



## Digital Animation Media to Improve Learning Motivation in Elementary Science Education

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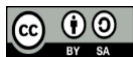
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### Keywords:

Educational animated video;  
Learning motivation;  
IPAS learning;  
Elementary education;  
Learning media

### ABSTRACT

*This study aims to examine the effectiveness of educational animated videos as a medium for science learning. In addition, this study aims to investigate the differences in students' learning enthusiasm between students taught using animated videos and those taught using conventional teaching methods. This study employed a Research and Development (R&D) approach using the ADDIE development model involving fifth-grade students at SD Negeri 22 Palu. Data were collected through observations, interviews, validation questionnaires, and learning motivation questionnaires, then analyzed using descriptive quantitative and qualitative techniques. The media obtained a validity score of 89.82% and a practicality score of 86.46%, categorized as very valid and practical. The media also helped teachers deliver learning materials more clearly, interactively, and effectively for students. In addition, the use of animated videos can increase student participation and engagement during the learning process. Furthermore, the developed media demonstrated high practicality and effectiveness in supporting elementary students' science learning.*



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## INTRODUCTION

Learning in Natural and Social Sciences, referred to as IPAS (*Ilmu Pengetahuan Alam dan Sosial*) in the Indonesian elementary school curriculum, plays an important role in helping students understand natural phenomena and social life in their surrounding environment. Through IPAS learning, students are expected to develop critical thinking skills, curiosity, and active participation during the learning process. However, in practice, IPAS learning in elementary schools still faces various challenges, particularly related to students' low learning motivation and enthusiasm. Many students tend to feel less interested in the learning process because teaching methods are still dominated by conventional approaches and limited use of interactive learning media. As a result, students often become passive during classroom activities, which affects their understanding of the learning material and overall learning outcomes. Many students consider IPAS learning difficult because it involves understanding abstract concepts related to natural and social phenomena that are not always easy to observe directly. Students often experience difficulties in understanding the material when learning is delivered only through verbal explanations or textbooks without adequate visualization support (Zahra, 2024). These challenges can reduce students' learning motivation and enthusiasm, especially when they are unable to relate the learning material to real-life situations. Therefore, the use of visual and interactive learning media is needed to help students understand IPAS concepts more concretely and meaningfully (Irawati et al., 2025).

Based on preliminary observations conducted at SD Negeri 22 Palu, IPAS learning activities still tend to use teacher-centered approaches with monotonous conventional methods. During the learning process, several students appeared less enthusiastic, were easily distracted, and showed low participation in classroom discussions and question-and-answer sessions. Some students also experienced difficulties in understanding the learning material because the explanations were delivered mostly through textbooks and verbal instruction without the support of interesting visual media. This condition often causes students to feel bored and decreases their learning motivation (Imaliyah et al., 2025). In addition, teachers still face challenges in managing students with different characteristics and levels of understanding. Teacher involvement in creating interactive learning situations also needs improvement, particularly in encouraging students to actively participate during classroom activities and presentations (Faizal et al., 2025). This situation indicates a gap between the expected learning outcomes and the actual conditions in the classroom.

Therefore, the importance of this research is based on the need for learning media that can increase students' motivation and engagement in the learning process. In addition, the use of digital learning media in elementary schools has not yet been optimized, causing students to become more passive during classroom activities and rely mainly on memorization without deeply understanding the concepts being taught (Rizal et al., 2025). Consequently, innovative and interactive learning media are needed to support more meaningful and engaging learning experiences for students. The rapid development of technology has significantly influenced the field of education, particularly through the increasing use of the internet as a continuously evolving educational technology (Gagoshidze & Tavkheldidze, 2024). In this context, the use of digital learning media, such as educational animated videos, has become an appropriate alternative to support the learning process. Innovative learning media can create a more engaging and interactive classroom environment, thereby helping to reduce students' boredom during learning activities (Ariyana et al., 2022). Furthermore, learning media that integrate visual and audio elements have been proven to facilitate students' understanding of learning materials while also increasing their learning motivation (Sigari & Gandomi, 2022). Educational animated video media has the potential to assist teachers in conveying complex or difficult-to-explain information through more contextual learning approaches. In addition, the use of animated videos has been reported to help attract and maintain students' attention and focus, create a more enjoyable and visually engaging learning environment, and support the management of classroom learning activities. More importantly, several studies have indicated that animated video media can improve students' understanding of learning materials (Adiati et al., 2023). Therefore, the development of educational animated videos is considered a relevant approach to addressing the problem of low student learning motivation.

Based on theoretical studies, learning media plays an important role in supporting the success of the learning process by helping teachers deliver material more clearly and increasing students' attention and interest in learning (Wardani et al., 2024). This is supported by the Multimedia Learning Theory proposed by Richard E. Mayer, which explains that students learn more effectively when information is presented through a combination of visual and auditory elements rather than through text alone. The integration of images, sound, animation, and movement in animated video media can help students process information more meaningfully and reduce difficulties in understanding abstract concepts. Consequently, animated videos have the potential to increase students' engagement, participation, and learning motivation during classroom activities (Dewayanti et al., 2023). Furthermore, learning motivation theories, such as the ARCS model proposed. emphasize that motivation can be enhanced through four main components: attention, relevance, confidence, and satisfaction. In this context, educational animated videos can support the attention component by presenting attractive visual and audio elements that capture students' interest. The relevance component can be strengthened through contextual learning content related to students' daily experiences. In addition, animated videos may help increase students' confidence by presenting material in a clearer and easier-to-understand manner, while the satisfaction component can be achieved when students successfully understand the material and actively participate in the learning process. Therefore, the use of educational animated videos has a strong theoretical basis as an effective learning medium.

To address the problems of low learning motivation and limited student engagement, this study proposes the development of educational animated video media as an innovative learning solution. Animated videos were chosen because they are able to present learning materials through attractive visual and audio elements that are suitable for the characteristics of elementary school students. In addition, this media has the potential to make learning activities more interactive, enjoyable, and easier for students to understand, particularly in learning abstract IPAS concepts. Therefore, the development of educational animated videos is expected to support improvements in both the quality of learning and students' learning motivation.

The purpose of this study was to examine the effectiveness of educational animated videos as a learning medium in science education. In addition, this study aimed to investigate the role of animated videos in addressing the low learning motivation of fifth-grade students at SD Negeri 22 Palu. Furthermore, this study aimed to determine the feasibility, practicality, and effectiveness of educational animated video media in supporting students' learning motivation in science learning.

Based on previous studies, educational animated videos have generally been examined in relation to learning outcomes and student engagement. However, this study specifically focuses on the development of animated video media for IPAS learning and its influence on the learning motivation of elementary school students. Based on theoretical studies and previous research results, the hypotheses proposed in this study are: (1) the use of educational animated videos as a science learning medium can increase students' learning motivation (Pradana, 2025) and Thus, this study is expected to contribute to the development of innovative learning media that are relevant to current educational needs.

## **METHOD**

This study employed a Research and Development (R&D) approach to develop and evaluate the effectiveness of educational animated videos as a learning medium for science education. The R&D method was chosen because it can produce valid, practical, and effective learning media through systematic steps (Waruwu, 2024). The selection of the R&D method is based on the characteristics of research that not only tests theory but also develops valid, practical, and effective learning products (Ariyana et al., 2022; Irawan et al., 2023).

The development model used in this study was ADDIE (Analysis, Design, Development, Implementation, and Evaluation). In the analysis stage, students' learning needs and classroom problems were identified. The design stage involved planning the content, storyboard, and visual appearance of the animated video. During the development stage, the animated video media was created

and validated by experts. The implementation stage involved applying the media in classroom learning activities, while the evaluation stage was conducted to assess the effectiveness of the animated video in improving students' learning motivation. The ADDIE model was chosen because it provides systematic, flexible, and easy-to-implement stages in the development of learning media (Syafitri et al., 2022; Apriansyah, 2023). In addition, this model allows evaluation to be conducted at each stage, enabling continuous improvement of product quality throughout the development process (Daniyati et al., 2023). Compared to other development models, ADDIE is considered more suitable for this study because it offers a simpler and more structured process for developing educational animated videos, particularly in aligning learning content, media design, implementation, and evaluation with the characteristics and needs of elementary school students.

The population of this study consisted of all fifth-grade students at SD Negeri 22 Palu. The samples were selected using a purposive sampling technique, in which participants were chosen based on specific considerations relevant to the objectives and needs of the study (Fitri, 2021). The number of participants involved in the study was adjusted to the predetermined research sample and was consistently used throughout the article. The sample consisted of 16 fifth-grade students who were present during the study. The participants included both male and female students with diverse academic abilities and an age range of approximately 10–11 years old. This study was conducted during the odd semester of the 2025/2026 academic year at SD Negeri 22 Palu.

The research instruments used in this study included observation sheets, interview guidelines, and questionnaires. The questionnaires consisted of material expert validation questionnaires, media expert validation questionnaires, and student learning motivation questionnaires administered before and after the use of the animated video media. These instruments were designed to assess the validity, practicality, and effectiveness of the developed learning media. The indicators of learning motivation used as the basis for preparing the questionnaire referred to aspects such as students' attention, interest, participation, enthusiasm, and persistence during the learning process.

Furthermore, observation sheets were used to observe student activities during classroom learning, while interviews were conducted to gather information regarding learning conditions and the need for instructional media. Before being used in the study, the research instruments underwent validity and reliability testing to ensure that the instruments were appropriate and consistent for data collection. Instrument validity was assessed through expert judgment, while reliability testing was conducted to determine the consistency of the questionnaire items. Non-test data processing, including questionnaires, observations, and interviews, referred to systematic analysis techniques to obtain accurate and reliable data (Damayanti et al., 2024).

The media developed in this study was designed to support the learning process through the integration of visual, audio, and animation elements that are suitable for elementary school students' characteristics. The animated video media was intended to present learning materials in a more concrete, interesting, and interactive manner, thereby helping students understand concepts more easily and increasing their learning motivation and engagement during classroom activities (Selvianita et al., 2024). The developed media combines visual, audio, and animation elements to provide a more engaging and easily understood learning experience for students. This approach is consistent with Multimedia Learning Theory proposed by Richard E. Mayer, which states that students learn more effectively when information is presented through both visual and auditory channels simultaneously. Therefore, the integration of images, narration, and animation in the learning media is expected to help students understand learning materials more meaningfully while increasing their motivation and engagement during the learning process.

The research procedure was conducted through several stages based on the ADDIE development model, consisting of Analysis, Design, Development, Implementation, and Evaluation. The analysis stage was carried out to identify learning problems and needs through classroom observations and interviews with teachers regarding the conditions of IPAS learning, students' learning motivation, and the need for appropriate learning media. The design stage involved preparing learning materials, formulating learning objectives, developing storyboards, selecting visual and audio elements, and designing the structure of the educational animated video according to the characteristics of elementary school students. In the development stage, the educational animated video was produced by

integrating text, images, narration, animation, and audio elements. The resulting product was then validated by material and media experts to assess its feasibility and quality. The implementation stage involved conducting a trial of the developed media with fifth-grade students at SD Negeri 22 Palu to observe students' responses, participation, and learning motivation during the learning process. Finally, the evaluation stage was conducted through questionnaires, observations, and interviews to assess the validity, practicality, and effectiveness of the educational animated video media, as well as to identify aspects that required improvement to enhance learning outcomes.

This stage was carried out systematically to produce high-quality learning media that was appropriate for classroom use. Each stage of the ADDIE model was implemented in an organized manner, starting from identifying learning problems and students' needs, designing the structure and content of the animated video, developing and validating the media, conducting classroom implementation, and finally evaluating the effectiveness of the media. Through these stages, the developed animated video media was expected to meet students' learning needs, support the learning process more effectively, and increase students' learning motivation and engagement during IPAS learning activities.

The data analysis techniques in this study used both quantitative and qualitative approaches. Quantitative data were obtained from validation questionnaires, practicality questionnaires, and students' learning motivation questionnaires administered before and after the implementation of the animated video media. The quantitative data were analyzed using percentage calculations to determine the level of validity and practicality of the developed media. The media were categorized as practical if they achieved a percentage score of more than 60%.

Meanwhile, qualitative data were obtained through observations and interviews conducted during the learning process. The qualitative data analysis was carried out systematically through several stages, namely data reduction, data presentation, and conclusion drawing. Data reduction involved selecting and simplifying relevant information obtained from observations and interviews. Data presentation was conducted by organizing the findings in a descriptive form to facilitate interpretation, while the conclusion-drawing stage was used to identify patterns, responses, and suggestions from validators, teachers, and students regarding the developed learning media.

In conducting the research, ethical aspects were also carefully considered. The study was conducted after obtaining permission from SD Negeri 22 Palu as the research location. Furthermore, the researcher explained the objectives and procedures of the study to the participants and obtained informed consent before the data collection process was carried out.

## **RESULTS AND DISCUSSIONS**

The results of this study indicate that the developed educational animated video media met the criteria of validity, practicality, and effectiveness for use in IPAS learning at the elementary school level. The media was considered valid based on expert validation results, practical based on positive responses from teachers and students during implementation, and effective in improving students' learning motivation.

This article outlines the results of the research conducted based on the established procedures of the ADDIE development model. The findings are presented through the stages of analysis, design, development, implementation, and evaluation. Each stage was carried out systematically to answer the research question regarding the quality and effectiveness of the developed educational animated video media.

### **Analysis Stage**

The analysis phase of this study included curriculum analysis and needs analysis. The results of the curriculum analysis showed that SD Negeri 22 Palu had implemented the Independent Curriculum in the learning process. The Food Chain topic in fifth-grade IPAS learning, which became the focus of this study, requires clear and engaging visualizations to help students understand abstract concepts and increase their learning motivation.

Based on preliminary observations conducted in the fifth-grade classroom, several students appeared less enthusiastic during learning activities, especially when the teacher used lecture-based methods and textbook-centered instruction. Approximately more than half of the students showed low participation during classroom discussions and question-and-answer sessions. In addition, interview results with the classroom teacher indicated that students often experienced difficulties in understanding the material because learning media were still limited. The teacher stated that “students are usually more interested when learning uses videos or pictures, but the available media are still limited and not specifically designed according to the learning material.

Furthermore, the needs analysis indicated that the learning process in fifth grade was still dominated by conventional teaching methods, with textbooks serving as the primary learning resource. Although teachers occasionally used video media in learning activities, its use was still limited to supplementary clips and had not yet functioned as the main instructional medium specifically designed to support students’ understanding of the material being taught. Therefore, the development of educational animated video media was considered necessary to create a more interactive and motivating learning environment for students.

The developed media presents learning materials through the integration of moving images, color elements, and simple explanations that are adapted to the characteristics of elementary school students. Based on the implementation results, the use of animated video media showed the potential to support students’ understanding of learning materials and increase their engagement during classroom activities. In addition, this media can assist teachers in delivering learning materials in a more interactive and visually engaging manner, particularly in IPAS learning activities.

In the design stage, the researchers developed an initial product concept as the basis for the subsequent media development process. The design was prepared by considering the characteristics and learning needs of elementary school students, so the media appearance was designed to be simple, visually attractive, and easy to understand. The developed media integrated animated images, explanatory text, illustrations, color elements, narration, and moving animations that were adjusted to the learning material being presented.

In addition, the design of the animated video media referred to the principles of multimedia learning, which emphasize the integration of visual and audio elements to support students’ understanding of learning materials. Based on this approach, the developed media was expected to facilitate students in understanding IPAS concepts more clearly and encourage greater engagement during learning activities. Therefore, the educational animated video media was designed to create a more interactive, meaningful, and student-centered learning experience.

The educational animated video consists of several sections presenting food chain material. Figure 1 presents the definition of the food chain as an introduction to the topic.



Fig.1. Food chain definition material

Figure 2 illustrates the role of producers as the primary source of energy in the ecosystem.



Fig.2. Food chain material producer section

Figure 3 illustrates the consumer levels in the food chain. Figure 3(a) presents first-level consumers, Figure 3(b) presents second-level consumers, and Figure 3(c) presents third-level consumers.



Fig.3. Food chain material; a) First-level consumers, b) Second-level consumers, c) Third-level consumers

Furthermore, Figure 4 presents decomposers and their role in breaking down organic matter and recycling nutrients in the ecosystem. These visual presentations were designed to help students understand food chain concepts more easily through attractive animations and systematic explanations.



Fig.4. Food chain material decomposer section

### Development Stage

This development stage consisted of developing the educational animated video media, preparing validation instruments, and conducting initial product testing. At this stage, the animated video media was developed by integrating visual, audio, text, and animation elements that were adjusted to the learning objectives and the characteristics of elementary school students. After the media product was completed, validation instruments were used by material experts and media experts to assess the validity and feasibility of the developed media. Furthermore, initial product testing was conducted to identify aspects that needed improvement before the media was implemented in classroom learning activities.

The instruments used were a material validation questionnaire, a media expert validation questionnaire, and a user response questionnaire involving teachers and students. In addition to the questionnaire, a student learning motivation questionnaire was also developed, which was used before and after using the video.

This study aims to determine the increase in student learning motivation after using educational animated video media. All instruments were developed to obtain accurate data as a basis for product evaluation and improvement. The developed assessment instruments were then given to validators consisting of material experts, media experts, and users (teachers and students). The following are the validation results from the expert validators on the learning materials.

The material validation results obtained from expert assessment are presented in Table 1. The evaluation focused on two main aspects, namely material suitability and language compatibility. The results indicate that both aspects achieved very good categories, demonstrating that the developed educational animated video is appropriate in terms of content accuracy and language use for elementary school students.

Table 1. Material Validation Results

No	Assessment Aspects	Percentage (%)	Category
1.	Material Suitability	87.5%	Very good
2.	Language Compatibility	93.75%	Very good
	Average	90.75%	Very good

As shown in Table 1, the material suitability aspect obtained a score of 87.50%, while the language compatibility aspect achieved 93.75%. The average score was categorized as very good, indicating that the learning material presented in the educational animated video is appropriate, understandable, and suitable for use in IPAS learning at the elementary school level.

The high material validation score indicates that the educational animated video successfully presented content that was relevant to the curriculum and appropriate for elementary school students. This finding is consistent with the study conducted by Qifsy et al. (2023), which reported that animated video media achieved a very valid category and was suitable for science learning. Similar results were also reported by Herawati et al. (2024), who found that animated learning videos obtained high validity

scores from expert validators. The similarity of these findings suggests that animated video media can effectively combine learning content and visual presentation to support students' understanding of science concepts

The highest score was obtained in the language compatibility aspect, with a percentage of 93.75%. This result indicates that the language used in the animated video was clear, communicative, and easily understood by students. Meanwhile, the material suitability aspect obtained a score of 87.5%, which also falls into the very good category. This shows that the learning materials presented in the animated video were relevant to the curriculum and learning objectives. However, several suggestions from validators indicated that some parts of the material explanation and visual presentation could still be improved to make the content more concise and easier for students to follow.

Furthermore, the media validation process also assessed aspects such as visual quality and design, audio quality and duration, technical quality, and the benefits of the developed media. Overall, the validation results indicate that the educational animated video media has strong potential to support a more interactive, engaging, and meaningful learning process for elementary school students. The results of the media expert validation are presented in Table 2. The validation was conducted to assess the quality of the developed educational animated video in terms of visual design, audio quality, technical aspects, and overall usability. The assessment results provide information regarding the feasibility of the media before its implementation in classroom learning activities.

Table 2. Media Validation Results

No	Assessment Aspects	Percentage (%)	Category
1.	Visual Quality and Design	100%	Very good
2.	Audio Quality and Duration	66.67%	Fair
3.	Technical Quality and Benefits	100%	Very good
	Average	88.89%	Very good

As shown in Table 2, the visual quality and design aspect obtained a score of 100.00%, indicating that the media displayed an attractive and appropriate design for elementary school students. The audio quality and duration aspect received a score of 66.67%, categorized as fair, suggesting that several improvements were needed regarding narration quality and video duration. Meanwhile, the technical quality and benefits aspect achieved a score of 100.00%, indicating that the media functioned properly and provided meaningful support for the learning process. Overall, the average score of 88.89% was categorized as very good, demonstrating that the educational animated video media was feasible for use in IPAS learning.

The high media validation score demonstrates that the visual design, technical quality, and overall functionality of the developed media met the standards required for classroom implementation. These findings support previous studies indicating that animated video media can provide attractive and effective learning experiences for elementary school students (Herawati et al., 2024). Reported similar results, where animated learning videos were categorized as highly feasible due to their visual appeal and ease of use. Therefore, the present findings strengthen the evidence that educational animated videos are suitable for supporting science learning activities in elementary schools.

The highest scores were obtained in the aspects of visual quality and design, as well as technical quality and benefits, each receiving 100% in the "very good" category. These results indicate that the visual appearance, animation elements, color selection, and overall media presentation were considered highly appropriate for elementary school students. In addition, the media was regarded as technically functional and beneficial in supporting the learning process and increasing student engagement.

However, the audio quality and duration aspect obtained a lower score of 66.67%, categorized as "fair." Based on validator feedback, several weaknesses of the media were identified, particularly regarding the clarity of narration audio, balance between background music and narration volume, and the duration of several video segments that were considered too long for elementary school students' attention span. Validators suggested improving the synchronization between audio and visual elements and making some explanations more concise to maintain students' focus during learning activities.

Furthermore, the educational animated video components in this study were developed using digital applications to support the integration of visual, text, animation, and audio elements into a cohesive learning medium. The media was designed to present learning materials in a more interactive and engaging manner, thereby supporting students' understanding and motivation in IPAS learning activities.

Table 3. Educational Animation Video Components

No	Category	Components in Video	Title	Component Explanation
1.	Video Opener Component	Video title, opening illustration, and text animation	Food chain	The opening section was designed to attract students' attention through colorful illustrations, animated text, and introductory narration related to the food chain topic. This component was intended to increase students' curiosity and readiness before entering the main learning material.
2.	Producer Material Component	Plant illustrations, explanatory text, narration, and simple animations	Producer	This component presents explanations about producers as the primary energy source in the food chain. Visual illustrations, narration, and animations were integrated to help students understand the process of photosynthesis and the role of plants more clearly and concretely.
3.	Consumer Material Component	Animal illustrations, explanatory text, and moving animations.	Consumer	This section presents various types of consumers, such as herbivores and carnivores, through animated animal illustrations and visual transitions. The use of moving animations was intended to increase students' engagement and facilitate their understanding of the relationships between organisms in the food chain.

No	Category	Components in Video	Title	Component Explanation
4.	Food Chain Material Component	Food chain flow illustrations and animated arrows	Food chain	This component visualizes the sequence of food chains using connected illustrations and animated arrows. The visual representation was designed to help students understand the process of energy transfer and the relationship between living organisms in a more logical and meaningful way.
5.	Decomposer Material Component	Illustrations of fungi and bacteria, explanatory text, and narration	Decomposer	This section explains the role of decomposers in the ecosystem using simple illustrations and narration. The integration of visual and audio elements was intended to support students in understanding abstract ecological concepts more easily.
6.	Video Conclusion Component	Summary text, closing narration, and final animations	Conclusion	The closing section summarizes the learning material presented in the video and reinforces students' understanding of the food chain concept. Ending animations and concluding narration were included to provide a more memorable and meaningful learning experience for students.

### Implementation Stage

The educational animated video media was implemented in IPAS learning activities involving 16 fifth-grade students at SD Negeri 22 Palu. During the implementation process, students used the animated video media in classroom learning activities related to the food chain topic. After the learning activities were completed, students were asked to fill out a user response questionnaire to determine the practicality of the developed media.

The product trial for students was assessed based on several aspects, including students' interest and attention during learning, enthusiasm and motivation to learn, activeness in classroom activities, and perseverance in completing learning tasks. These aspects were used to evaluate how far the educational animated video media could support student engagement and create a more interactive learning experience. Tabel 4 presents the results of the student user response trial.

Table 4. User Practicality Assessment Results

Aspect	Score	Percentage (%)	Criteria
Interest and Interest	173	90.10%	Very good
Spirit and Encouragement Study	165	85.94%	Very good
Activity in Learning	157	81.77%	Very good
Perseverance and Sincerity	169	88.02%	Very good

Based on the results of the student response questionnaire analysis presented in Table 4, the educational animated video media obtained an average score of 86.46%, which falls into the “very good” category. These results indicate that the developed media is considered highly practical for use in the learning process.

The practicality results indicate that students responded positively to the use of educational animated videos during classroom learning. The attractive animations, narration, and visual elements encouraged students to participate more actively in learning activities. This finding is consistent with the study by Dumako (2023), which found that animated video media increased students’ interest and participation during learning. Similar findings were also reported by Adiati et al. (2023) who concluded that animated videos contribute positively to student engagement and learning experiences.

The highest score was obtained in the aspect of students’ interest and attention in learning, with a percentage of 90.10%. This finding indicates that the visual appearance, animations, and audio elements in the educational video were able to attract students’ attention and increase their interest during learning activities. In addition, the aspects of learning enthusiasm and perseverance also obtained high scores, showing that students were more motivated and actively involved during the learning process when using the animated video media.

Although all aspects were categorized as very good, the activeness aspect obtained the lowest percentage compared to the other indicators, namely 81.77%. This result suggests that several students still needed guidance and encouragement to participate more actively during classroom discussions and learning activities. Nevertheless, overall findings demonstrate that the educational animated video media has strong potential to support a more interactive, engaging, and student-centered learning environment.

### Evaluation Stage

The evaluation stage was conducted to determine the extent to which the developed learning media achieved the predetermined learning objectives. Based on the results of implementation and product trials, the educational animated video media was considered effective in addressing students’ low learning motivation. The findings showed that students demonstrated higher levels of participation, enthusiasm, and engagement during the learning process when compared to conventional learning activities.

These results can be explained through the ARCS motivation model proposed by John Keller, which emphasizes the importance of attention, relevance, confidence, and satisfaction in increasing students’ learning motivation. The animated videos successfully attracted students’ attention through the use of colorful visuals, moving animations, narration, and interactive presentations. In addition, the presentation of contextual food chain materials helped students understand the relevance of the learning content to their daily environment, thereby increasing their engagement during classroom activities.

Furthermore, the clear explanations, simple storyline, and integration of visual and audio elements supported students’ confidence in understanding the learning material. Students appeared more willing to participate in discussions and answer questions because the material was presented in a more concrete and understandable form. The positive responses shown by students during the learning activities also reflected the satisfaction aspect, where students felt more interested and enjoyed the learning process.

These findings are also consistent with Multimedia Learning Theory proposed by Richard E. Mayer, which explains that students learn more effectively when information is delivered through a combination of visual and auditory elements. Therefore, the developed educational animated video

media not only supported students' understanding of IPAS concepts but also contributed positively to improving their motivation and engagement in the learning process.

After going through a series of design and development stages, an educational animated video was successfully produced as a learning medium for the food chain topic in IPAS learning. This media was developed as an effort to address students' low learning motivation, particularly in understanding food chain concepts that are often considered difficult when delivered only through conventional teaching methods. Through the use of animated videos, students were able to observe the food chain process visually and interactively, making the material more concrete and easier to understand.

In the design stage, the researchers developed an initial concept as the basis for the media development process. The design process began with determining the sequence of material presentation in a form that was attractive and appropriate for elementary school students. Each component of the media, including colors, illustrations, animations, narration, and text, was designed by considering students' characteristics and learning needs. Furthermore, the researchers prepared video scenarios and visualized the relationships between living organisms in the food chain to support students' understanding of the material.

The next stage was the development process, in which the educational animated video media was produced according to the prepared design. After the product was completed, validation was conducted by material experts and media experts to determine the feasibility of the developed media. The validation results showed that the average score from material experts was 90.75%, while the score from media experts was 88.89%, resulting in an overall average of 89.82%, categorized as "very valid." These findings indicate that the developed media was appropriate in terms of curriculum suitability, material relevance, visual appearance, and technical quality for classroom learning.

After the validation process, a product trial was conducted involving 16 fifth-grade students at SD Negeri 22 Palu to determine the practicality and acceptability of the media. Based on the student response questionnaire, the media obtained an average score of 86.46%, categorized as "very practical." These results indicate that the educational animated video media was easy to use, attractive, and helpful in supporting students' understanding of the food chain material. Students also showed increased participation and enthusiasm during learning activities.

The effectiveness of the developed media can be explained through the ARCS motivation model proposed by John Keller, particularly in the aspects of attention, engagement, confidence, and satisfaction. The use of colorful visuals, moving animations, and narration successfully attracted students' attention and maintained their engagement during the learning process. In addition, the presentation of materials in a clear and systematic manner helped increase students' confidence in understanding the food chain concepts. Students also appeared more satisfied and enthusiastic because the learning activities became more interactive and enjoyable.

These findings are also consistent with Multimedia Learning Theory proposed by Richard E. Mayer, which explains that students learn more effectively when information is delivered through the integration of visual and auditory elements. The combination of images, animations, text, and narration in the educational animated video enabled students to process information more meaningfully and reduced difficulties in understanding abstract concepts related to ecosystems and food chains.

Based on the trial results, the use of educational animated video media showed positive effects on students' learning motivation and engagement during classroom activities. The findings of this study indicate that educational animated video media can improve students' learning motivation and engagement in IPAS learning. This result is in line with the Multimedia Learning Theory proposed by Mayer, which states that students learn more effectively when information is presented through both visual and auditory channels. The integration of animation, narration, text, and illustrations in the developed media helped students understand food chain concepts more concretely and meaningfully.

Furthermore, the findings are consistent with previous studies. Adiaty et al. (2023) reported that animated video media positively affected students' learning outcomes and classroom participation. Pradana (2025) found that animated videos function as effective interactive learning media capable of increasing students' learning motivation. The consistency between the present study and previous research suggests that animated video media has significant potential to support more engaging and student-centered learning environments.

The increase in students' motivation can also be explained through Keller's ARCS model, which emphasizes Attention, Relevance, Confidence, and Satisfaction. The animated videos attracted students' attention through colorful visual presentations, increased relevance by connecting learning content with real-life situations, enhanced confidence through clear explanations, and generated satisfaction through successful learning experiences. Therefore, the developed media not only functions as a learning aid but also serves as a motivational tool that supports active student participation in science learning.

However, this study also had several limitations. First, the number of participants involved in the study was relatively small, consisting of only 16 students, which may limit the generalizability of the findings. Second, the study was conducted in only one elementary school, so the results may not fully represent learning conditions in other schools with different characteristics. Third, the duration of media implementation was relatively short, meaning that the long-term effects of the educational animated video on students' learning motivation and learning outcomes could not yet be fully observed. Therefore, future studies are recommended to involve larger samples, multiple schools, and longer implementation periods to obtain more comprehensive findings regarding the effectiveness of educational animated video media in elementary school learning.

## **CONCLUSION AND SUGGESTION**

Based on the results of the research and development process, it can be concluded that the educational animated video media was successfully developed through systematic stages based on the ADDIE model, including analysis, design, development, implementation, and evaluation. The developed media met the feasibility criteria based on validation results from material experts and media experts, with an overall validity score categorized as "very valid." In addition, the implementation results showed that the media was practical and easy to use in classroom learning activities, particularly in supporting IPAS learning on the food chain topic for fifth-grade students at SD Negeri 22 Palu.

The findings of this study also indicate that the educational animated video media contributed positively to increasing students' learning motivation, engagement, and participation during the learning process. The integration of visual, audio, animation, and narration elements enabled students to understand abstract concepts more concretely and interactively. These results support Multimedia Learning Theory proposed by Richard E. which emphasize the importance of attention, engagement, confidence, and satisfaction in improving learning motivation. Therefore, this study contributes academically to the development of digital-based IPAS learning media that are relevant to the characteristics and learning needs of elementary school students in the current educational context.

Based on these findings, several recommendations can be proposed. For teachers, it is recommended to utilize educational animated video media as an innovative learning strategy to create more interactive, engaging, and student-centered learning activities. Teachers are also encouraged to develop creative digital learning media that are adapted to students' characteristics and learning materials.

For schools, it is recommended to provide adequate technological facilities and support the integration of digital learning media into classroom instruction. Schools can also encourage teachers to participate in training related to the development and utilization of technology-based learning media to improve the quality of learning.

For future researchers, it is recommended to develop similar educational animated video media for different learning materials, grade levels, or educational contexts with larger sample sizes and longer implementation periods. Future studies may also examine the long-term effects of digital learning media on students' learning outcomes, critical thinking skills, and learning motivation in elementary education.

## CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHOR CONTRIBUTIONS STATEMENT

Conceptualization, N.M., M.A., and S.W.; methodology, N.M., M.A., and S.W.; investigation, N.M.; data collection, N.M.; formal analysis, N.M.; supervision, M.A. and S.W.; validation, N., R.A.P., and P.; writing—original draft preparation, N.M.; writing—review and editing, M.A., S.W., N., R.A.P., and P. All authors have read and agreed to the published version of the manuscript.

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## DECLARATION OF GENERATIVE AI SOURCES

The authors declare that no generative artificial intelligence or artificial intelligence-assisted technology was used in the writing process of this manuscript.

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