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Effectiveness of animation-based learning in enhancing elementary students' cognitive achievement in science

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ABSTRACT

This study aims to analyze the effectiveness of using animation media in science learning to improve students' cognitive learning outcomes on the material of the solar system arrangement. This study used a quantitative approach with a quasi-experimental method and a Nonequivalent Control Group Design. The research sample consisted of 58 grade VI students, who were divided into experimental groups (n = 29) who received learning assisted by animated media and control groups (n = 29) who received conventional learning. The analysis showed that there was a significant difference in cognitive learning outcomes between the two groups, with a significance value of 0.000 <0.05, so the alternative hypothesis (Ha) was accepted. The average pretest score of the experimental group was 49.90 and increased to 83.48 on the post-test after the treatment. The average pretest score of the control group was 63.90, with an increase to 70.76 in the post-test. The results of this study concluded that the use of animated media in science learning in elementary schools significantly contributed to the improvement of students' cognitive learning outcomes on the concept of the solar system arrangement. Based on these findings, it is recommended that educators make more use of animated media as a tool in learning science, especially on abstract concepts such as the composition of the solar system.

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1. INTRODUCTION

Learning is an active process that involves the interaction of individuals with their environment to gain new knowledge and experiences (Hanafy, 2014; Hasbullah et al., 2019; Maptuhah & Juhji, 2021; Sulaiman & Neviyarni, 2021). The quality of learning is highly dependent on the level of mental and physical involvement of learners in the process (Nugraha, 2018; Irawati et al., 2022; Putri et al., 2024). However, monotonous learning often leads to students' lack of attention, thus negatively impacting their concept understanding and learning outcomes (Dasopang, 2017; Rahmayani, 2019; Hakeu et al., 2023). Innovative approaches are required to increase the efficacy of learning, and using engaging and interactive learning materials is one such approach (Cahyati et al., 2018; Fatimaturohmah et al., 2024).

Learning media is an important tool in delivering material in a more enjoyable and easy-to-understand manner for students (Junaidi, 2019; Sudarsana et al., 2020; Kustyarini et al., 2020;

Mustofa et al., 2022). Various studies show that media that involve more than one sense (Buckingham, 2007; McDougall & Potter, 2019), such as audiovisual media, can improve the understanding and retention of information (Ibrahim et al., 2012; Tawil & Dahlan, 2021; Teng, 2023; Sholeh et al., 2024). In learning Natural Sciences in elementary schools, the utilization of appropriate media is instrumental in helping students understand abstract concepts (Chen, 2006), including the solar system (Henze et al., 2008; Durukan et al., 2023). However, many teachers still use conventional methods by relying on textbooks and lectures (Smetana & Bell, 2012; Fahrudin et al., 2021), which do not support students' visual understanding (Hulqi & Arifin, 2022).

Several previous studies have proven the effectiveness of using animation media in improving student learning outcomes (Sun & Nembhard, 2023; Warisda et al., 2024). The study by Choirunnisa and Widiyanti (2023) showed that the use of animated media in science learning has a positive impact on the understanding of students with special needs. Sari and Yatri (2023) also found that animated media can improve learning outcomes in Indonesian language subjects. This finding is supported by Sukiyasa and Sukoco's (2013) research, which revealed that the use of animated media has a significant influence on student motivation and learning outcomes in automotive electrical system materials. Although there are studies that prove the effectiveness of animated media, research that examines its impact on understanding the concept of the solar system in elementary schools is still minimal. Therefore, this research is important to do.

Based on preliminary observations conducted at Kademangan State Elementary School, Kasemen District, in February 2024, it was found that science learning is still dominated by the lecture method and the use of textbooks. As a result, many students have difficulty understanding the concept of the solar system, which is reflected in the low achievement of the Minimum Completion Criteria, which is 70. The lack of variety of media used, limited facilities, and difficulties in controlling student attention are the main obstacles in the learning process. Therefore, innovative efforts are needed to improve the quality of science learning through the application of more interactive and engaging media.

Based on these problems, this study aims to analyze the effectiveness of using animation media to improve elementary school student's understanding of the solar system concept. The results of this study are expected to contribute to the development of more innovative and technology-based learning strategies, improving the quality of science learning in elementary schools.

2. METHOD

Research Design

This research uses a quasi-experimental method with a nonequivalent control group design. This design is similar to a pretest-post-test control group design but without a randomization process in the selection of experimental and control groups. It is designed to evaluate the effectiveness of an intervention by comparing pretest and posttest results between the two groups. Table 1 below illustrates the research design used.

Table 1. Research Design

Class	Pretest	Treatment	Post-Test
Control	O_1	-	O_2
Experiment	O_3	X	O_4

Population and Research Sample

The population in this study was all grade VI students at Kademangan State Elementary School. The research sample was selected using a non-probability sampling technique with a saturated sampling approach. This technique was applied because the population was relatively small, so all members of the population were used as research samples. The sample consisted of class VI A (n = 29) as the experimental group and class VI B (n = 29) as the control group.

Research Instrument

The instrument used in this study was a learning outcome test consisting of 15 multiple-choice questions about Solar System material. Before being used in research, this instrument went through validation and reliability stages to ensure measurement quality, including validity test to assess the accuracy of the items in measuring learning outcomes, reliability test using the KR-20 formula to ensure the consistency of measurement results, difficulty level analysis using the difficulty index to ensure the variety of questions, and differentiation analysis using the discrimination index to identify the effectiveness of each item.

The multiple-choice test used in this study was the Solar System material with Basic Competence: [3.7] Explaining the solar system and the characteristics of the members of the solar system. Furthermore, 10 valid question indicators were created with cognitive aspects C1 to C3, as shown in Table 2 below.

Table 2. Multiple Choice Test Question Indicators for Solar System Material

Question Indicator	Item	Cognitive Aspects
Students can show the planets that have the most satellites and those that do not have satellites in the solar system correctly.	1	C1
When presented with data, students can correctly mention the characteristics of the planet Mars.	2, 3	C1
Students are able to identify the planet with the hottest climate in the solar system correctly.	4	C1
When presented with data, students can show the characteristics of the planet Venus correctly.	5	C1
Students are asked to explain the definition of the solar system correctly.	6	C2
Presented with questions, Students can explain the process of the formation of the solar system correctly.	7	C2
Presented with questions, Students can explain the characteristics of the planet Venus correctly.	8, 9	C2
Presented with images, Students can determine the arrangement of planet numbers in the solar system correctly.	10, 11	C3
Presented with images, Students can sort planets based on distance from the sun correctly.	12, 13	C3
Students can sort inner planets and outer planets in the solar system correctly.	14, 15	C2

Data Analysis Technique

Before hypothesis testing is carried out, a prerequisite test is carried out. First, the normality test uses the One-Sample Kolmogorov-Smirnov Test to ensure normal data distribution. Second,

the homogeneity test uses Levene's Test to assess the similarity of variance between groups. After the prerequisites were met, hypothesis testing was carried out using the Independent Sample T-Test to test for significant differences between student learning outcomes in the experimental and control groups. All statistical analyses in this study were conducted using SPSS version 22 software to improve the accuracy and objectivity of data processing.

3. RESULT AND DISCUSSION

Result

Normality Test

Normality test analysis was conducted to determine whether the pretest and posttest data in the experimental and control classes were usually distributed. The normality test results are presented in Table 3 below.

Table 3. Results of the Pretest and Posttest Normality Test in Experimental and Control Classes

Test Type	Groups	N	Mean	Std. Deviation	Test Statistic	Asymp. Sig. (2-tailed)
Pretest	Experiment	29	49.90	12.670	0.167	0.058
	Control	29	63.90	14.807	0.155	0.073
Posttest	Experiment	29	83.48	9.489	0.160	0.054
	Control	29	70.76	11.603	0.178	0.059

Based on Table 3, at the pretest stage, the experimental class had an average value of 49.90 with a standard deviation of 12.670. In contrast, the control class has an average of 63.90 with a standard deviation of 14.807. The significance value (Asymp. Sig.) for the experimental class is 0.058, and for the control class, it is 0.073, both of which are greater than $\alpha = 0.05$, so the pretest data from both groups can be said to be normally distributed. At the post-test stage, the experimental class showed an increase in the average value to 83.48 with a standard deviation of 9.489. In contrast, the control class had an average of 70.76 with a standard deviation of 11.603. The significance value (Asymp. Sig.) for the experimental class was 0.054, and for the control class was 0.059, both of which remained greater than $\alpha = 0.05$, so the post-test data were also normally distributed. Thus, the results of the normality test showed that the data in this study fulfil the assumption of normality.

Homogeneity Test

Furthermore, the homogeneity test was carried out using the Levene test to determine whether the two groups had homogeneous variances. The results of the homogeneity test are shown in Table 4 below.

Table 4. Homogeneity Test Results

Test Type	Levene Statistic	df1	df2	Sig.
Pretest	0.379	1	56	0.541
Posttest	0.992	1	56	0.324

In the pretest homogeneity test, the Levene Statistic value is 0.379 with degrees of freedom ($df1 = 1$, $df2 = 56$) and a significance value (Sig.) of 0.541. Since the significance value is more

significant than α = 0.05, it can be concluded that the variance of pretest data between experimental and control classes is homogeneous. Meanwhile, in the post-test homogeneity test, the Levene Statistic value obtained was 0.992 with degrees of freedom (df1 = 1, df2 = 56) and a significance value (Sig.) of 0.324. This significance value is also greater than α = 0.05, so it can be concluded that the post-test data between the two groups has a homogeneous variance.

Hypothesis Test

Hypothesis testing was conducted using the Independent Samples Test to determine whether there was a significant difference between the learning outcomes of students who used animated media and those who used conventional learning. The results of the analysis are presented in Table 5.

Table 5. Hypothesis Test Results

Variable	Assumption of Equality of Variance	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Science Learning Outcomes	Equal variances assumed	0.992	0.324	4.572	56	0.000	12.724	2.783	7.148-18.300
	Equal variances not assumed			4.572	53.879	0.000	12.724	2.783	7.144-18.305

Based on the hypothesis test results in Table 5 above, the significance value (Sig. 2-tailed) is 0.000, which is smaller than the significance limit of 0.05 ($p < 0.05$). It shows that there is a significant difference between the learning outcomes of students who use animated media and students who follow conventional learning. In addition, the t value of 4.572 with a degree of freedom (df) of 56 indicates that the difference between the two groups has a significant effect. The Mean Difference value of 12.724 shows that students who use animated media have higher learning outcomes compared to students who follow conventional learning. Therefore, this finding confirms that the use of animated media in science learning can significantly improve student learning outcomes.

Discussion

The results of the hypothesis test analysis show that there is a significant difference between the learning outcomes of students who use animated media and students who follow conventional learning. The significance value (Sig. 2-tailed) of 0.000, which is smaller than 0.05, indicates that the null hypothesis is rejected, so it can be concluded that the use of animated media has a real impact on student learning outcomes in science learning. This finding is in line with previous research, which states that animation media can improve students' concept understanding and retention in science subjects (Ibrahim et al., 2012; Tawil & Dahlan, 2021; Teng, 2023; Sholeh et al., 2024). Thus, the results of this study strengthen the empirical evidence that animation-based technology is an effective learning strategy for improving understanding of science concepts among students.

In addition, the t value of 4.572 with a degree of freedom (df) of 56 indicates that the difference between the two groups is not only statistically significant but also has a reasonably strong effect on student learning outcomes. The average difference in learning outcomes of 12.724 indicates that students who used the animated media obtained higher scores compared to the conventional group. It is in line with the findings of Evrekli and Balım (2024), who stated that the use of animated media, such as videos and concept cartoons, can provide clear visualization of abstract concepts, making them more accessible to students. Azzahra et al.'s (2024) study showed that students who were familiar with animated content scored significantly higher on the final test compared to those who received traditional instruction, indicating an increase in conceptual understanding. Therefore, the use of animated media in science learning not only improves conceptual understanding but also strengthens students' engagement in the learning process.

From a cognitive perspective, these results can be explained through the Cognitive Theory of Multimedia Learning (Mayer, 2005, 2022), which states that information processing becomes more effective when students receive information through visual and auditory channels simultaneously. Animation media allows students to connect abstract concepts with concrete visual representations, thus accelerating the comprehension process and reducing the cognitive load (Chen, 2006; Evrekli & Balım, 2024). In learning science in elementary school, many concepts are dynamic and require an understanding of the process so that animated media can provide a more precise representation than conventional methods that only rely on text or lectures. Therefore, the use of animation media in learning can be a solution to improve student learning outcomes, especially in materials that require an understanding of complex scientific processes.

The implications of these findings are significant for teachers and curriculum developers, especially in designing technology-based learning strategies. In today's digital era, learning approaches that incorporate interactive media, such as animation, are increasingly relevant to improve learning effectiveness. Research by Rosen (2009) also shows that the use of animation-based media can increase students' learning motivation and strengthen long-term memory. Therefore, teachers are advised to optimally utilize animation media in science learning, not only to improve learning outcomes but also to create a more enjoyable and meaningful learning experience for students.

4. Conclusion

The use of animated media in science learning significantly improves students' cognitive learning outcomes on the concept of solar system structure. It is evidenced by the difference in pretest and posttest scores, which are higher in the experimental group than in the control group, as well as the results of hypothesis testing, which show statistical significance (0,000 < 0,05). This finding supports the multimedia learning theory that emphasizes the effectiveness of the combination of visual and auditory elements in improving the understanding of abstract concepts. Therefore, teachers are advised to make more use of animation media as an innovative learning strategy to improve student engagement and learning outcomes, especially in complex materials that require deep conceptual understanding.

REFERENCES

Azzahra, F. D., Rini, C. P., & Oktrifianty, E. (2024). Pengaruh media video animasi terhadap pemahaman konsep ipa siswa kelas iv sekolah dasar. *Jurnal Pendidikan Dasar Perkhasa: Jurnal Penelitian Pendidikan Dasar*, *10*(2), 1001–1011. https://doi.org/10.31932/jpdp.v10i2.3826

Buckingham, D. (2007). Media education goes digital: An introduction. *Learning, Media and Technology*, *32*(2), 111–119. https://doi.org/10.1080/17439880701343006

Cahyati, N., Syafdaningsih, S., & Rukiyah, R. (2018). Pengembangan media interaktif dalam pengenalan kata bermakna pada anak. *Cakrawala Dini: Jurnal Pendidikan Anak Usia Dini*, *9*(2), 160–170. https://doi.org/10.17509/cd.v9i2.11339

Chen, J. X. (2006). Learning abstract concepts through interactive playing. *Computers & Graphics*, *30*(1), 10–19. https://doi.org/10.1016/j.cag.2005.10.023

Choirunnisa, R., & Widiyanti, S. (2023). Implementasi google sites sebagai media pembelajaran berbasis web untuk meningkatkan belajar anak berkebutuhan khusus. *Jurnal Penelitian Sistem Informasi*, *1*(3), 66–74. https://doi.org/10.54066/jpsi.v1i3.669

Dasopang, M. D. (2017). Belajar dan pembelajaran. *Fitrah: Jurnal Kajian Ilmu-Ilmu Keislaman*, *3*(2), 333–352. https://doi.org/10.24952/fitrah.v3i2.945

Durukan, Ü. G., Turan Güntepe, E., & Dönmez Usta, N. (2023). Evaluation of the effectiveness of augmented reality-based teaching material: The solar system. *International Journal of Human–Computer Interaction*, *39*(12), 2542–2556. https://doi.org/10.1080/10447318.2022.2121041

Evrekli, E., & Balım, A. G. (2024). The effect of using animated concept cartoons in science education on student's conceptual understanding. *Manisa Celal Bayar Üniversitesi Eğitim Fakültesi Dergisi*, *12*(2), 414–436. https://doi.org/10.52826/mcbuefd.1556259

Fahrudin, F., Ansari, A., & Ichsan, A. S. (2021). Pembelajaran konvensional dan kritis kreatif dalam perspektif pendidikan Islam. *Hikmah*, *18*(1), 64–80.

Fatimaturohmah, N., Wibowo, E. W., & Khaeroni, K. (2024). Media video animasi sebagai sarana meningkatkan hasil belajar mata pelajaran IPAS siswa kelas IV SD/MI. *Primary: Jurnal Keilmuan Dan Kependidikan Dasar*, *16*(2), 173–186. https://doi.org/10.32678/primary.v16i2.11159

Hakeu, F., Pakaya, I. I., & Tangkudung, M. (2023). Pemanfaatan media pembelajaran berbasis gamifikasi dalam proses pembelajaran di MIS Terpadu Al-Azhfar. *Awwaliyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *6*(2), 154–166. https://doi.org/10.58518/awwaliyah.v6i2.1930

Hanafy, M. S. (2014). Konsep belajar dan pembelajaran. *Lentera Pendidikan: Jurnal Ilmu Tarbiyah Dan Keguruan*, *17*(1), 66–79. https://doi.org/10.24252/lp.2014v17n1a5

Hasbullah, H., Juhji, J., & Maksum, A. (2019). Strategi belajar mengajar dalam upaya peningkatan hasil belajar pendidikan agama Islam. *EDURELIGIA: Jurnal Pendidikan Agama Islam*, *3*(1), 17–24. https://doi.org/10.33650/edureligia.v3i1.859

Henze, I., Van Driel, J. H., & Verloop, N. (2008). Development of experienced science teachers' pedagogical content knowledge of models of the solar system and the universe. *International Journal of Science Education*, *30*(10), 1321–1342. https://doi.org/10.1080/09500690802187017

Hulqi, R. H., & Arifin, M. B. U. B. (2022). Pengembangan video animasi materi tata surya kelas VI untuk meningkatkan hasil belajar di MI Muhammadiyah 2 Kedungbanteng. *Didaktis: Jurnal Pendidikan Dan Ilmu Pengetahuan*, *22*(2), 237–252. https://doi.org/10.30651/didaktis.v22i2.12873

Ibrahim, M., Antonenko, P. D., Greenwood, C. M., & Wheeler, D. (2012). Effects of segmenting, signalling, and weeding on learning from educational video. *Learning, Media and Technology*, *37*(3), 220–235. https://doi.org/10.1080/17439884.2011.585993

Irawati, I., Setyaningsih, R., Rosyad, A. M., Juhji, J., & Herlinda, F. (2022). Hubungan pendidik dan peserta didik perspektif al-Quran. *Risâlah, Jurnal Pendidikan Dan Studi Islam*, *8*(1), 388–409. https://doi.org/10.31943/jurnal_risalah.v8i1.230

Junaidi, J. (2019). Peran media pembelajaran dalam proses belajar mengajar. *Diklat Review: Jurnal Manajemen Pendidikan Dan Pelatihan*, *3*(1), 45–56. https://doi.org/10.35446/diklatreview.v3i1.349

Kustyarini, K., Utami, S., & Koesmijati, E. (2020). The importance of interactive learning media in a new civilization era. *European Journal of Open Education and E-Learning Studies*, *5*(2). http://dx.doi.org/10.46827/ejoe.v5i2.3298

Maptuhah, M., & Juhji, J. (2021). Pengaruh perhatian orangtua dalam pembelajaran daring terhadap motivasi belajar peserta didik madrasah tsanawiyah. *Attadrib: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *4*(1), 25–34. https://doi.org/10.54069/attadrib.v4i1.127

Mayer, R. E. (2005). Cognitive theory of multimedia learning. *The Cambridge Handbook of Multimedia Learning*, *41*(1), 31–48.

Mayer, R. E. (2022). The future of multimedia learning. *The Journal of Applied Instructional Design*, *11*(4), 69–77.

McDougall, J., & Potter, J. (2019). Digital media learning in the third space. *Media Practice and Education*, *20*(1), 1–11. https://doi.org/10.1080/25741136.2018.1511362

Mustofa, R. H., Pramudita, D. A., Atmono, D., Priyankara, R., Asmawan, M. C., Rahmattullah, M., Mudrikah, S., & Pamungkas, L. N. S. (2022). Exploring educational students acceptance of using movies as economics learning media: PLS-SEM analysis. *International Review of Economics Education*, *39*, 100236. https://doi.org/10.1016/j.iree.2022.100236

Nugraha, M. (2018). Manajemen kelas dalam meningkatkan proses pembelajaran. *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan*, *4*(01), 27–44. https://doi.org/10.32678/tarbawi.v4i01.1769

Putri, S. A., Saefurohman, A., & Juhji, J. (2024). Pengembangan media papan pintar berbasis gambar untuk meningkatkan keterampilan berpikir kritis dalam pembelajaran IPA. *Jurnal Pengajaran Sekolah Dasar*, *3*(1), 15–26. https://doi.org/10.56855/jpsd.v3i1.1042

Rahmayani, A. L. (2019). Pengaruh model pembelajaran discovery learning dengan menggunakan media video terhadap hasil belajar siswa. *JP (Jurnal Pendidikan): Teori Dan Praktik*, *4*(1), 59–62. https://doi.org/10.26740/jp.v4n1.p59-62

Rosen, Y. (2009). The effects of an animation-based on-line learning environment on transfer of knowledge and on motivation for science and technology learning. *Journal of Educational Computing Research*, *40*(4), 451–467. https://doi.org/10.2190/EC.40.4.d

Sari, H. R., & Yatri, I. (2023). Video animasi melalui aplikasi canva untuk meningkatkan hasil belajar bahasa indonesia siswa sekolah dasar. *Edukasiana: Jurnal Inovasi Pendidikan*, *2*(3), 159–166. https://doi.org/10.56916/ejip.v2i3.381

Sholeh, M. I., Mohamed, M. R. A. A., & Abror, S. (2024). Development of audio-visual media to enhance student comprehension in Islamic education. *Attarbiyah: Journal of Islamic Culture and Education*, *9*(2), 145–156. https://doi.org/10.18326/attarbiyah.v9i2.145-156

Smetana, L. K., & Bell, R. L. (2012). Computer simulations to support science instruction and learning: A critical review of the literature. *International Journal of Science Education*, *34*(9), 1337–1370. https://doi.org/10.1080/09500693.2011.605182

Sudarsana, I. K., Arini, N. W., Mastini, G. N., Sukerni, N. M., & Pusparini, L. D. (2020). *Learning media: The development and its utilization*. Yayasan Ahmar Cendekia Indonesia.

Sukiyasa, K., & Sukoco, S. (2013). Pengaruh media animasi terhadap hasil belajar dan motivasi belajar siswa materi sistem kelistrikan otomotif. *Jurnal Pendidikan Vokasi*, *3*(1), 126–137. https://doi.org/10.21831/jpv.v3i1.1588

Sulaiman, S., & Neviyarni, S. (2021). Teori belajar menurut aliran psikologi humanistik serta implikasinya dalam proses belajar dan pembelajaran. *Jurnal Sikola: Jurnal Kajian Pendidikan Dan Pembelajaran*, *2*(3), 220–234. https://doi.org/10.24036/sikola.v2i3.118

Sun, Y., & Nembhard, D. A. (2023). Static vs.dynamic representations and the mediating role of behavioral affect on e-learning outcomes. *International Journal of Human–Computer Interaction*, *39*(17), 3312–3323. https://doi.org/10.1080/10447318.2022.2096187

Tawil, M., & Dahlan, A. (2021). Application of interactive audio visual media to improve students' creative thinking skill. *Journal of Physics: Conference Series*, *1752*(1), 012076. https://doi.org/10.1088/1742-6596/1752/1/012076

Teng, M. F. (2023). The effectiveness of multimedia input on vocabulary learning and retention. *Innovation in Language Learning and Teaching*, *17*(3), 738–754. https://doi.org/10.1080/17501229.2022.2131791

Warisda, U. S., Muhibbuddin, M., Andayani, D., Safrida, S., & Nur, Y. I. M. (2024). The influence of animation media on improving student learning outcomes on human respiratory system material at SMP N 3 West Labuhanhaji. *Jurnal Ilmiah Mahasiswa Pendidikan Biologi*, *9*(1), 59–64.