervention with Visual Image Teaching Media, the average score significantly increased to 99.00, with a median of 100.00. The minimum score reached 95, indicating that almost all students achieved a very good level of reading fluency. This suggests that Visual Image Teaching Media is highly effective in enhancing reading skills.

In Group B, the average pretest score was 65.50, with a median of 65.00 and a score range of 60 to 70. The variation among students in this group was smaller compared to Group A, reflecting a more uniform initial level of ability. After the intervention with animated video media, the average score rose to 89.00, with a median of 90.00. Although this represents a significant increase compared to the pretest score, the results were not as favorable as those in Group A. The narrower range of scores (85–100) indicates that this media was effective, but less optimal than the visual image teaching media.

Furthermore, the control group had an average pretest score of 65.50, identical to that of Group B, with a score range of 45 to 70, indicating varying initial reading abilities. After following conventional instruction without any specialized intervention, the average posttest score increased only to 70.50, with a median of 70.00. This minimal increase suggests that, without additional intervention, students' reading abilities did not change significantly.

Table 2. Descriptive Analysis of Gain Score

Group	N	Min	Max	Mean Gain Score	Median Gain Score	Std. Deviation
Experiment A	10	83.33	100.00	96.9048	100.0000	6.54942
Experiment B	10	50.00	100.00	68.1548	66.6667	13.85270
Control C	10	.00	42.86	3.4396	14.2857	15.75190

The average N-gain score for Group A was 96.9048, approximately 96.9%, categorizing it as very effective (Raharjo, 2019). The minimum N-gain value for this group was 83.33%, while the maximum reached 100%. These results indicate that visual image teaching media has a significant impact on improving students' reading skills, with nearly all students achieving the maximum score on the posttest. This underscores the effectiveness of visual image teaching media in enhancing reading fluency.

In contrast, the average N-gain score for Group B was 68.1548, or around 68.2%, placing it in the fairly effective category (Raharjo, 2019). The minimum N-gain value for this group was 50%, and the maximum was 100%. While there was a notable increase in Group B, the effect was not as pronounced as that observed in Group A. This suggests that animated videos can improve reading skills, but their effectiveness remains lower compared to visual image teaching media.

Furthermore, the average N-gain score for Group C was 3.4396, or approximately 3.4%, indicating that the control group did not experience significant improvement. The minimum N-gain score for this group was 0%, and the maximum score was only 42.86%. This minimal increase indicates that, without specialized intervention, students' reading abilities showed very limited improvement, rendering Group C ineffective.

Based on the results of the N-gain score analysis, it can be concluded that Group A (visual image teaching media) exhibited a very effective increase in students' reading abilities, with an average N-gain of 96.9%. This demonstrates that visual image teaching media significantly enhances reading fluency, as nearly all students achieved the maximum score on the posttest. In contrast, Group B (animated video) showed fairly effective results with an average N-

gain of 68.2%. Although this represents a significant increase, its effectiveness was still lower than that of Group A. Meanwhile, Group C (control), which did not receive any specialized intervention, showed only a minimal increase, with an average N-gain of 3.4%. This limited improvement indicates that, without intervention, students' reading abilities did not develop substantially. Therefore, it can be concluded that visual image teaching media is more effective than animated videos in improving reading fluency among elementary school students.

Table 3. Results of the Kruskal-Wallis Posttest and Gain Score

Variables	Chi-Square	Df	Sig. (p)
Posttest	25,694	2	<.001
Gain Score	25.116	2	<.001

Based on the results of the Kruskal-Wallis test conducted on the posttest and gain score variables, the Chi-Square value was 25.694 with a p-value <.001 for the posttest, and the Chi-Square value was 25.116 with a p-value <.001 for the gain score. Both of these test results indicate that there is a significant difference between the three treatment groups (Groups A, B, and C), both in the posttest and in the gain score (Sukron, 2023). With a p-value smaller than 0.05, it can be concluded that the intervention given, both using visual image teaching media and animated videos, has a different and significant effect on students' reading ability. This indicates that the learning method applied in this study plays an important role in improving students' reading fluency, with the group receiving the intervention showing better results than the control group.

Table 4. Pairwise Post Hoc Test

Group 1	Group 2	Sig.	Adj. Sig. a
Control C	Experiment A	0.006	0.019
Control C	Experiment B	<0.001	0.000
Experiment A	Experiment B	0.023	0.070

Based on the results of the pairwise post hoc test, the comparison between the control group (C) and experimental group A revealed a significance value of 0.019 (adj. sig), which is less than 0.05, indicating a significant difference between the two groups. A

similar finding was observed in the comparison between the control group (C) and experimental group B, where the significance value was 0.000 (adj. sig), also demonstrating a significant difference. However, the comparison between experimental groups A and B yielded a significance value of 0.070 (adj. sig), which exceeds 0.05, indicating no significant difference between the two experimental groups. Therefore, it can be concluded that both experimental groups A and B exhibited significant differences compared to the control group, but there was no significant difference between the two experimental groups (Lawe et al., 2018).

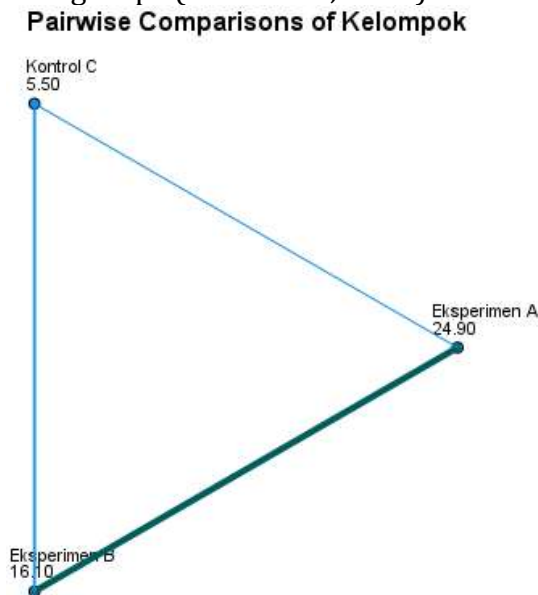


Figure 2. Pairwise comparisons of the control and experimental group

Furthermore, the pairwise comparisons graph illustrates the average rankings of the three groups that received different treatments. The control group (Group C), which followed conventional learning methods, had the lowest average ranking of 5.50, indicating the least favorable learning outcomes compared to the other groups. The experimental group utilizing animated video media (Group B) achieved an average ranking of 16.10, reflecting an improvement in learning outcomes relative to the control group. In contrast, the experimental group using Visual Image Learning

Media (Group A) attained the highest average ranking of 24.90, signifying that Visual Image Learning Media had the most positive impact on educational outcomes among the methods evaluated. This highlights the effectiveness of Visual Image Learning Media in enhancing the quality of learning.

The lines connecting the groups in this figure represent pairwise comparisons based on their average rankings. These lines illustrate the extent to which student learning outcomes were influenced by the treatments administered to each group. The thick line connecting Group A (visual media) and Group C (control) indicates a significant difference, with Group A demonstrating markedly better learning outcomes than Group C. This suggests that visual media is more effective in improving reading fluency compared to the no-intervention approach. Conversely, the thinner line between Group A (visual media) and Group B (video animation) indicates that although a difference exists between these two groups, it is not as substantial as the difference between Group A and Group C. This implies that while video animation is effective, Visual Image Learning Media has a greater impact on enhancing students' reading abilities. Thus, these lines facilitate the visualization of the magnitude and strength of differences between pairs of groups based on the interventions received, providing a clearer understanding of the effectiveness of each treatment in the context of this study.

This study aims to measure the effectiveness of visual image teaching media and animated videos in improving reading fluency at the elementary school level. Based on the results obtained from the study conducted at SD Negeri 26 Air Tawar Timur, it can be concluded that both types of teaching media positively influence the reading abilities of grade 1 elementary school students. However, there is a significant difference in the effectiveness of the two teaching methods. The results of the pretest and posttest indicated that Group A (Visual Image Teaching Media) experienced a substantial increase, with an average posttest score of 99.00 and a high N-gain score of 96.90%. This demonstrates that visual image teaching media significantly impacts students' reading abilities. The use of clear and engaging visual images facilitates students' understanding of the concepts taught, aligning with Piaget's

cognitive development theory, which posits that children at this age find it easier to comprehend concrete information that they can see and experience directly (Ibda, 2015).

Group B (Animated Video) also yielded favorable results, with an average posttest score of 89.00 and an N-gain score of 68.15%. Although these results are not as high as those of Group A, they still indicate that animated videos can effectively improve students' reading fluency. Animated videos provide a dynamic and interactive learning experience, which can enhance students' motivation and engagement in learning. However, the difference in effectiveness between Group A and Group B can be attributed to the cognitive developmental stage of the students. While animated videos can be entertaining, the fast-moving elements and rapid changes may present concepts that are too complex for students who are just beginning to learn to read. This can lead to confusion, as students must process quickly changing information, which may not align with their cognitive abilities at this early stage of reading development (Irawan et al., 2023; Sianturi et al., 2024).

Group C (Control) demonstrated lower results, with an average posttest score of 70.50 and a very low N-gain score of 3.44%. This indicates that learning environments lacking appropriate aids or methods do not facilitate significant progress in the development of students' reading skills. It underscores the importance of using suitable teaching media in the learning process, particularly in the early stages of elementary education. Research by J(Atmadi & Tuhfatul Janan, 2024) supports this finding, stating that without appropriate intervention, students' reading skills may stagnate or fail to develop. This highlights the critical role of effective teaching media in supporting learning, enabling students to achieve better outcomes in their reading abilities.

Furthermore, the results of the Kruskal-Wallis analysis test indicated significant differences among the three groups (Experiment A, Experiment B, and Control) at the $p < 0.001$ level for both the posttest and gain score variables. This demonstrates that the use of visual image teaching media and animated videos results in a marked improvement in students' reading abilities compared to no intervention. The pairwise post hoc test further revealed significant differences between Group A and Group C, with Group A exhibiting substantially better outcomes. Although a difference was

noted between Group A and Group B, it was not statistically significant ($p = 0.070$), suggesting that while both teaching media were effective, visual image teaching media proved to be superior.

Based on these findings, it can be concluded that visual image teaching media, characterized by engaging and easily comprehensible images, is more effective in enhancing students' reading skills. This effectiveness aligns with the cognitive developmental stage of children aged 7-11 years, who are in the concrete operational stage according to Piaget's developmental theory. At this stage, children are more adept at understanding concepts presented in concrete and visual formats, as they can more readily connect to tangible information. While animated videos have significant potential to enhance student motivation and engagement, their effectiveness in improving reading skills may be less optimal for this age group. The dynamic nature of animations, which often involve complex and rapidly changing information, can be challenging for students who are just beginning to learn to read.

This study offers practical insights for teachers in selecting appropriate teaching media to enhance students' reading skills, particularly in the early stages of education. Educators are encouraged to prioritize the use of visual image teaching media due to its demonstrated effectiveness. However, animated videos can also serve as a valuable alternative to enrich students' learning experiences. Furthermore, this study establishes a foundation for the future development of more innovative learning media. The results of this study present the comparison of reading fluency across three groups: visual image (A), animated video (B), and control (C).

Table 1 shows that Group A experienced the greatest improvement, with the mean score increasing from 64.00 (pretest) to 99.00 (posttest). Group B also showed improvement, from 65.50 to 89.00, while Group C showed only a slight increase from 65.50 to 70.50. The gain score analysis further confirms these findings. Group A achieved the highest mean gain score (96.9%), categorized as highly effective. Group B achieved a moderate gain score (68.2%), while Group C showed minimal improvement (3.4%). The Kruskal-Wallis test results indicated a significant difference among the three

groups ($p < 0.001$), suggesting that the type of instructional media significantly affects reading fluency outcomes.

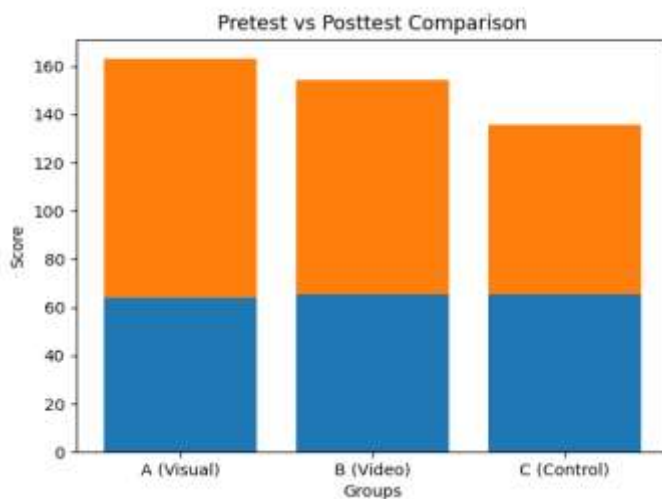


Figure 3. Pretest and Posttest Comparison

4. CONCLUSION

This study indicates that both visual image media and animated video media have positive effects on improving reading fluency among first-grade elementary school students. Visual images showed a tendency toward greater improvement compared to animated videos; however, the difference between the two was not statistically significant.

Given the small sample size, short intervention duration, and limited control of confounding variables, the findings of this study should be interpreted as preliminary. Therefore, it cannot be conclusively stated that visual images are universally more effective than animated videos.

Future research is recommended to involve larger sample sizes, longer intervention periods, and more rigorous experimental controls. Additionally, further studies should examine how specific design features of visual and animated media influence reading development.

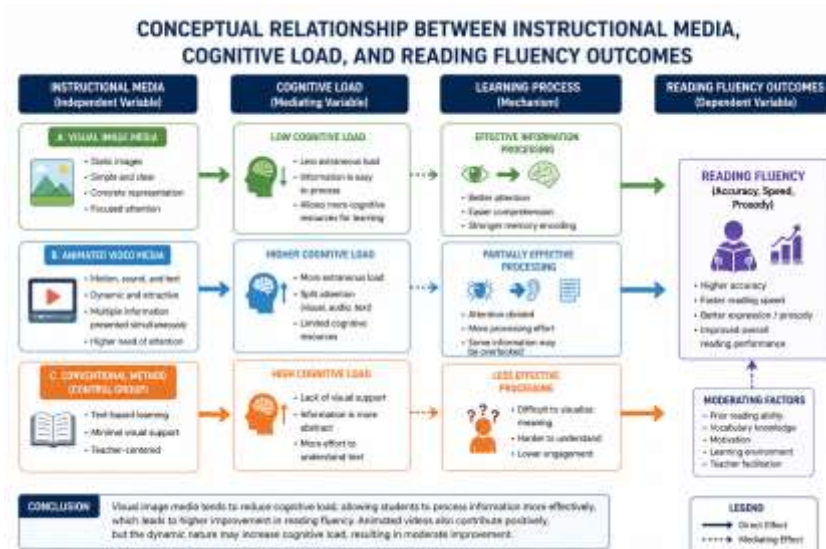


Figure 4. Conceptual Relationship between Media and Reading Fluency

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