



Development of Canva-Based Animated Video Learning Media to Improve Elementary School Science Learning Outcomes

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ABSTRACT

Science learning in elementary schools often faces challenges because some materials are abstract and difficult for students to visualize. One concept that students often find difficult to understand is photosynthesis. This study aims to develop animated learning videos using the Canva application, determine the appropriateness of the learning media, and evaluate its effectiveness in improving students' learning outcomes on photosynthesis material. This research applied the Research and Development (R&D) approach based on the ADDIE model, comprising five stages: analysis, design, development, implementation, and evaluation. The subjects were 26 fourth-grade students at SDN Mangkang Wetan 03 Semarang. Data were collected through observation, interviews, questionnaires, documentation, and learning outcome tests in the form of pre-tests and post-tests. The findings showed that the animated video learning media developed was feasible based on expert validation. The media expert validation score reached 96%, and the material expert validation score was 93%, both categorized as very feasible. The mean pre-test score was 58.84, while the post-test score rose to 82.88. The N-gain value of 0.58 indicates a moderate level of improvement. These results indicate that Canva-based animated learning videos effectively improve students' learning outcomes on photosynthesis material.

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1. INTRODUCTION

Elementary education is a crucial stage in developing students' fundamental knowledge and skills. At this stage, students begin to enhance their scientific thinking skills through various subjects, including Natural and Social Sciences (IPAS). Science learning aims to help students understand scientific concepts related to everyday phenomena, including photosynthesis in plants. However, photosynthesis is often difficult for students to understand because the process cannot be directly observed and is abstract. Lectures or textbooks often fail to help students clearly visualize the process. Therefore, engaging learning media that can represent learning concepts visually are needed to enable students to understand the material more easily (Sari et al., 2025).

The application of technology-based learning media is known to improve the quality of classroom learning. Learning media that utilize digital technology allow for more stimulating, responsive, and contextual presentations for students. One widely used medium in learning is animated video. Research by (Nisa & Efendi, 2023) indicates that the use of animated video media can improve elementary school students' learning outcomes by presenting learning materials more appealingly and facilitating students' understanding of concepts. Furthermore, research carried out by (Aswatun et al., 2025) also demonstrates that the use of animated videos in learning can boost student motivation and engagement during learning activities.

The advancement of digital technology also creates opportunities for teachers to design more creative and innovative learning media. Multimedia-based learning media that combine text, images, audio, and animation can assist students in understanding abstract learning concepts more concretely. A study conducted by (Hilmiyati & Nafsi, 2024) shows that the use of Canva-based animated video media can improve elementary school students' thinking skills in science subjects. Furthermore, research by (Purba et al., 2024) shows that the development of Canva-based animated video media can enhance students' motivation and learning outcomes at the elementary level. However, many teachers continue to exist who have not fully utilized digital design applications to create interesting and interactive learning media (Rahma et al., 2023).

Referring to these conditions, there is a need for alternative learning media that are easy for teachers to use, engaging for students, and capable of improving learning outcomes. One application that can be utilized to develop such media is Canva, as it provides a variety of design features, animations, templates, and facilitates the creation of instructional videos (Agustiyan et al., 2024). Through the use of this application, teachers can create more creative and interactive learning media that align with the characteristics of elementary school students (Hidayatullah et al., 2023). Furthermore, previous studies have demonstrated that Canva-based animated videos have a positive effect on elementary school students' science learning outcomes (Safitri et al., 2026).

However, these studies still have limitations, namely that they have not specifically examined the design and development of Canva-based animated video media for certain materials, especially photosynthesis in grade IV of elementary school, and have not integrated many aspects of media feasibility, user response, and learning effectiveness comprehensively (Rahayuningsih & Muhtar, 2022; Rahma et al., 2023). Therefore, this study aims to develop an animated video learning media based on interesting and interactive photosynthesis materials and test its feasibility, user response, and effectiveness in improving the learning

outcomes of grade IV elementary school students. The novelty of this research lies in the development of media that is integrated with feasibility tests by experts, analysis of teacher and student responses, and effectiveness testing through a thorough comparison of pre-test and post-test results.

2. METHODS

This study employed a Research and Development (R&D) approach to create Canva-based animated video learning media for teaching photosynthesis in science subjects. The development process followed the ADDIE model, which includes five stages: analysis, design, development, implementation, and evaluation (Hidayat & Nizar, 2021).

The participants in this study were 26 fourth-grade students of SDN Mangkang Wetan 03, who were involved in the product trial and implementation phases. Data were collected using both test and non-test techniques. The test method was used to measure students' learning outcomes on photosynthesis material through pre-test and post-test assessments after using the developed media. Meanwhile, non-test techniques included observation, interviews, and questionnaires. Observations were conducted to examine classroom learning activities, particularly focusing on the use of instructional media, student participation, and their responses during the learning process. Semi-structured interviews were carried out with the fourth-grade teacher to gather information about the need for learning media, challenges in using instructional media, and teachers' perceptions of digital media integration in learning. Questionnaires were administered to collect responses from both teachers and students regarding the developed media. In addition, validation questionnaires were used to obtain data on media feasibility from media experts and content suitability from subject matter experts. The questionnaire items were developed based on learning media evaluation indicators, including aspects of visual appearance, ease of use, clarity of content, and usefulness. A total of 16 items were included in the questionnaire. To measure students' learning outcomes, a test consisting of 20 multiple-choice questions was designed based on competency indicators related to photosynthesis, covering knowledge and conceptual understanding. The test was administered as a pre-test and a post-test. Data analysis was conducted in several stages. Validation data from media and subject matter experts were analyzed to determine the feasibility of the developed media. Responses from teachers and students were analyzed using descriptive quantitative methods. Furthermore, students' learning outcomes were analyzed using statistical tests, including normality tests, paired-sample t-tests, and N-Gain analysis, to determine improvements in learning outcomes, with the assistance of SPSS software.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Analysis Stage

During the analysis phase, the researcher carried out a needs assessment by conducting interviews with teachers and distributing questionnaires to both teachers and fourth-grade students at SDN Mangkang Wetan 03. The interview results showed that photosynthesis was considered a challenging topic because it involves processes that cannot be directly observed. Meanwhile, data from the student questionnaires revealed that many students had difficulty understanding the material when it was delivered through textbooks and verbal explanations. They reported that learning became easier when supported by visual media such as animations, moving images, and audio elements.

3.1.2 Design Stage

In the design phase, the concept of animated video learning media was formulated by determining the sequence of materials, including Learning Outcomes (CP) and Learning Objectives (TP), preparing a storyboard, designing visuals, and developing animations for each scene adapted to the characteristics of elementary school learners. The animated video will consist of approximately 20 scenes, each 8 seconds long, for a total duration of 160 seconds (approximately 3 minutes 40 seconds). In the learning video, there are three main characters, namely Klory, Puti, and Made. Klory is depicted as a green leaf who acts as a moderator, is cheerful and always smiling, and has sparkling eyes with a fresh light green leaf shape. In addition, there are two other characters, namely Puti and Made, who are depicted as peers who have a high curiosity about natural phenomena. Puti is depicted as a cheerful girl with white skin, while Made is a brown-skinned boy who has a high enthusiasm for studying the natural environment. The characters and storyline in the video are designed according to the level of cognitive development of fourth-grade elementary students. Through Puti and Made's adventures in discovering how plants produce food, the topic of photosynthesis is presented contextually and engagingly. The presentation is simple, light, and straightforward, helping students to follow the explanations. The resulting animated video is as follows.

Table 1. Product Storyboard

No	Time	Image (Video Scene)	Narrative
1	00:00–00:04		The video begins with the learning title and the compiler's identity as initial information, and an introduction to the media for students.
2	00:05–00:15		The display of plant characters in a bright garden creates a pleasant learning atmosphere and attracts students' attention.
3	00:16–00:26		Children's characters appear with plants as an introduction to learning and to introduce the characters in the video.
4	00:27–00:58		Puti and Made are preparing a picnic in the park. While chatting, they start to feel hungry and quickly eat the snacks they brought. This demonstrates that living things need food.

No	Time	Image (Video Scene)	Narrative
5	00:59–01:30		A woodpecker's arrival in search of food demonstrates that animals need a source of livelihood. Puti explains that all living things need food to survive, including plants.
6	01:31–01:52		Puti, Made, and Klory introduce photosynthesis as the process by which plants make food.
7	01:53–02:01		Showing animation of photosynthesis materials, which include water, carbon dioxide, and the help of sunlight; photosynthesis can take place.
8	02:02–02:23		The process of photosynthesis begins with plants absorbing water from the soil through the roots; the water is distributed to the leaves through the stem.
9	02:24–02:55		Klory explained that sunlight is absorbed by leaves with the help of chlorophyll (the green substance in leaves). Leaves contain stomata (small openings for air to enter and exit).

No	Time	Image (Video Scene)	Narrative
10	02:55–03:16		An animation is shown showing the results of photosynthesis in the form of glucose and oxygen.
11	03:17–03:27		All the characters come together to present a conclusion about photosynthesis. The process of photosynthesis produces food for plants and oxygen for living things on Earth.

3.1.3 Development Stage

The subsequent phase involves development concerning learning media. The media was developed using the Canva application by utilizing the Canva AI feature to illustrate the flow of the coding script written by the researcher according to the characteristics of fourth-grade students; motion effects, explanatory text, and audio narration also support the delivery of the material. The material presented in the video includes the definition of photosynthesis, the process of photosynthesis, the function of photosynthesis for plants, and factors that influence the process of photosynthesis. Media and material experts subsequently reviewed the developed product to evaluate its level of feasibility. The assessment by material experts covered several aspects, namely the consistency of the learning content with learning achievements and learning objectives, precision of concepts and comprehensiveness of the material, and clarity of language use in delivering the material. Meanwhile, the assessment by media experts covered aspects of display design, use of color, visual and animation quality, integration between images, text, and audio, and ease of use of the media in learning. Experts' input and suggestions were used as a reference for improvements and refinements to the generated Canva-based animated video media. Referring to the results of the evaluation by material experts, the feasibility percentage was 93% with a very feasible category. Meanwhile, the assessment findings from media authorities showed a feasibility proportion of 96% with a significantly feasible category.

3.1.4 Implementation Stage

The implementation phase involved testing the animated video media on fourth-grade students at SDN Mangkang Wetan 03. The evaluation process was conducted in several

stages, including small-group and large-group trials, to identify students' responses to the developed media. Following the implementation, the effectiveness of the media was further supported by data obtained from teacher and student response questionnaires administered after the learning activities. The results of the teacher response questionnaire showed that the use of video-based learning media achieved a score of 99%, which falls into the "very good" category. This finding indicates that the video learning media is highly suitable for use in science instruction and assists teachers in delivering material in a clearer and more structured manner. Similarly, the student response questionnaire results showed a total score of 2574 out of a maximum possible score of 2600, corresponding to 99% and categorized as "very good."

3.1.5 Evaluation Stage

The evaluation stage was carried out to assess the effectiveness of the developed learning media in improving students' learning outcomes. This phase involved administering a pretest before the learning process and a posttest after students used the animated video media. The test instrument initially consisted of 40 items, which were subjected to validity, reliability, discrimination index, and difficulty level analysis. The results indicated that 26 items were valid, with a reliability coefficient of 0.88 categorized as very high. In addition, the discrimination analysis showed that 21 items fell into the good and excellent categories, while the difficulty level analysis revealed that most items were classified as medium to difficult. From these results, 20 questions were selected and used as the final test instrument. Furthermore, the pretest and posttest data were analyzed using statistical methods, including normality testing, paired sample t-test, and N-gain analysis, to determine data distribution, differences in learning outcomes, and the extent of improvement in students' understanding after using the developed media. The findings showed that the average pretest score was 58.84, which increased to 82.88 in the posttest. This indicates that students' learning outcomes improved after the implementation of the animated video media in the learning process. Subsequently, the pretest and posttest scores were further examined to determine whether the data were normally distributed using the Shapiro–Wilk normality test with the assistance of SPSS software. This test was selected because it is appropriate for sample sizes of fewer than 50 participants. The results of the normality test are presented in Table 2.

Table 2. Normality Test

One-Sample Kolmogorov-Smirnov Test			
		Pre_Test	Post_Test
N		26	26
Normal Parameters ^{a,b}	Mean	58.8462	82.8846
	Std. Deviation	9.08930	7.23506
Most Extreme Differences	Absolute	.142	.155
	Positive	.142	.155
	Negative	-.135	-.115
Test Statistic		.142	.155
Asymp. Sig. (2-tailed)		.187 ^c	.110 ^c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

The normality test analysis showed that the pre-test data had a significance value (Sig.) of 0.187. Since this value is higher than 0.05, the pre-test data are categorized as normally distributed. In addition, the post-test data showed a significance value of 0.110. This result is also above 0.05, indicating that the post-test data are normally distributed.

Furthermore, a T-Test was carried out to examine whether there was a significant difference between students' pre-test and post-test scores. The test was conducted by comparing student learning outcomes before and after the use of Canva-based animated video learning media. The results of the T-Test analysis are presented in Table 3.

Table. 3 Paired Sample T-Test

Paired Samples Test									
Paired Differences									
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre_Test Post_Test	-24,03846	8,00240	1,56940	-27,27070	20,80622	-15,317	25	0,000

Based on the t-test analysis, the Sig. (2-tailed) value was 0.000. Since this value is less than 0.05, H_0 is rejected while H_a is accepted. Furthermore, an N-gain test was carried out to assess the improvement in student learning outcomes after engaging in learning through Canva-based animated video media. This test was applied to measure the extent of improvement in learning outcomes by comparing pre-test and post-test scores. The results of the N-gain test are presented in Table 4.

Table 4. N-gain Test

Average Pre-Test	Average Test	Max Score	N-Gain	Category
58,84	82,88	100	0,58	Sedang

Based on the data, the N-gain test analysis produced a score of 0.58. This score is categorized as moderate, showing that there was an improvement in students' learning outcomes after the use of animated video learning media.

4.2 Discussion

The findings are based on observations, teacher interviews, and questionnaires distributed to identify students' needs. The implementation of learning is still dominated by lectures and the use of textbooks, which leads to the utilization of visual as well as interactive learning media still being limited. Based on the analysis of observations and needs, this condition is in line with the cognitive Features of fourth-grade students at the concrete operational stage, who require visual and contextual presentations to bridge abstract concepts for easier understanding (Aini et al., 2025). Research (Hilmiyati & Nafsi, 2024; Purba et al., 2024) also supports the need for media innovations that can visualize the process of photosynthesis clearly and attractively, so that Canva-based animated video media was developed that integrates attractive designs, graphics, images, text, animation, and audio to support learning.

This media is designed in the form of an animated video consisting of 20 scenes with a total duration of approximately 3 minutes 40 seconds. The character of Klory complements the presentation of the material as a moderator, as well as two student characters, Puti and Made, who play a role during the learning process storyline. The incorporation of characters in learning media is intended to make the learning experience more contextual and engaging, enabling students to follow the flow of material explanations more easily. Animated media featuring visual characters can increase attention spans and learning motivation, and help students grasp learning concepts more clearly because the information is presented in an engaging and easy-to-follow manner (Faisal et al., 2024; Kurnia et al., 2025).

The presentation of material in the form of a simple adventure story is also designed to enable students to understand the process of photosynthesis through animated visualization gradually. The flow of material delivery is kept light, concise, and tailored to the cognitive developmental level of primary school students. This approach aligns with research showing that the utilization of animated videos can increase student engagement because the material is presented visually and dynamically, helping students understand abstract concepts more easily (Caella & Yulianto, 2024). Furthermore, animated video media has been shown to improve students' motivation and attention since it combines visual, audio, and narrative elements, making learning more engaging (Maulana et al., 2025).

The validation conducted by material experts yielded a feasibility percentage of 93%, which falls into the "very feasible" category. This finding suggests that the content presented in the animated video media aligns with the Learning Outcomes and instructional objectives, and demonstrates strong conceptual accuracy. Moreover, the way the material is delivered is considered well-structured, enabling students to comprehend the concept of photosynthesis gradually and systematically. Meanwhile, the evaluation from media experts resulted in a percentage of 96%, also categorized as "very feasible." This indicates that the developed media meets the required standards in terms of visual design, color usage, animation quality, the harmony between images and text, as well as the clarity of narration in explaining the material. The engaging visual presentation and animations tailored to the characteristics of elementary school students are believed to enhance students' attention and learning interest. Based on the student response questionnaire, a total score of 2574 out of a maximum score of 2600 was obtained, equivalent to 99%, and categorized as "very good." These results show that students are interested and feel supported in understanding photosynthesis material through the use of animated video media developed with the Canva application. This outcome is consistent with the study conducted by (Salma et al., 2025), which reported that 90% of students felt more engaged and found it easier to understand the material when using this instructional media. In addition, teachers also provided highly positive feedback, with 95% stating that the media is easy to use and significantly supports the science learning process.

The results of the feasibility evaluation show that the Canva-based animated video learning media possesses highly effective product specifications and is appropriate for use in the learning process. These results are consistent with previous studies, which state that animated video-based learning media can deliver material more engagingly and interactively, thereby helping students understand concepts more easily (Hilmiyati & Nafsi, 2024). Other

studies also reveal that the use of animated video media in science learning can enhance students' interest and learning outcomes, as the material is presented visually and dynamically, making it easier to comprehend (Caella & Yulianto, 2024). In addition, animated videos have been proven to improve students' attention and motivation by combining visual, audio, and narrative elements, resulting in a more engaging and effective learning experience (Ria et al., 2025). Therefore, the Canva-based animated video media developed in this study is considered highly suitable for use in learning and can proceed to the implementation stage in fourth-grade elementary science learning.

Effectiveness is indicated by statistical analysis, which reveals a meaningful difference between students' pre-test and post-test scores after the implementation of the developed learning media (Nisa & Efendi, 2023). The paired sample t-test produced a significance value of 0.000, demonstrating that the utilization of animated video media significantly influences students' educational outcomes (Yanda & Stavinibelia, 2024). In addition, the results of the N-gain analysis 0.58, which falls into the moderate category, indicate that the developed media can improve students' conceptual understanding quite effectively (Nurhidayah et al., 2025). This increase in learning outcomes indicates that the use of animated video media can assist students in understanding abstract material through more concrete visualizations (Caella & Yulianto, 2024). This result is in accordance with research indicating that the use of animated video media can enhance conceptual understanding and student learning outcomes because the material is presented visually, attractively, and easily understood by students (Nisa & Efendi, 2023). Other research also shows that animated video media can enhance students' learning motivation, engagement, and involvement in the learning process because it can combine visual, audio, and narrative elements in an integrated manner so that learning becomes more interactive (Aswatun et al., 2025).

In addition to improving learning outcomes, the creation of animated video media also brings positive effects for students' engagement and interest in learning during the learning process. (Wuryanti & Kartowagiran, 2016) Animated video media allows for a more contextual presentation of material through visual illustrations, animated movements, and narratives that help students understand scientific processes gradually. In the abstract material of photosynthesis, the use of animation can visualize processes that cannot be directly observed by students, thereby helping to improve conceptual understanding. This result is consistent with research indicating that the development of animation-based learning media can enhance the quality of the learning process because it can present complex concepts in a simpler and easier-to-understand way for elementary school students (Wibowo & Dahlan, 2025). Additionally, studies reveal that Canva-based animated videos can boost students' learning motivation and outcomes as the media provides visually appealing content, is easy to develop by teachers, and is appropriate to the characteristics of students at the elementary school level (Purba et al., 2024). Furthermore, another study (Salma et al., 2025) The findings also indicated that the use of animated video media in science learning led to an improvement in students' learning outcomes, ranging from moderate to high categories. Therefore, the development of animated video media based on the Canva application in this study can be considered appropriate for use in science learning, as it is capable of significantly increasing conceptual understanding, motivation for learning, along with students' learning results.

4. CONCLUSION

This study successfully developed learning media in the form of animated videos created using the Canva application for photosynthesis material to enhance elementary school students' learning outcomes. The developed media is characterized by engaging visual illustrations, concise and simple narration, animations that clearly depict the photosynthesis process, user-friendly instructions, and narration audio and background music that create an enjoyable learning atmosphere. The material presented covers the concept of photosynthesis, its processes, functions, and the factors influencing it, all of which are delivered contextually to facilitate students' understanding. In addition, the media is distributed in the form of an accessible link that can be opened on various devices without requiring additional application installation.

The results of expert validation, along with positive responses from teachers and students categorized as very good, as well as the improvement in student learning outcomes indicated by the increase in pre-test and post-test scores, demonstrate that the Canva-based animated video media is both valid and effective for use in learning. This media has proven to support students in understanding photosynthesis material in a more engaging, interactive, and comprehensible manner. Practically, this research contributes to elementary school teachers by offering an alternative learning medium that is easy to design and implement to improve the quality of science learning. Moreover, this media can serve as a solution to overcome the limitations of conventional teaching methods commonly used in classrooms. Theoretically, the findings of this study reinforce previous research highlighting the effectiveness of digital-based learning media, particularly animated videos, in improving students' learning outcomes. Nevertheless, this study has certain limitations, including its focus on a single topic and a relatively small sample size. Therefore, future studies are recommended to develop similar media for different topics, involve larger samples, and explore their impact on other aspects such as learning motivation, critical thinking skills, and student engagement in greater depth.

5. AUTHORS' NOTE

This research was conducted at SDN Mangkang Wetan 03, Semarang City, with fourth-grade students in a natural science lesson on photosynthesis. The author declares that this article is an original work free from plagiarism and has not been published or submitted to other journals. All sources used in writing this article have been listed in the bibliography in accordance with scientific writing standards.

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