JPPIPA 11(12) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Enhancing Science Learning through the Development of Animation Video Media Based on Bruner's Cognitive Theory Using Canva for Students

Eliza Novita[1*], Abna Hidayati[1], Darmansyah[1], Ridwan[1]

[1] Education technology of Postgraduate Program, Universitas Negeri Padang, Indonesia.

Received: October 27, 2025
Revised: December 12, 2025
Accepted: December 25, 2025
Published: December 31, 2025

Corresponding Author:
Eliza Novita
elizanovita14@gmail.com

DOI: 10.29303/jppipa.v11i12.13270

© 2025 The Authors. This open access article is distributed under a (CC-BY License)

Abstract: This study aims to develop animated video learning media based on Bruner's cognitive theory to enhance the science learning process of third-grade students at SDN 18 Koto Tinggi, focusing on the topics of energy sources and energy transformations. Animated videos are used to present abstract concepts through clear visual representations, enabling learning activities that are more engaging and interactive for students. The study applied a research and development approach using the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation, to ensure that the developed media is valid, practical, and effective. The validity of the media was examined through expert validation involving media experts, content experts, and language experts, and the results indicated that the media was highly feasible and appropriate for achieving the intended learning objectives. Effectiveness testing was conducted using pre-test and post-test instruments, which showed a significant improvement in students' learning outcomes with an N-Gain score of 0.71. In addition, student and teacher responses demonstrated that the animated video media was very practical, easy to use, attractive, and effective when implemented in classroom learning. Overall, this study contributes to literature on technology-based learning media in Indonesia and supports animated videos for elementary science.

Keywords: Animated video; Bruner's cognitive theory; Interactive media; Learning outcomes; Science Learning.

Introduction

The development of science and technology is a global phenomenon that plays an important role in improving the quality of education, particularly in science learning. Science education universally aims to develop students' critical, logical, and systematic thinking skills in understanding natural phenomena and applying them in everyday life. In line with the demands of 21st-century learning, the integration of technology into science learning has become indispensable, as technology enables the presentation of learning materials in more contextual, visual, and interactive ways, thereby enhancing student engagement and understanding (Huang & Wang, 2025; Kuznetsova et al., 2024).

At the elementary school level, science learning emphasizes mastery of basic concepts as a foundation for learning science at higher levels. However, several science topics, such as energy sources and energy transformations, have abstract characteristics that are difficult for students who are still at the concrete operational stage of cognitive development to understand. This condition requires the use of learning media that are able to visualize concepts clearly and meaningfully. Visual based learning media, particularly animated videos, are considered effective in helping students build mental representations through moving images, colors, and systematic storylines, making the

How to Cite:
Novita, E., Hidayati, A., Darmansyah, D., & Ridwan, R. (2025). Enhancing Science Learning through the Development of Animation Video Media Based on Bruner's Cognitive Theory Using Canva for Students. *Jurnal Penelitian Pendidikan IPA*, *11*(12), 550–560. https://doi.org/10.29303/jppipa.v11i12.13270

learning process easier to understand and more engaging (Cotiangco et al., 2024; Sri Utaminingsih et al., 2024; Stadlinger et al., 2021).

Although technological facilities such as laptops and projectors are available in many elementary schools, the use of technology-based learning media in science instruction remains suboptimal. Learning is still dominated by conventional methods centered on teachers and textbooks, resulting in relatively low levels of active student participation. This condition was also found at SDN 18 Koto Tinggi, where initial observations indicated that third-grade students experienced difficulties in understanding the topics of energy sources and energy transformations. Assessment results also revealed a considerable gap between the expected learning outcomes and the actual achievements. Observations of science learning outcomes in Grade III showed that the students' average scores were below the Minimum Criteria for Learning Achievement (KKTP), indicating problems related to the effectiveness of the ongoing learning process (Rahim et al., 2019).

Table 1. Recap of Average Student Scores for Grade III

School Name	Number of Students	KKTP	Average Score
SD Negeri 18 Koto Tinggi	9	70	56

Classroom observations and data analysis indicate that students did not meet the Minimum Criteria for Learning Achievement (KKTP), suggesting problems in the learning strategies and media used (Jayadi et al., 2024; Rahim et al., 2019; Sain et al., 2024). Therefore, there is a need for new and innovative learning media. One possible innovation is the development of animated video media, which can help increase students' motivation and learning achievement.

Previous studies have shown that the use of animated videos in science learning can improve students' conceptual understanding and learning outcomes. Animated videos integrate visual and audio elements that can maintain students' attention and facilitate the understanding of concepts that are difficult to observe directly. However, most of these studies still focus primarily on visual aspects and have not systematically integrated cognitive learning theories that align with the developmental characteristics of elementary school students (Ramadan et al., 2023; Wardana & Adlini, 2022; Widyawati & Kamaludin, 2024).

One theory that is highly relevant to support visual-based learning is Bruner's cognitive theory, which emphasizes three stages of learning representation: enactive, iconic, and symbolic. Iconic representation through the use of images and animations is believed to help students understand complex scientific concepts gradually and meaningfully. Animated videos developed based on Bruner's cognitive theory function not only as visual aids but also as tools that encourage active student engagement in the science learning process (Faheela Saeed & Sher Zaman, 2024; Nur Arsyad et al., 2024).

Based on these conditions, this study offers a novelty in the form of developing animated video learning media based on Bruner's cognitive theory, systematically designed using the ADDIE model. The novelty of this study lies in the integration of Bruner's cognitive stages into the design and flow of animated videos, so that the developed media are not only visually attractive but also aligned with the thinking processes of third-grade elementary school students. This study is important to produce learning media that are valid, practical, and effective in improving students' science learning outcomes, while also supporting the implementation of the Merdeka Curriculum through creative and innovative technology-based learning. Practically, the results of this study are expected to provide an alternative solution for teachers in optimizing science learning and to contribute to the development of science learning media literature in Indonesia.

.

Method

Time and Location of the Research

This research was conducted during the even semester of the current academic year at SDN 18 Koto Tinggi. The selection of the research location was based on preliminary observations indicating that science learning in third grade still faces challenges in delivering abstract concepts, particularly on the topics of energy sources and energy transformations.

Type of Research

This study employed a Research and Development (R&D) approach aimed at producing animated video learning media based on Bruner's cognitive theory and examining its validity, practicality, and effectiveness. The development model used was ADDIE, which consists of the stages of analysis, design, development, implementation, and evaluation.

Population and Sample

The population of this study consisted of all third-grade students at SDN 18 Koto Tinggi. The sample was selected using purposive sampling, involving third-grade students who participated in science learning on the topics of energy sources and energy transformations. The sample selection was aligned with the research objectives and the cognitive developmental characteristics of elementary school students.

Development Stages and Data Analysis

The study employs an R&D approach, in which the educational product to be developed would subsequently be trialed on its effectiveness. Based on (Widyastuti & Susiana, 2019), R&D means doing something to create a specific educational product and then testing its effectiveness. This study will use ADDIE development according to Riser and Mollenda. According to (Wibawa & Susanti, 2025), the ADDIE model is designed according to an orderly system for the solution to learning problems by harmonizing the learning resource activity with student needs. ADDIE stands for a series of interconnected steps that are flexible and adaptable. (Spatioti et al., 2022) mention that the ADDIE model is highly relevant, as it adapts to various conditions, has flexibility in addressing problems, and is suitable for educational development. Furthermore, this model offers a solid framework for revisions at each stage.

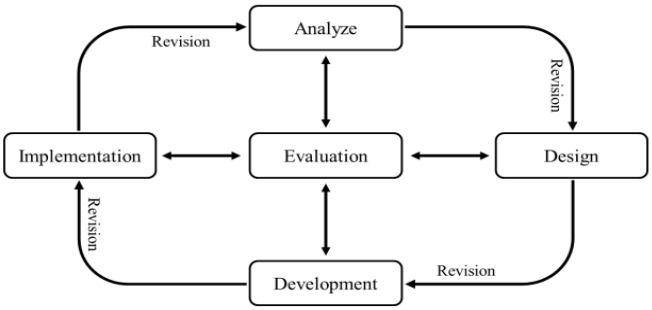

Figure 1. ADDIE Model

Addie has five stages: Analyze, Design, Develop, Implement, and Evaluate. These stages shall be systematically followed in the development of the media as described below. In the first stage, the researcher undergoes needs analysis, student analysis, and specification analysis ((Naila Muna & Wardhana, 2022) through observations at SD negeri 18 koto tinggi in grade III Science Learning and by interviews with the Science Learning subject teacher.

a. Needs Analysis

The needs analysis is carried out through observing and interviewing the Science Learning teacher. It aims to identify the main issues in the learning process and to give insight into areas for development.

b. Student Analysis

The analysis of students helps identify characteristics of the students relevant to the design and development of the animated video media. Such analysis includes the abilities of students, their attention, motivation, learning styles, trait, and prior knowledge. A good understanding of these characteristics will help in conforming the media to meet its intended learning objectives.

c. Concept Analysis

In concept analysis, the relevant concepts for teaching have been identified, organized, and systematically detailed based on data from the needs analysis. This entails a review of the learning objectives and goals and determining the resources needed to assist in the media's development. Adequately planned concept analysis ensures that materials within the educational media are set in such a way that they promote effective learning.

Following the analysis phase, the design phase will commence, with the developing of the animated video media. This will involve preparation of the video script, storyboard design, and media production. The video script outlines all that is going to be included in the video: topic, audience, objective, length of video, and approach. The storyboard depicts how the video will unfold visually, ensuring clarity and conciseness of the intended message. The production will design pictures, backgrounds (classroom environment), and put sound into effect.

After the animated video media has been completed, the validation process will begin. The product is validated through the subject matter expert, media expert, and language expert to determine its quality and effectiveness. Improvement of the media is based on the feedback obtained from the experts prior to its implementation in the classroom. This validation affirms that the media is both appropriate and practical for use within the domain of its intended application. After validation, a trial is conducted, where some teachers will use the media in real classroom situations. This phase is concerned with the practicality and effectiveness of the media. From the trial, insight into how animated video support students' learning and whether it meets the quality standard will be acquired. The data from the trial will be used to assess media usability and effectiveness in capturing students' engagement and learning outcome.

Finally, in the evaluation phase, the media will be revised based on the trial outcome and expert validation feedback. The product after revision will be finalized, ensuring that it aligns with the educational goals, thus qualifying for further use in similar learning environments. The research subjects of the present study are the grade III students at SD negeri 18 koto tinggi. The population was chosen because the students are in the developmental stage where the grasping of abstract concepts, especially in Science Learning, is often difficult without appropriate media. The research has been focused on this subject as it poses quite a challenge for the very students in the understanding of such difficult scientific concepts.

As to the collecting of the data for this research, observation, interviews, and questionnaires will all be utilized in one way or another. The observation part

entails the researcher following students through the lesson as they keep engaged and interact with the media. The interviews will be conducted with the teacher to get qualitative data about learning experiences, problems encountered, and media application. Therefore, the questionnaires will deal with students' opinions regarding the media, on how interesting, and how it helped them in understanding the lesson. The analysis and final refining of the media were going to base on the qualitative data gained from the feedback of the panel of experts, interviews with the teacher and students, and observations. For quantitative analysis, data from the questionnaires will be processed and analyzed using descriptive statistics to evaluate the effectiveness and practicality of the developed media.

Expert (subject matter, media, and language) and end-user (student and teacher) feedback is gathered to assess both the validity and practicality of the animated video media. The same formulas will be used for data analysis in testing both validity and practicality. The average score for validity and practicality is calculated using Formula 1.

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

Where:
$\bar{x}$ = Average score for validity or practicality
$\sum x$ = Sum of scores from all validators/respondents
n = Number of validators/respondents

Next, the percentage score for both validity and practicality is calculated:

$$P(s) = \frac{S}{N} x100\% \quad (2)$$

Where:
(P(s)) = Percentage score for validity or practicality
(S) = Sum of scores for each sub-variable (from the validator's or respondent's assessment)
(N) = Maximum possible score for each item

Once the percentage score is obtained, the results are interpreted according to the following categories:

Table 2. Categories of validity or practicality

Percentage (%)	Category
81 - 100	Very Valid/Very Practical
61 – 80	Valid/Practical
41 – 60	SufficientlyValid/Sufficiently Practical
21 - 40	Invalid/Impractical
0 – 20	Very Invalid/Very Impractical

To evaluate the effectiveness of the animated video media, pre-test and post-test scores will be compared. The difference between these scores, known as the N-gain, will be calculated to determine the improvement in students' understanding of the topics covered by the video. The formula to calculate the N-gain is:

$$(g) = \frac{Posttest\ score\ -\ Pretest\ score}{Maximum\ possible\ score - Pretest\ score} \quad (3)$$

The calculation results are interpreted using the gain index (g), following the classification by Hake (1998) as presented in Table 3.

Table 3. Categories of Normalized Gain Index Values

Gain Index (g)	Category
(g) ≥ 0.70	High
0.30 ≤ (g) ≥ 0.70	Medium
(g) < 0.30	Low

The data from the pre-test and post-test will also be presented in terms of percentages, classifying students' performance as very good, good, sufficient, poor, or very poor. This comprehensive methodology ensures a rigorous development and evaluation process for the animated video media, allowing for detailed assessment of its impact on student learning and its overall effectiveness in enhancing Science Learning.

Result and Discussion

Define Phase

1. Needs Analysis

At SDN 18 Koto Tinggi, low learning achievement in Science Learning alone corroborates the inadequacy of methods used in teaching. Only 44.44 per cent of students achieve the results expected from them. From interviews with teachers, this has been ascertained to result chiefly from an undue reliance on traditional methods, such as textbooks and blackboards and therefore, the learning process became just a boring experience. Despite the existence of LCD projectors and personal computers, their deployment for interactive learning is still greatly ill-fated through the lack of skills to integrate technology.

Students are also more conversant with technological media, which may include video or interactive applications that provide integration of sight and sound. Therefore, to develop animated video media based on Bruner's cognitive theory seems an exemplary alternative. Brunertype theory stresses organizing the content in such a way that students have to actively explore and discover knowledge by means of visual, dynamic representation such as animated video. This type of media could help to present abstract concepts into tangible, concrete, physical representations before students' very own eyes (Purwantini et al., 2023).

In addition, the lack of student motivation and engagement constitutes another key disadvantage for

the success of learning at SDN 18 Koto Tinggi. Teachers stated that most of their students are apathetic and show little enthusiasm toward learning the subject. The use of animated video media can motivate students to want to participate in lessons. Research in SDN 09 Semadai indicates that animated videos on the topic of "Humans and their Environment" can greatly help students to visualize scientific concepts that before this were hard to grasp through traditional methods. Hence, using animated video media by the implementation of Bruner's cognitive theory should lead to better-engaged students, easier understanding, and better learning outcomes.

2. Student Analysis

A prerequisite for effective educational media design, the grasp of the developmental characteristics of Grade III students (approximately 9 years old) plays an important role. According to Piaget's theory, children at this age are in the concrete operational stage, which means they can logically process concrete objects and experiences but not really deal with abstract or theoretical concepts (Juwantara, 2019).

It is this cognitive development stage that makes the use of animated video as learning media exceedingly relevant. Animations give students concrete demonstrations of abstract phenomena, which in turn aids in solidifying the concepts within Science Learning (IPA). According to Bruner's theory, these kinds of opportunities should be presented to students so they can actively explore and engage with the material and animation provides an effective tool in this. Visual representations of concepts such as the water cycle or photosynthesis, students would become more engaged and able to relate the concepts to their life experiences, which in turn would enhance comprehension (Gumilar et al., 2024).

In addition, Grade III students prefer learning that is fun and interesting. With animated videos, the learning process could be considered lively and educative and thus keeping the students entertained while lessens the burden of topic assimilation. An active interaction with the material, promoted by the animated media, coincides well with Bruner's constructivism, in which students construct their knowledge through the interaction with learning material (Novikasari et al., 2025).

3. Concept Analysis

The topic associated with energy sources and transformations, as a very significant topic in the Science Learning curriculum for Grade III students, introduces students to energy as a concept, energy sources, and the process of transforming energy. It explains the phenomena of nature and also the technologies that are relevant to their everyday lives' events (Nurul Hariani et al., 2025).

The energy material is composed of several key concepts in Science Learning in Grade III students. First, energy can be understood as the capacity of doing work or causing changes. Secondly, sources of energy are taught to them and these include renewable energy such as solar energy, wind, and water, as well as non-renewable energy sources, such as fossil fuels such as coal and oil (Fadya Dwi Kundaryanti et al., 2023). The third concept deals with different forms of energy namely heat, light, motion, electricity, and chemical energy, where each type is availed for human daily practical use (Yunus Agustian et al., 2023). Finally, the concept of energy transformation is introduced, explaining how energy can change from one form to another, such as when electricity is transformed into light in a lamp or chemical energy is converted to heat in a stove (Disa Sahra et al., 2025).

4. Specification Analysis

Specification analysis highlights the functional and non-functional system requirements necessary for the development of animated video media based upon Bruner's cognitive theory intervention for Science Learning in Grade III. Functional specifications include capabilities of animation creation and editing, provision of text, narration, sound effects, and controls for playback. In addition, it must also possess interactivity components that would allow students to engage with the content.

For hardware, it requires at least a laptop having Intel Core i5, 8GB RAM, and 256GB SSD for developers. For classrooms, Intel i3 laptops with 4GB RAM and 720p projectors are enough to play the media. Software include Canva Pro for animation making, Audacity for audio editing, and HandBrake for video conversion.

Non-functional requirements entail ensuring that media are compatible with a range of devices and simple for teachers with minimal technical expertise to manipulate. The system should also provide students with easy access in distributing instructional content materials.

Design Phase

The design process for creating the educational animated video in Canva aims to systematically impart the learning messages. The video essentially introduces the students to the basic concepts of energy sources, forms of energy, and energy transformation into everyday life.

To produce the animation script mapped out on the story tale, they begin with an engaging introduction to energy as an everyday activity, such as turning on lights or using a gas stove. It describes energy sources (sun, water, wind, and fossil fuels), then forms of energy

(light, heat, motion, and electricity), and, lastly, energy transformation, such as from electrical energy to light or heat. The language used is simple and suitable for students.

Next, the production process is guided by a storyboard that shows the scene sequence, animations, text, and narration. For example, in the first scene, it might show the shining sun paired with the text "Main Energy Source on Earth" and show the energy sources of the water wheel or windmill in further scenes. The storyboard will also describe some of the energy transformations: a ball falling (potential to kinetic energy) or a fan turning (electrical to mechanical energy).

The next stage is video production in Canva, where all elements-text, images, icons, animation, and sounds-are brought together according to the storyboard. Voice narration is recorded to clarify the visuals and added sound was recorded for background music. Finally, editing, where content is checked for accuracy, length, and quality before coming out as an informative yet engaging educational video. The following (Figure 1-6) are the results of animated video production:

Figure 2. Video intro

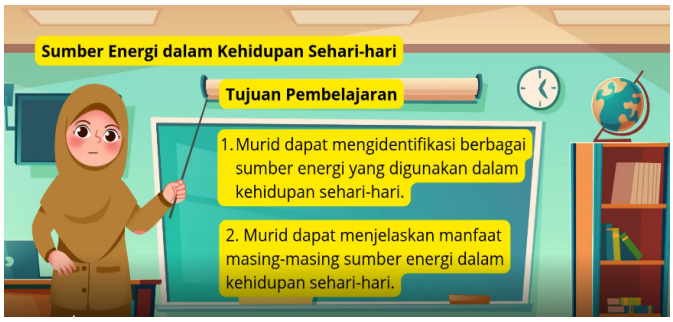

Figure 3. Learning objectives

Figure 4. one of the learning animations

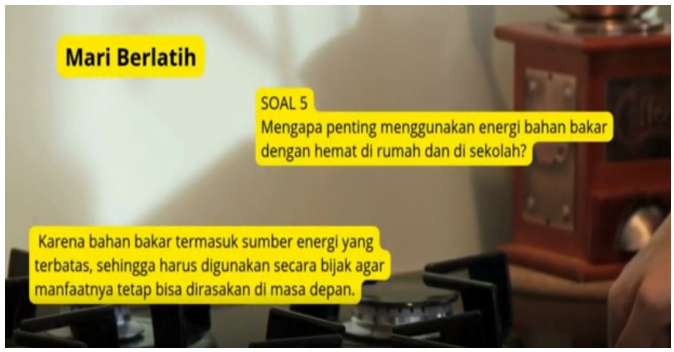

Figure 5. Practice questions

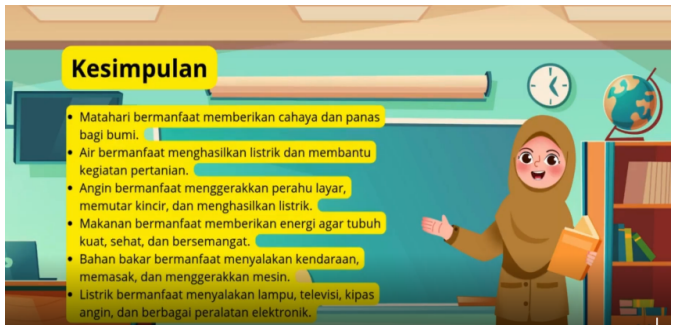

Figure 6. Conclusion

Development Phase

The animated video media based on Bruner's cognitive theory is for the Science ( ) subject in grade III and is being validated by three experts: media expert, content expert, and language expert. Validation is done to make sure that the media designed and developed is worth using for the learning process. Each expert rated various aspects that support interdependently for the quality of the media. The validation results are shown in Table 4.

Table 4. Media Validator Evaluation Results

Expert Field	Validity Percentage(%)	Category
Media Expert	97	Very Valid
Content Expert	97	Very Valid
Language Expert	100	Very Valid
Average Validity	98	Very Valid

The validation of a media expert, Dr. Septriyan Anugrah, S.Kom., M.Pd.T., examined the aspects of visual design-interactivity, usability, and technical feasibility. Media gets a 97% rating, which indicates excellent and attractive visual design, combined with elements that are appropriate for the characteristics of students in grade III. Bright colors, appropriate images, and a neat layout are conducive to students' comprehension of the material. The media also provides interaction so that students can be involved in the learning process. The technical feasibility, such as compatibility with different devices, has been met well

to ensure the media is used in schools without technical problems.

Prof. Dr. Risda Amini, M.P. with a rating of 97%, validated aspects such as curriculum compatibility, material accuracy and depth, simplicity and ease of understanding, and relevance to students' daily lives. The material in the animated video concerning energy sources and energy transformation is organized simply for comprehensible student learning, with correct explanations making it in line with the third-grade elementary school curriculum. Real-life examples and clear visualization assist students to translate the more abstract concepts into their lives, such as solar energy and wind in daily life.

According to the validation of language expert Dr. Abdurahman, M.Pd., a perfect score of 100% was given with references to language clarity, degree of comprehension, grammatical accuracy, and motivational tone. The language in the animated video is in a clear, simple form that can be easily understood by third-grade students. The sentences were all grammatically correct and well-formed according to the rules of Indonesian grammar. Also, the language style in the animation is geared toward children; it is fun and not boring, and it motivates students to take an active part in the learning process.

Combined with the results of the highest evaluation for the three aspects: media (97%), content (97%), and language (100%); it was concluded that the developed animated video media is extremely appropriate for use in grade III learning. This media has met the expected quality standards and is now ready for use as a companion in students' understanding of energy sources and energy transformation. Therefore, it can be concluded that such media would be very effective in boosting student engagement and understanding, as well as being fun and rewarding for learning.

Implementation Phase

The implementation phase of this study was carried out at SDN 18 Koto Tinggi with prior permission from Postgraduate Program, Universitas Negeri Padang. During implementation, the researcher prepared a lesson flow akin to that of the teacher. That includes an opening phase, delivery of the material, and a closing phase, with additional activities at the beginning and end. In the opening phase, a pre-test was conducted to assess the students' prior knowledge of the material, and in the closing phase, a post-test was conducted to evaluate their attainment of learning objectives. To evaluate the practicality of the developed animated video media, a practicality questionnaire was administered to both teachers and students.

Practicality evaluations were conducted on 9 grade III students at SDN 18 Koto Tinggi. The evaluation covers 5 major aspects: ease, student engagement, media quality, learning effectiveness, and general satisfaction. The results of the student practicality evaluation are presented in the Table 5.

Table 5. Student Practicality Evaluation Results

Aspect	Percentage (%)	Category
Ease of Use	93.33	Very Practical
Student Engagement	92.59	Very Practical
Media Quality	94.45	Very Practical
Learning Effectiveness	93.33	Very Practical
General Satisfaction	97.78	Very Practical
Total	94.07	Very Practical

The feedback evaluated showed that the animated video media was very effective and practical for learning purposes. It scored 93.33% for the aspect of ease of use, implying that students found it easy to access and use the media. The aspect of student engagement was rated 92.59%, meaning that the animation video increased students' interest and participation in the lesson. Media quality scored 94.45%, indicating student satisfaction with the visual and audio quality presented. Learning effectiveness scored 93.33%, indicating the media helped students effectively understand the lesson. Satisfaction in general received the highest score of 97.78%. Students were highly satisfied with animated video media for this lesson. Thus, it can be concluded that animated video media is very practical and beneficial in learning, with a grand mean score of 94.07%.

The evaluation of the teacher's practicability was conducted with 2 teachers at SDN 18 Koto Tinggi. In the following table are the results of the teacher's practicability Rating Scale:

Table 6. Teacher Practicality Evaluation Results

Aspect	Percentage(%)	Category
Ease of Use	96	Very Practical
Student Engagement	90	Very Practical
Media Quality	100	Very Practical
Learning Effectiveness	95	Very Practical
General Satisfaction	95	Very Practical
Total	95.20	Very Practical

The practical evaluation conducted by the teachers gave very positive results. Ease of use got a percentage of 96%, which means that the animated video media was very easy for teachers to use in their teaching. Student engagement got a score of 90%, which indicates that the video animation was able to engage students, although not without some difficulties. Media quality was scored 100%, meaning that the media was indeed highly appropriate for the intended lesson in terms of both visual and audio support. Effectiveness of learning scored 95%, which indicated that the animated video

was effective in helping achieve the learning objectives. Satisfaction generally scored very high at 95%, which means that teachers were really satisfied with the media application in teaching. Overall, on a composite score of 95.2%, which means the animated video media is very much practical for teaching with great advantage in terms of the teachers' use and students' learning outcomes.

The interactive animated video media developed for elementary students in science learning were displayed to give excellent results in improvement of students 'understanding of concepts. This is clearly shown through the comparison between pre-test and post-test results, which present a significant improvement in students' abilities after using media. The Table 7 shows the evaluation results of students' knowledge.

Table 7. N-Gain Score for Knowledge Competency

Test	Lowest Score	Highest Score	Average Score	N-Gain	Criteria
Pre-test	28	62	45.83	0.71	High
Post-test	76	92	82.25		

The effectiveness test Canva-based sparkling interactive educational video media tested in science learning at SD was followed with an N-Gain score of 0.71. This shows a significant improvement in students' understanding of the lesson after using the media. Based on the N-Gain score of 0.71, it falls in the high category of results; hence, the interactive media has successfully improved student learning outcomes. This improvement indicates that Canva-based animated video media drew students' attention and made it easier for them to understand the concepts of science taught. Further, this media provides a higher level interactivity of the learning process making students more active in knowing the material using visual elements and narration in the video. In summary, it can be said that the use of interactive animated video media using Canva would surely give a positive effect on enhancing students' understanding in elementary school especially in the science subject.

Evaluation Phase

The trial results were very positive response from students. They were more enthusiastic, active, and able to correlate science learning concepts with projected life experiences. Educators also agreed that media could facilitate the delivery of abstract material in more concrete and understandable ways. The average N-Gain of 0.71 reached by pre-test and post-test, which falls within high category, indicates that there is a significant improvement in student learning outcomes resulting from the use of animated video media. It shows how effective Bruner's cognitive theory is applied through animated visualization, which enables students to build a gradual conceptual understanding, from concrete experience to symbolic representation. Thus evaluation results show that the animated video media developed using Canva is not only applicable for use, but also improves the effectiveness and quality of learning science meaningfully for grade III students in elementary school.

The ADDIE model (Analyze, Design, Develop, Implement, and Evaluate) organized and oriented the animated video media development through a platform called Canva for the third grade. The development follows the needs of users and integrates Bruner's cognitive theory. Analysis showed the requirements for educational improvement with respect to a learning completion rate as low as 44.44% due to the dominance of the more conventional teaching strategies with limited use of technology. The students were in the concrete operational period according to Piaget when animated video media was deemed very appropriate for boosting motivation and understanding on science content. This strengthens the rationale why this research focuses on improving motivation and learning outcomes through the media of animated video: the use of animated video shows that it significantly increases students' motivation and learning outcomes, especially in learning concepts abstract like energy transformation (Ayunda et al., 2024; Dimas Qondias et al., 2024; Inwanti & Setiawan, 2025).

In the design phase, the script was logically organized to be simple and gradually made more complex by examples that were real and relevant to students' lives. The storyboard was helpful in showing how each one of the scenes would connect with the animation. Students' interests are further catered through the ease generated in creating animations using Canva and the freely available graphic elements available (Fitri et al., 2023; Ikhlas et al., 2023). Studies have also provided evidence that Canva is effective in simplifying the design of interactive and creative learning media (Huda et al., 2025).

During the development stage, all of the animations, images, sounds, text, and narration were merged to Canva. The validation results from three experts demonstrated a very high validity rate of 98% which reflects the quality of the media according to all standards. Implementation of suggestions by the experts, such as the addition of dynamic animations and a concluding section that would further enhance the learning message, improved the quality of the video (Alwi Dalimunthe & Reinita, 2022; Estuhono et al., 2025). From then on, the media would be rated and recognized very practical and effective for student motivation, as well as learning outcomes.

In fact, the implementation phase was where the animated video was used in SDN 18 Koto Tinggi through the mechanisms of pretest, video exposure, and posttest. The teachers took the role as facilitators linking the materials in students' daily life experiences. Results from observations indicated that students demonstrated greater enthusiasm to understand the concept of energy transformation demonstrated through animated media (Imam Hamdani et al., 2025; Puspitasari et al., 2024). Besides that, animation sparked students' involvement in an abstract idea more concrete and real-seeming (Ulfah et al., 2025).

At this stage of evaluation, the media have really worked out because of the N-Gain value score of 0.71, which demonstrates that such value in media really reflects significant improvement in students' understanding. Evaluations, both formative and summative, therefore indicate that the media are not only valid theoretically, but such media must also have effectiveness in augmenting the understanding of energy concepts. Evaluation of the practicality of the media from teachers' perspectives and students' perspectives are highly favorable: 95.2% from teachers and 94.07% from students, confirming that the media are practical and add significant enhancement to learning outcomes for students (Silitonga et al., 2024; Sri Mertasari & Candiasa, 2022).

All in all, the development of animated video media based on Bruner's cognitive theory with the instrumentality of Canva has achieved the development of media that is valid and practical but also effective in increasing the student engagement and understanding within science content of third-grade classrooms. This media, therefore, serves as an innovative alternative to probably more interactive and meaningful learning in the digital age.

Conclusion

This study demonstrates that the development of animated video learning media based on Bruner's cognitive theory using the ADDIE model results in media that are valid, practical, and effective for improving science learning among third grade students on the topics of energy sources and energy transformations. Validation results from media, content, and language experts indicate that the developed media are highly feasible for classroom implementation. Effectiveness testing through pre-test and post-test shows a significant improvement in students' learning outcomes, with an N-Gain score of 0.71, categorized as high. In addition, responses from students and teachers reveal that the animated video media exhibit a very high level of practicality in terms of ease of use, attractiveness, and their ability to enhance student engagement and understanding.

In general, the findings of this study can be generalized to suggest that animated video learning media designed according to Bruner's cognitive stages are effective in supporting elementary students' understanding of abstract science concepts. The practical implications of this study indicate that such animated video media can serve as an innovative alternative for teachers in science instruction to improve the quality of the learning process and student achievement. Furthermore, the media have the potential to be further developed and applied to other science topics with similar abstract characteristics.

Acknowledgments

The much-helped execution of this study was in the form of moral encouragement from many individuals. In this context, the authors would like to acknowledge with much appreciation Abna Hidayati, Darmansyah, and Ridwan for their unending encouragement, guidance, and suggestions which made great contribution to the final outcome of this article. Also thank you Dr. Septriyan Anugrah, S.Kom., M.Pd.T., Professor Dr. Risda Amini, M.P. and Dr. Abdurahman, M.Pd. for the great help to the success of this research by their contribution in validating many things related to this research.

Author Contributions

E, N participated in the design, data collection, and analysis of the research. A, H was the main supervisor and provided academic guidance and support in the whole research process. D verified the language sides, ensuring clarity and correctness, as well as a motivational tone. R validated the materials to ensure their accuracy and alignment with the curriculum. Each of the authors carried a vital role in the conceptualization, design, and the execution of research.

Funding

This research received no external funding

Conflicts of Interest

The authors declare no conflict of interest.

References

Alwi Dalimunthe, C. N., & Reinita, R. (2022). Validity Canva Video Media Integrated Thematic Learning Based On PBL Models In Elementary Schools. *Jurnal Gentala Pendidikan Dasar*, *7*(1), 132–160. https://doi.org/10.22437/gentala.v7i1.18346

Ayunda, Y., Azmi, D. I., & Suhartatik, S. (2024). Analysis Of The Use Of Animated Video Learning Media On The Science Learning Motivation Junior High School Student. *Jurnal Pembelajaran Sains*, *8*(2), 94. https://doi.org/10.17977/um033v8i2p94-101

Cotiangco, E. N., Huraño, N. J., Sodoso, E. R., Sumagang, M. G., Jumao-as, J. J., Canoy, J., Picardal, M., & Sanchez, J. M. (2024). Android-based Audio-Visual Comics in Enhancing Conceptual Understanding and Motivation of Chemistry Concepts. *Orbital: The*

Electronic Journal of Chemistry, 125–135. https://doi.org/10.17807/orbital.v16i2.19953

Dimas Qondias, Kale, D. E., Tawa, E. S., Ngura, E. T., & Mere, V. O. (2024). Effectiveness of Animated Video Learning Media on Science Learning Outcomes of Elementary School Students. *International Journal of Instructions and Language Studies*, *2*(2), 1–10. https://doi.org/10.25078/ijils.v2i2.4208

Disa Sahra, Finda Rustiana, Airin Airin, Ari Suriani, & Afriza Media. (2025). Inovasi dalam Pembelajaran IPA Sumber Energi untuk Menumbuhkan Pemahaman Konsep Sejak Dini. *Pentagon : Jurnal Matematika Dan Ilmu Pengetahuan Alam*, *3*(2), 80–86. https://doi.org/10.62383/pentagon.v3i2.525

Estuhono, E., Ahmad Ilham Asmaryadi Ma, & Muhammad Karles. (2025). Pengembangan Video Animasi Berbasis Canva Pada Pembelajaran IPAS Kelas III MIN 2 Dharmasraya. *Jurnal Tunas Pendidikan*, *7*(2), 453–461. https://doi.org/10.52060/pgsd.v7i2.2312

Fadya Dwi Kundaryanti, Pratiwi Ayu Retno Sari, & Wahyu Kurniawati. (2023). Upaya Peralihan Negara Indonesia dalam Mengembangkan Energi Terbarukan. *CAHAYA: Journal of Research on Science Education*, *1*(2), 63–71. https://doi.org/10.70115/cahaya.v1i2.95

Faheela Saeed, & Sher Zaman. (2024). Effect of Animated Instructions on Elementary Students' Conceptual Knowledge in Science. *The Critical Review of Social Sciences Studies*, *2*(2), 1759–1769. https://doi.org/10.59075/xhtdkz63

Fitri, A., Annas, F., Efriyanti, L., & Darmawati, G. (2023). Development of Instructional Media Using "Canva" Based on Animated Videos for the Subject of Biology. *Jurnal Educative: Journal of Educational Studies*, *8*(1), 90. https://doi.org/10.30983/educative.v8i1.6563

Gumilar, G., Harsono, H., Wulandari, M. D., Markhamah, M., & Rahmawati, L. E. (2024). Contextualization of Photosynthesis Learning Based on Visual Thinking in Elementary Schools. *SEJ (Science Education Journal)*, *8*(2), 129–146. https://doi.org/10.21070/sej.v8i2.1659

Huang, Y.-T., & Wang, T.-H. (2025). Effect of integrating gamified teaching activities on learning emotions of design students with different learning styles. *Interactive Learning Environments*, *33*(5), 3614–3634. https://doi.org/10.1080/10494820.2024.2446538

Huda, A., Sari, L. M., Effendi, H., Giatman, M., Firdaus, -, & Sukmawati, M. (2025). Canva-based Animation Comic Video Media in Informatics Learning at SMP Negeri 14 Padang. *JOIV : International Journal on Informatics Visualization*, *9*(1), 120. https://doi.org/10.62527/joiv.9.1.3177

Ikhlas, R. Z., Japakiya, R., & Muzayanah, T. (2023). Utilization of Canva Application as a Learning Media Video Creation. *Journal of Social Science Utilizing Technology*, *1*(3), 158–169. https://doi.org/10.55849/jssut.v1i3.558

Imam Hamdani, Yuliana Nelisma, & Tengku Febri Irwansyah. (2025). Development of Animated Video Media About Students' Learning Interests at MTsT Daarut Tahfizh Al-Ikhlas. *International Journal of Technology and Education Research*, *3*(02), 22–30. https://doi.org/10.63922/ijeter.v3i02.1722

Inwanti, S. N., & Setiawan, D. (2025). Enhancing Motivation and Science Learning Outcomes of Elementary School Students using Animated Video: A Quasi-Experimental Study. *Jurnal Pendidikan MIPA*, *26*(1), 212–226. https://doi.org/10.23960/jpmipa.v26i1.pp212-226

Jayadi, U., Harahap, A., & Aslan, A. (2024). Educational Landscape in Indonesia in 2023: Challenges and Opportunities. *International Journal of Education and Digital Learning (IJEDL)*, *2*(2), 49–58. https://doi.org/10.47353/ijedl.v2i2.266

Juwantara, R. A. (2019). Analisis Teori Perkembangan Kognitif Piaget pada Tahap Anak Usia Operasional Konkret 7-12 Tahun dalam Pembelajaran Matematika. *Al-Adzka: Jurnal Ilmiah Pendidikan Guru Madrasah Ibtidaiyah*, *9*(1), 27. https://doi.org/10.18592/aladzkapgmi.v9i1.3011

Kuznetsova, H., Danylchenko, I., Zenchenko, T., Rostykus, N., & Lushchynska, O. (2024). Incorporating innovative technologies into higher education teaching: Mastery and implementation perspectives for educators. *Multidisciplinary Reviews*, *7*, 2024spe027. https://doi.org/10.31893/multirev.2024spe027

Novikasari, I., Rahmawati, L., Muflihin, H., Mutijah, & Rohmad. (2025). Pembelajaran Penemuan Berbasis Teori Bruner Untuk Meningkatkan Kemampuan Penalaran Matematis Siswa Kelas III SD/MI di Kabupaten Bayumas. *Primary : Jurnal Keilmuan Dan Kependidikan Dasar*, *17*(1), 35–50. https://doi.org/10.32678/primary.v17i1.11317

Nur Arsyad, S., Tangkin, W. P., Sumartono, S., & Astuti, B. (2024). Implications Of Bruner's Cognitive Theory On Elementary School Education In The 21st Century. *Klasikal : Journal Of Education, Language Teaching And Science*, *6*(3), 697–704. https://doi.org/10.52208/klasikal.v6i3.1225

Nurul Hariani, Tri Indah Kusumawati, & Safran. (2025). Pengembangan Media Pembelajaran Ipa Berupa Kartu Domino Pada Materi Sumber Energi , Perubahan Energi, Dan Sumber Energi Alternatif Dalam Kehidupan Sehari-Hari Di Kelas Iv Mis Taqwa Desa Simpang Tangsi Balimbingan, Kecamatan Tanah Jawa, Kabupaten Simalungu. *Jurnal Riset Multidisiplin Edukasi*, *2*(6), 719–726.

https://doi.org/10.71282/jurmie.v2i6.557

Purwantini, M. N., Rokhiyah, I., & Astuti, I. (2023). Pengembangan Video Animasi Pada Mata Pelajaran Ipa Dalam Materi Manusia Dan Lingkungan Di Kelas V Sdn 09 Semadai. *Vox Edukasi: Jurnal Ilmiah Ilmu Pendidikan*, *14*(2), 222–231. https://doi.org/10.31932/ve.v14i2.2246

Puspitasari, E., Krismanto, W., Tuken, R., & Pasinggi, Y. S. (2024). Using Video Animation In Contextual Teaching And Learning To Enhance Student Engagement In Science Learning. *Quantum: Jurnal Inovasi Pendidikan Sains*, *15*(1), 13. https://doi.org/10.20527/quantum.v15i1.17134

Rahim, F. R., Suherman, D. S., & Murtiani, M. (2019). Analisis Kompetensi Guru dalam Mempersiapkan Media Pembelajaran Berbasis Teknologi Informasi Era Revolusi Industri 4.0. *JURNAL EKSAKTA PENDIDIKAN (JEP)*, *3*(2), 133. https://doi.org/10.24036/jep/vol3-iss2/367

Ramadan, Z. H., Anggriani, M. D., & Dafit, F. (2023). Development of 3-Dimensional Cartoon Animation Videos to Improve Higher Order Thinking Skills of Elementary School Students. *Jurnal Penelitian Pendidikan IPA*, *9*(11), 10506–40516. https://doi.org/10.29303/jppipa.v9i11.5564

Sain, Z. H., Aulia Luqman AZIZ, & Moses Adeolu AGOI. (2024). Navigating Educational Challenges in Indonesia: Policy Recommendations for Future Success. *Journal Of Digital Learning And Distance Education*, *3*(4), 1038–1046. https://doi.org/10.56778/jdlde.v3i4.339

Silitonga, M., Solihin, M. D., Isnaini, M., & Hutahaean, H. D. (2024). Application of Learning Media in Improving Higher Order Thinking Skills in Electronics Teaching Materials. *Jurnal Penelitian Pendidikan IPA*, *10*(2), 648–653. https://doi.org/10.29303/jppipa.v10i2.6256

Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. *Information*, *13*(9), 402. https://doi.org/10.3390/info13090402

Sri Mertasari, N. M., & Candiasa, I. M. (2022). Formative Evaluation of Digital Learning Materials. *Journal of Education Technology*, *6*(3), 507–514. https://doi.org/10.23887/jet.v6i3.44165

Sri Utaminingsih, Machfud, Santosa, & G.K. Kassymova. (2024). Development of Learning Management with Animated Video to Increase Motivation and Learning Outcomes. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *41*(2), 31–42. https://doi.org/10.37934/araset.41.2.3142

Stadlinger, B., Jepsen, S., Chapple, I., Sanz, M., & Terheyden, H. (2021). Technology-enhanced learning: a role for video animation. *British Dental Journal*, *230*(2), 93–96. https://doi.org/10.1038/s41415-020-2588-1

Ulfah, W. A., Subagyo, S., Santoso, N., Putranto, D., & Ramadan, G. (2025). Application of video animation to increase students' interest and physical skills in primary school physical education. *Retos*, *66*, 766–772. https://doi.org/10.47197/retos.v66.113610

Wardana, D. K., & Adlini, M. N. (2022). Pengembangan Video Pembelajaran Berbasis Animasi Materi Sistem Respirasi Kelas XI SMA. *Jurnal Penelitian Pendidikan IPA*, *8*(3), 1301–1307. https://doi.org/10.29303/jppipa.v8i3.1641

Wibawa, R. P., & Susanti, M. D. E. (2025). *Design And Construction Of Project Based Learning Media Using The Addie Method* (pp. 1019–1028). https://doi.org/10.2991/978-2-38476-317-7_100

Widyastuti, E., & Susiana. (2019). Using the ADDIE model to develop learning material for actuarial mathematics. *Journal of Physics: Conference Series*, *1188*, 012052. https://doi.org/10.1088/1742-6596/1188/1/012052

Widyawati, F., & Kamaludin, A. (2024). Development of Powtoon Animation Video on Colligative Properties of Contextually Charged Solutions to Increase Student Learning Motivation. *Jurnal Penelitian Pendidikan IPA*, *10*(12), 10329–10340. https://doi.org/10.29303/jppipa.v10i12.9360

Yunus Agustian, Dandan Luhur Saraswati, & Supardi U.S. (2023). Pembuatan Alat Peraga Roda Energi Guna Mempermudah Proses Pembelajaran IPA Terpadu. *DIAJAR: Jurnal Pendidikan Dan Pembelajaran*, *2*(3), 359–366. https://doi.org/10.54259/diajar.v2i3.1687