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The Effect of Video-Based Audiovisual Learning Media on the Science Learning Outcomes of Fourth-Grade Elementary School Students

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ABSTRACT : Learning in Ilmu Pengetahuan Alam dan Sosial (IPAS) at the elementary school level continues to face challenges related to the limited use of varied and engaging instructional media, which may affect students' understanding and learning outcomes. This study aimed to determine the effect of video-based audiovisual learning media on the IPAS learning outcomes of fourth-grade students at SD Negeri 3 Ranomeeto Barat. This study employed a quantitative approach with a pre-experimental method using a One-Group Pretest–Posttest Design. The sample consisted of 18 fourth-grade students selected through saturated sampling. Data were collected using a learning achievement test that had undergone expert validation and were analyzed using descriptive statistics, the Shapiro–Wilk normality test, the paired-samples t-test, and the N-Gain test with the assistance of IBM SPSS Statistics version 27. The results showed an improvement in students' learning outcomes, with the mean score increasing from 71.11 on the pretest to 87.39 on the posttest. The normality test indicated that the data were normally distributed, allowing further analysis using parametric statistics. The paired-samples t-test produced a significance value of 0.001 ($p < 0.05$), indicating a statistically significant difference between students' learning outcomes before and after the implementation of video-based audiovisual learning media. The average N-Gain score was 0.60, which falls within the moderate category. These findings indicate that video-based audiovisual learning media can improve students' understanding and learning outcomes by presenting IPAS content through integrated visual and auditory elements. Therefore, video-based audiovisual learning media can serve as an effective and innovative alternative for supporting IPAS learning and improving elementary school students' learning outcomes.

Keywords: Audiovisual Learning Media, Elementary School, IPAS, Learning Outcomes, Video-Based Learning.

INTRODUCTION

Education is a fundamental factor in improving the quality of human resources and developing individuals who possess knowledge, skills, attitudes, and character. National education is directed toward developing students' potential and shaping the character and civilization of a dignified nation, thereby contributing to the intellectual development of society (Republic of Indonesia, 2003). Consequently, the learning process must be systematically designed to provide meaningful learning experiences and support the comprehensive development of students. In line with the implementation of the Independent Curriculum, Natural and Social Sciences (Ilmu Pengetahuan Alam dan Sosial/IPAS) is one of the subjects that plays an important role

in developing students' understanding of natural and social phenomena (Ministry of Education, Culture, Research, and Technology, 2022). Through IPAS learning, students are expected to understand various phenomena in their surrounding environment and apply the knowledge acquired in everyday life.

The effectiveness of IPAS learning is influenced by various factors, one of which is the selection and use of appropriate learning media. Learning media function as instruments that assist teachers in conveying information, presenting learning materials, and facilitating students' understanding of concepts. The use of appropriate media can make learning more engaging, increase students' attention, and support the achievement of optimal learning outcomes. Conversely, the use of monotonous and less varied learning media may result in teacher-centred learning, which can limit student participation and reduce their interest in the learning process. Arsyad (2019) explains that learning media serve as instruments for conveying messages and information, thereby improving the effectiveness and efficiency of the learning process.

The importance of learning media is also supported by Nurrita (2018), who states that learning media can facilitate the delivery of learning messages and contribute to improving the effectiveness of the learning process and student learning outcomes. In the context of technology-based learning, the development and utilization of digital learning media have become increasingly important. Ekadayanti et al. (2024) demonstrated that the development of learning media based on Canva for mathematics and science learning can support teachers' digital literacy and encourage the utilization of technology in the elementary school learning process. This finding indicates that the integration of digital technology into learning media can support the creation of more innovative and relevant learning experiences.

One form of learning media that has considerable potential for IPAS learning is video-based audiovisual media. Audiovisual media combine visual and auditory elements, including images, text, narration, sound, and movement, to convey learning information. The combination of these elements enables learning materials to be presented more concretely and dynamically, thereby helping students understand concepts that may otherwise be abstract or difficult to observe directly. The use of audiovisual media has also been associated with increased student attention, motivation, participation, and learning outcomes because students receive information through multiple sensory channels (Nurcahyanti & Tirtoni, 2023; Yusnarti et al., 2022).

The effectiveness of technology-based media in improving learning outcomes is supported by several previous studies. Arifatun et al. (2026) found that the use of animated media had a significant effect on students' cognitive learning outcomes in

science learning at the elementary school level. Although animation and video-based audiovisual media have different characteristics, both utilize visual movement and multimedia elements to present learning content in a more engaging and comprehensible manner. Similarly, Rifani et al. (2026) showed that the use of learning media in science-related learning can contribute to creating a more engaging learning experience and increasing students' involvement in the learning process. These findings reinforce the argument that innovative learning media can serve as an important pedagogical instrument for improving the quality of elementary school learning.

The development of digital learning media is also relevant to the increasingly important role of technology in education. Saqjuddin and Saputra (2025) demonstrated that digital comic media can be developed as an innovative learning resource to increase students' interest in learning. This finding suggests that digital media, when designed according to students' characteristics and learning needs, can create more engaging learning experiences. Furthermore, the use of digital learning media can encourage students to interact more actively with learning content and reduce the dominance of conventional teacher-centred instruction.

Based on observations conducted at SD Negeri 3 Ranomeeto Barat during the 2025/2026 academic year, the IPAS learning process was still predominantly conducted through lecture-based instruction and the use of relatively limited learning media. This condition resulted in relatively low student engagement during the learning process. The learning outcome data showed that the average score of fourth-grade students in IPAS was 69.78, with a learning mastery rate of only 50%. This achievement had not yet met the Minimum Completion Criteria (Kriteria Ketuntasan Minimal/KKM) established by the school, namely 70. These findings indicate the need for learning innovations that can increase students' engagement, facilitate their understanding of learning materials, and improve their learning outcomes.

One alternative solution to this problem is the implementation of video-based audiovisual learning media. This media integrates images, sound, narration, text, and movement to present learning content in a more concrete, systematic, and engaging manner. Through video-based audiovisual media, students can observe learning content through visual representations while simultaneously receiving auditory explanations. Such a learning experience is expected to facilitate students' understanding of concepts, increase their attention and motivation, and encourage more active participation during the learning process. The findings of Khairiyah et al. (2025) indicate that audiovisual media can contribute to increasing students' attention, motivation, and understanding in elementary school science and IPAS learning.

The use of audiovisual media can also be explained through relevant learning theories. From a behaviourist perspective, Skinner (1953) argues that learning occurs through the relationship between stimuli and responses. In this context, engaging and meaningful learning media can function as stimuli that encourage students to respond actively to learning activities, which may ultimately contribute to improved learning outcomes. In addition, the principles of Cognitive Load Theory suggest that the presentation of information through appropriately integrated visual and auditory elements can assist students in processing information more effectively and reduce unnecessary cognitive load. Therefore, video-based audiovisual media have the potential to facilitate students' comprehension of learning concepts, particularly materials that require visual explanation and contextual representation.

Several previous studies have demonstrated the positive contribution of audiovisual media to student learning outcomes. Ardini (2023) found that audiovisual media positively influenced fourth-grade students' science learning outcomes by assisting them in understanding abstract concepts. Batubara et al. (2025) also reported that the use of audiovisual media could improve students' motivation, interest, and learning outcomes in science learning. Furthermore, Arumsari (2023) reported that students with visual learning preferences tended to achieve better learning outcomes when learning activities utilized visual elements. This finding reinforces the importance of selecting learning media that are capable of presenting learning information in a visually meaningful manner.

Other studies have also shown that the use of audiovisual media and learning videos can significantly improve elementary school students' learning outcomes. Video-based media can present learning materials in an attractive, contextual, and dynamic manner, thereby supporting students' conceptual understanding and increasing their involvement in learning activities (Hidayah et al., 2025; Sari et al., 2024). The findings of Arifatun et al. (2026) further support the effectiveness of technology-based visual media in improving cognitive learning outcomes in science learning. Meanwhile, the research of Ekadayanti et al. (2024) highlights the importance of developing technology-based learning media to support the implementation of innovative learning in elementary schools.

Nevertheless, research specifically examining the effect of video-based audiovisual learning media on fourth-grade students' learning outcomes in the IPAS topic "Norms in My Regional Customs" at SD Negeri 3 Ranomeeto Barat remains limited. Previous studies have generally examined audiovisual media in science learning, animation-based media, or other specific learning materials. Therefore, a research gap remains concerning the application of video-based audiovisual learning media to specific IPAS content related to norms and regional customs. The present

study seeks to address this gap by examining the effect of video-based audiovisual learning media on the IPAS learning outcomes of fourth-grade students at SD Negeri 3 Ranomeeto Barat.

Based on the aforementioned background, this study aims to determine the effect of video-based audiovisual learning media on the IPAS learning outcomes of fourth-grade students at SD Negeri 3 Ranomeeto Barat. This study is expected to contribute empirically to the development of technology-based learning media in elementary education and provide practical implications for teachers in selecting innovative media that are relevant to students' characteristics and learning needs.

METHODS

This study employed a quantitative approach using a pre-experimental research design, specifically a One-Group Pretest–Posttest Design. This design was selected to examine the effect of video-based audiovisual learning media on students' IPAS learning outcomes by comparing students' achievement before and after the treatment. The research design is presented in Table 1.

Table 1. One-Group Pretest–Posttest Research Design

Pretest	Treatment	Posttest
O_1	X	O_2

Note:

O_1 = Pretest administered before the treatment

X = Treatment using video-based audiovisual learning media

O_2 = Posttest administered after the treatment

The study was conducted during the even semester of the 2025/2026 academic year at SD Negeri 3 Ranomeeto Barat, South Konawe Regency, Southeast Sulawesi Province. The population consisted of all 18 fourth-grade students enrolled at the school. Because the population was relatively small, the study employed a saturated sampling technique, whereby all members of the population were included as research participants. Thus, the sample consisted of 18 fourth-grade students.

The primary instrument used in this study was a multiple-choice test designed to measure students' IPAS learning outcomes. The test was administered twice: before the implementation of the video-based audiovisual learning media (pretest) and after the treatment (posttest). Data collection was conducted using the testing technique, which enabled the researcher to measure changes in students' learning outcomes following the implementation of the treatment.

Prior to its use in the main study, the learning outcome instrument underwent content validation by two validators: a lecturer from the Elementary School Teacher Education (PGSD) Study Program and a fourth-grade teacher at SD Negeri 3

Ranomeeto Barat. The validation process assessed the conformity of the test items with the learning indicators, content and material coverage, item construction, and language clarity. The results of the validation process produced a feasibility percentage of 93.75%, which was categorized as very valid. Therefore, the instrument was considered appropriate for measuring students' IPAS learning outcomes.

The collected data were analyzed using descriptive and inferential statistical procedures. Descriptive statistics were used to describe students' learning outcomes before and after the implementation of video-based audiovisual learning media. Before hypothesis testing was conducted, the normality of the data was examined using the Shapiro–Wilk test because the number of research participants was fewer than 50. The data were considered normally distributed when the significance value was greater than 0.05. Following the fulfillment of the normality assumption, hypothesis testing was conducted using the paired-samples t-test to determine whether there was a statistically significant difference between students' pretest and posttest scores. In addition, the improvement in students' learning outcomes was analyzed using the N-Gain test based on the classification proposed by Hake (1998). All data analysis procedures were conducted using IBM SPSS Statistics version 27.

RESULT AND DISCUSSION

RESULT

A. Descriptive Statistical Analysis

Descriptive statistical analysis was conducted to provide an overview of the learning outcomes of fourth-grade students before and after the implementation of video-based audiovisual learning media. The analysis included the number of participants, mean, median, mode, standard deviation, minimum score, and maximum score. The results are presented in Table 2.

Table 2. Descriptive Statistics of Students' IPAS Learning Outcomes

Statistic	Pretest	Posttest
Number of Students (N)	18	18
Mean	71.11	87.39
Median	73.00	87.00
Mode	73.00	87.00
Standard Deviation	6.79	7.88
Minimum Score	60.00	73.00
Maximum Score	87.00	100.00

As shown in Table 2, the mean pretest score was 71.11, while the mean posttest score increased to 87.39. This represents an average increase of 16.28 points following

the implementation of video-based audiovisual learning media. The increase in the median score from 73.00 to 87.00 and the mode from 73.00 to 87.00 further indicates a general shift in students' learning outcomes toward higher achievement levels.

The minimum score also increased from 60.00 in the pretest to 73.00 in the posttest, while the maximum score increased from 87.00 to 100.00. These results indicate that the improvement was not limited to students with high initial achievement but was also evident among students who initially obtained relatively lower scores. Although the standard deviation increased slightly from 6.79 to 7.88, the posttest results generally demonstrated an improvement in students' IPAS learning outcomes after the implementation of video-based audiovisual learning media.

B. Normality Test

Before conducting hypothesis testing, a normality test was performed to determine whether the pretest and posttest data were normally distributed. Because the sample consisted of fewer than 50 students, the Shapiro–Wilk test was used. The data were considered normally distributed if the significance value was greater than 0.05.

Table 3. Results of the Shapiro–Wilk Normality Test

Data	Shapiro–Wilk Statistic	df	Sig.
Pretest	0.910	18	0.085
Posttest	0.924	18	0.154

The results presented in Table 3 show that the pretest data obtained a significance value of 0.085, while the posttest data obtained a significance value of 0.154. Both values were greater than 0.05. Therefore, the pretest and posttest data were normally distributed. The fulfillment of the normality assumption indicated that the data were suitable for further analysis using a parametric statistical test, namely the paired-samples t-test.

C. Hypothesis Testing

After the normality assumption was fulfilled, hypothesis testing was conducted using a paired-samples t-test. This test was used to determine whether there was a statistically significant difference between students' IPAS learning outcomes before and after the implementation of video-based audiovisual learning media

Table 4. Results of the Paired-Samples t-Test

Comparison	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pretest – Posttest	-16.278	4.198	0.990	-16.450	17	0.001

The results of the paired-samples t-test showed a mean difference of -16.278, indicating that the posttest scores were substantially higher than the pretest scores. The obtained t-value was -16.450 with 17 degrees of freedom, while the significance value was 0.001. Because the significance value was less than 0.05, the null hypothesis (H_o) was rejected and the alternative hypothesis (H_1) was accepted.

These results indicate that there was a statistically significant difference between students' IPAS learning outcomes before and after the implementation of video-based audiovisual learning media. Thus, the use of video-based audiovisual learning media had a significant effect on the IPAS learning outcomes of fourth-grade students at SD Negeri 3 Ranomeeto Barat. The substantial increase in the mean score from 71.11 to 87.39 further supports the effectiveness of the treatment in improving students' learning achievement.

D. N-Gain Analysis

In addition to the paired-samples t-test, an N-Gain analysis was conducted to determine the magnitude of improvement in students' learning outcomes following the implementation of video-based audiovisual learning media. The N-Gain analysis provides an indication of the effectiveness of the treatment by comparing the increase in students' scores with the maximum possible improvement.

Table 5. N-Gain Analysis of Students' IPAS Learning Outcomes

Number of Students	Mean Pretest	Mean Posttest	Mean N-Gain	Category
18	71.11	87.39	0.60	Moderate

The results presented in Table 5 show that the mean N-Gain score was 0.60, which falls within the moderate category. Based on the classification proposed by Hake (1998) this result indicates that the implementation of video-based audiovisual learning media produced a moderate level of improvement in students' IPAS learning outcomes.

The N-Gain result complements the findings of the paired-samples t-test. While the hypothesis test confirmed that the improvement was statistically significant, the N-Gain analysis demonstrated the practical magnitude of the improvement. Therefore, the increase in students' learning outcomes was not only statistically significant but also demonstrated a moderate level of effectiveness. These findings suggest that video-based audiovisual learning media can serve as an effective instructional alternative for presenting IPAS content in a more visual, concrete, and engaging manner for elementary school students.

DISCUSSION

The results of this study demonstrate that the use of video-based audiovisual learning media significantly improved the science learning outcomes of fourth-grade

students at SD Negeri 3 Ranomeeto Barat. This finding is evidenced by the increase in the students' mean score from 71.11 on the pretest to 87.39 on the posttest. The improvement was further confirmed by the results of the paired-samples t-test, which yielded a significance value of 0.001 ($p < 0.05$). Therefore, the null hypothesis (H_o) was rejected and the alternative hypothesis (H_1) was accepted, indicating that the use of video-based audiovisual learning media had a statistically significant effect on students' science learning outcomes. Furthermore, the N-Gain analysis produced a mean score of 0.60, which falls into the moderate category. These findings indicate that video-based audiovisual learning media have a positive and meaningful contribution to improving elementary school students' science learning outcomes.

The improvement in learning outcomes can be attributed to the characteristics of video-based audiovisual learning media, which integrate visual and auditory elements, including images, sound, animation, text, and movement. The combination of these elements enables learning materials to be presented in a more concrete, contextual, and engaging manner. In science learning, particularly material related to "Norms in My Regional Customs," students may encounter concepts that are difficult to understand when delivered solely through verbal explanations. Through audiovisual presentations, learning content can be illustrated through visual examples and supported by verbal explanations, thereby helping students establish a clearer understanding of the material. This condition can increase students' attention and facilitate their active involvement in the learning process.

The findings of this study are consistent with the results of Mu'minin and Humaisi (2021), which showed that audiovisual learning media can increase students' learning motivation through more engaging and interactive presentations of learning materials. Increased motivation encourages students to participate more actively in learning activities, which subsequently supports better understanding and learning outcomes. Thus, the use of audiovisual media does not merely function as a tool for delivering information but also contributes to the creation of a more engaging learning environment.

The results of this study are also in line with Hidayah et al. (2025), who found that the use of audiovisual media significantly influenced elementary school students' science learning outcomes. The presentation of learning materials through a combination of images, sound, and video enables students to understand concepts more easily and contributes to improved academic achievement. Similarly, the findings of Ardini (2023) indicate that audiovisual media can help elementary school students understand abstract concepts through more concrete and comprehensible presentations. Batubara et al. (2025) also reported that the use of audiovisual media can improve students' motivation, interest, and learning outcomes in science learning.

The consistency between these findings and the present study reinforces the argument that audiovisual learning media are effective in supporting the improvement of elementary school students' learning outcomes.

The effectiveness of video-based audiovisual learning media can also be explained through Skinner's (1953) behaviourist theory. According to this perspective, learning is reflected in changes in behaviour resulting from stimuli provided to learners. In the context of this study, the use of video-based audiovisual media functioned as an external stimulus that attracted students' attention and encouraged them to respond actively to the learning process. The combination of moving images, sound, and visual illustrations provided a more stimulating learning experience than conventional verbal instruction alone. The students' positive responses to this stimulus were reflected in their increased understanding and improved posttest scores.

In addition, the findings can be explained through Cognitive Load Theory proposed by Sweller (1988). This theory emphasizes that the way information is presented influences the cognitive processes involved in learning. Video-based audiovisual media can assist students in processing information by presenting learning content through complementary visual and auditory channels. When information is presented appropriately, students can more easily identify and organize important concepts without experiencing excessive cognitive demands. Consequently, students are able to focus their attention on the essential learning content and process information more effectively.

The findings are also consistent with Paivio's (2006) Dual Coding Theory, which explains that information is more likely to be understood and remembered when it is processed through visual and verbal systems simultaneously. In this study, video-based audiovisual learning media combined visual elements, such as images, animations, and written text, with verbal elements delivered through sound or narration. The integration of these two forms of representation provided students with multiple pathways for understanding and recalling the learning material. Therefore, audiovisual media may support not only students' immediate comprehension but also the retention of information after the learning process has taken place.

The findings further support Arsyad's (2019) view that learning media play an important role in clarifying messages, increasing students' attention, and creating more meaningful learning experiences. The use of video-based audiovisual media allows students to receive information through both visual and auditory channels, thereby making the learning process more engaging and comprehensible. This is

particularly relevant to elementary school students, who generally benefit from concrete and visually supported learning experiences.

The present findings are also supported by Arumsari (2023), who reported that students with visual learning styles tend to achieve better learning outcomes than students with other learning styles. Although the focus of that study was on learning styles, the findings provide additional support for the use of media containing strong visual elements in the learning process. Video-based audiovisual media provide visual representations that can help students understand information more clearly and connect abstract concepts with concrete examples.

Furthermore, Sari et al. (2024) found that the use of animated video media can improve elementary school students' science learning outcomes by creating a more engaging learning experience and helping students visualize the concepts being studied. This finding is relevant to the present study because video-based audiovisual media similarly provide dynamic representations of learning materials. Through visual movement and auditory explanations, students can observe and process information in a more structured manner.

The findings of this study are also strengthened by recent research on the development and use of digital learning media. Ekadayanti et al. (2024) demonstrated the importance of developing digital learning media to support the improvement of teachers' digital literacy in mathematics and science learning. This finding emphasizes that the integration of digital media is increasingly important in improving the quality of contemporary learning. In addition, Arifatun et al. (2026) found that the use of animation media had a significant influence on students' cognitive science learning outcomes. This result is particularly relevant to the present study because both studies emphasize the use of visual and dynamic media to support students' understanding of science concepts.

Other studies have also demonstrated the potential of innovative learning media in improving the learning process. Rifani et al. (2026) reported that the use of diorama media in science learning positively influenced students' learning motivation, indicating that concrete and visual learning media can encourage greater student engagement. Meanwhile, Saqjuddin and Saputra (2025) showed that digital comic media can increase elementary school students' interest in learning. These findings support the broader argument that innovative media, whether audiovisual, animated, three-dimensional, or digital, can improve the quality of learning by making instructional content more engaging and accessible to students.

Nevertheless, the N-Gain result of 0.60, which falls within the moderate category, indicates that the use of video-based audiovisual learning media, although effective, does not automatically produce maximum improvement for all students.

The moderate level of improvement may be influenced by differences in students' initial abilities, learning styles, levels of attention, and their ability to process information presented through audiovisual media. Therefore, the use of video-based audiovisual learning media should ideally be combined with teacher explanations, questioning activities, discussions, and student practice to maximize learning outcomes.

The findings demonstrate that video-based audiovisual learning media can significantly improve science learning outcomes among fourth-grade students at SD Negeri 3 Ranomeeto Barat. The effectiveness of this media is supported by its ability to present learning materials through integrated visual and auditory stimuli, facilitate the understanding of concepts, increase students' attention, and create a more engaging learning environment. The findings are consistent with relevant learning theories and previous empirical research on audiovisual, animated, and digital learning media. Therefore, video-based audiovisual learning media can be considered an effective alternative instructional medium for supporting student-centred science learning in elementary schools.

CONCLUSION

This study concludes that the use of video-based audiovisual learning media has a significant effect on the learning outcomes of fourth-grade students at SD Negeri 3 Ranomeeto Barat in Natural and Social Sciences (IPAS). The effectiveness of the media is demonstrated by the increase in the students' mean score from 71.11 on the pretest to 87.39 on the posttest. The results of the paired-samples t-test also yielded a significance value of 0.001 ($p < 0.05$), indicating a statistically significant difference between students' learning outcomes before and after the implementation of the video-based audiovisual learning media. Furthermore, the mean N-Gain score of 0.60 falls within the moderate category, indicating that the media provided a meaningful improvement in students' learning outcomes.

These findings indicate that video-based audiovisual learning media can serve as an effective alternative for supporting IPAS learning in elementary schools. The integration of visual and auditory elements enables learning materials to be presented in a more concrete, engaging, and comprehensible manner, thereby supporting students' understanding and participation in the learning process. Therefore, teachers may consider the use of video-based audiovisual media as part of innovative and student-centred learning strategies. Future research is recommended to involve a larger sample size and a control group to provide stronger comparative evidence regarding the effectiveness of video-based audiovisual learning media. Further studies may also examine its effects on other learning outcomes, including students' learning

motivation, critical thinking skills, creativity, conceptual understanding, and problem-solving abilities.

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