

THE USE OF DIORAMAS AS AN INNOVATIVE MEDIA FOR IPAS IN FOURTH GRADE ELEMENTARY SCHOOL

Puji Liana Dewi^{1*}, Abdul Karim², Sati³

^{1,2,3}Universitas Muhammadiyah Cirebon

¹ pujilianadewi@gmail.com

Abstract

Learning outcomes are the primary output of the learning process. Low student achievement is a problem in the learning process. In this study, low achievement is attributed to the fact that instruction is theoretical and monotonous and does not utilize engaging, concrete teaching materials; as a result, students still struggle to understand the material—particularly abstract concepts—which makes learning tedious. This study aims to determine the effects and benefits of using dioramas on the learning outcomes of fourth-grade students at SD Negeri 1 Kasugengan Kidul. The research method used was a quantitative experimental study with a single-group pre-experimental design involving pre- and post-tests. The study population consisted of all students at SD Negeri 1 Kasugengan Kidul. The sampling technique used was non-probabilistic sampling, specifically a subjective sampling technique in which the sample was selected based on specific considerations. The sample consisted of 21 students. Data were collected through academic achievement tests, observations, and documentation. The research instruments included pre-test/post-test performance assessments consisting of five essay questions, a learning module observation sheet, teacher performance observations, affective observations, and student psychomotor observations. The results showed that the average score on the pre-test, which was initially 41.19, increased to 83.57 on the post-test. The normality test results indicated a normal distribution. Data analysis using the N-gain score test yielded a value of 0.7314, which falls into the “high” category, with an N-gain percentage of 73.1415%, classified as “effective.” Based on the hypothesis test using a t-test on paired samples, the significance value was $< 0.001 < 0.05$, with a value greater than the critical value, namely $27.051 > 2.086$; thus, H_0 was rejected and H_1 was accepted. This means that this study demonstrates a significant effect of the diorama medium on the learning outcomes of fourth-grade students at SD Negeri 1 Kasugengan Kidul.

Keywords: learning outcomes; diorama media; elementary school

Abstrak

Hasil belajar menjadi output yang utama dalam proses pembelajaran. Rendahnya hasil belajar peserta didik menjadi permasalahan pada proses pembelajaran. Pada penelitian ini, rendahnya hasil belajar karena pembelajaran bersifat teoritis, monoton dan tidak menggunakan media yang menarik, konkret, peserta didik masih kesulitan memahami materi, khususnya materi yang abstrak dan membuat pembelajaran menjadi membosankan. Penelitian ini bertujuan untuk mengetahui pengaruh dan manfaat penggunaan media diorama terhadap hasil belajar peserta didik kelas IV SD Negeri 1 Kasugengan Kidul. Metode penelitian yang digunakan adalah kuantitatif eksperimen dengan desain *pre-experimental design one group pretest-posttest*. Populasi dalam penelitian ini yaitu seluruh peserta didik di SD Negeri 1 Kasugengan Kidul. Teknik pengambilan sampel menggunakan *Nonprobability sampling*, yaitu teknik pengambilan sampel secara subjektif dimana sampel dipilih dengan pertimbangan tertentu. Sampel yang diambil berjumlah 21 peserta didik. Teknik pengumpulan data melalui tes hasil belajar, observasi dan dokumentasi. Instrumen penelitian nya yaitu tes hasil belajar pretest-posttest 5 soal uraian, lembar observasi modul ajar, observasi kinerja guru, observasi afektif dan observasi psikomotorik peserta didik. Hasil uji penelitian menunjukkan rata-rata *pretest* sebesar 41,19 meningkat menjadi 83,57 pada *posttest*. Hasil uji normalitas berdistribusi normal. Analisa data menggunakan uji N-gain score sebesar 0,7314 yang berada pada kategori tinggi, dengan N-gain persen sebesar 73,1415% dengan kategori efektif. Berdasarkan Uji hipotesis menggunakan *paired sampel t test* nilai signifikansi sebesar $< 0,001 < 0,05$ dengan nilai t_{hitung} lebih besar daripada t_{tabel} , yaitu $27,051 > 2,086$ sehingga H_0 ditolak dan H_1 diterima, yang berarti penelitian ini menunjukkan adanya pengaruh media diorama yang signifikan terhadap hasil belajar peserta didik kelas IV SD Negeri 1 Kasugengan Kidul.

Kata Kunci: hasil belajar; media diorama; sekolah dasar

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Introduction

Education is an indicator of a country's progress. Education is the key to a bright future. That is why everyone is required to attend school or continue their education. The government has even implemented a 12-year compulsory education program. In Islam, seeking knowledge is an obligation. Currently, the quality of learning outcomes is a primary concern in the field of education. Student learning outcomes serve as a benchmark for improving the quality of learning in educational institutions (Kulkarni & Karim, 2022). Student learning outcomes serve as a benchmark for improving the quality of learning in educational institutions. According to (Dhaki, 2020) student learning outcomes include academic achievements obtained through exams and assignments, as well as active participation—such as asking and answering questions—that supports the attainment of these outcomes. The learning process must adapt to changing times and student needs in order to achieve optimal learning outcomes. Therefore, as times change, students in the education sector are required to adapt to 21st-century learning.

In 21st-century learning, students are not only expected to receive information from their teachers; they also need clear visual materials or media to help them analyze, understand, and memorize the material more easily. Furthermore, education system reforms aim to reduce educational inequality in this country, as mentioned by Karim in (Amaliah et al., 2025). However, given the demands of 21st-century learning, it is evident that many learning processes in schools remain contextual and verbal in nature. As a result, students do not actively engage in the learning process, which leads to a lack of interest in the subject and ultimately results in poor learning outcomes. Therefore, instructional materials are crucial for making the learning process more meaningful and helping students understand the material more clearly and concretely. who states that the use of learning aids allows students to observe and experience firsthand the material presented by the teacher, and can capture their attention. Thus, learning media can be defined as anything used in learning activities to convey messages that stimulate students' thinking, interest, and emotions.

Based on the results of preliminary observations conducted at Kasugengan Kidul Public Elementary School No. 1, where the researcher conducted this study, it appears that the learning process remains monotonous, with a lack of innovation in the selection of learning media; these media are not utilized optimally, and no concrete materials are used, making printed textbooks the sole source of learning. As a result, lessons become less engaging, student enthusiasm wanes, and classroom interaction decreases, ultimately leading to unsatisfactory student learning outcomes. These low learning outcomes are clearly evident in the midterm exams for the IPAS subject, which still do not meet the criteria for achieving the learning objectives (KKTP). It is also known that teaching materials help students visualize concrete concepts, thereby facilitating their understanding of the material presented by Supriyono in an article (Qadri et al., 2024). Based on research conducted by Kurniawan and Triharsini cited in (Agustira, S., & Rahmi, 2022) which shows that instructional media can evoke joy, interest, and enthusiasm in students during the learning process, and that the development of such media enables the achievement of optimal results, which ultimately improves learning outcomes. This is clearly evident in IPAS

instruction, particularly in the module covering the water cycle. This topic explains the abstract process of the water cycle; therefore, students often have difficulty understanding the various stages of the cycle when it is presented without the aid of concrete instructional media. These findings also indicate that instructional materials can contribute to students' well-being, engagement, and enthusiasm throughout the learning process, and that the development of such materials enables the achievement of optimal outcomes, as reflected in improved academic performance (Suzana et al., 2021).

This situation is particularly evident in IPAS instruction, especially regarding the water cycle. Because this topic involves abstract processes, students often struggle to understand the stages of the water cycle when they are explained solely through words without the use of concrete learning aids. Indeed, according to (Rahmawati & Sati, 2021) the use of dioramas in learning aims to address difficulties associated with studying objects that are too large, objects that are physically out of reach, transparent structures, and demonstrating processes involving large objects. Science education requires a deep understanding of life; therefore, it is important for students to gain a deep understanding of science concepts. Science education is a field that not only focuses on the process of discovery but also encompasses concepts, principles, and facts, in accordance with (Wulandari et al., 2025).

To address students' low academic achievement in IPAS instruction, it is necessary to implement innovative teaching materials, particularly those that are concrete and engaging. Dioramas are one type of instructional resource that can be used in IPAS instruction, especially when discussing the water cycle. According to Sudjana, as cited in the journal (Munifah et al., 2020) a diorama is a three-dimensional medium that displays miniature scenes in 3D form, designed to depict real-life situations. Dioramas provide students with the opportunity to apply their knowledge through engaging projects; this medium makes the learning process more dynamic and helps prevent boredom (Farikhatin et al., 2024). Dioramas help students better understand the material thanks to their realistic three-dimensional visual representations. Using dioramas in the classroom can help students absorb the material more easily, which in turn improves their concentration, interest, and engagement, and boosts their academic performance. In addition, this diorama medium has several advantages. According to Sadiman cited in (Yanti & Huda, 2024) the advantage of three-dimensional media lies in the fact that, thanks to dioramas, students demonstrate greater creativity in exploring their environment. Students do not get bored during class because this medium brings a small piece of the world into the classroom in the form of three-dimensional miniatures. This medium offers practical experiences and concrete presentations while limiting the use of overly complex vocabulary. These findings are consistent with research conducted by Puspitasari (Farikhatin et al., 2024) which shows that the use of dioramas can improve student learning outcomes. A diorama is a collection of models and images arranged in an integrated manner to depict a real-life situation. The comprehensive picture presented accurately reflects real-world conditions. The use of dioramas provides students with the opportunity to observe the subject firsthand.

Various studies have shown that the use of dioramas can improve student learning outcomes. For example, a study conducted by (Purwanti et al., 2025) examined the impact of dioramas on science learning outcomes among fifth-grade elementary school students, showing that dioramas can be used to illustrate various abstract concepts to facilitate understanding and improve student learning outcomes. Furthermore, a study conducted by (Jannah et al., 2023) found a significant difference between the control group and the experimental group, indicating that the use of dioramas influenced the learning outcomes of fifth-grade students at State Elementary School No. 17 in Tanjung Batu. In addition, a study conducted by (Ainurrahmah

& Erwin, 2022) showed that the use of dioramas influences students' interest in learning; dioramas can create engaging learning experiences and strengthen students' interest in learning.

Although various studies have demonstrated the effectiveness of dioramas in improving learning outcomes, most of these studies still focus on the use of dioramas as conventional visual media and measure only students' cognitive aspects, while the impact of dioramas on students' affective and psychomotor aspects has not been analyzed in depth in this context. This study uses three-dimensional dioramas and QR codes as additional sources of information. In this study, QR codes are not used as the primary learning medium but rather as a supplementary medium for the dioramas. Dioramas remain the primary tool for observing the water cycle concretely, while the provided QR codes can be scanned by students using their smartphones to access explanations of the stages of the water cycle, thereby reinforcing the material being taught. Therefore, this study was conducted to address this research gap, which warrants further investigation.

Based on the context described above, previous research findings, and the identified gaps, this study proposes an innovative approach involving the use of three-dimensional dioramas. In addition, this study aims to evaluate the extent to which the use of dioramas can improve student learning outcomes by analyzing cognitive achievement and observing students' affective and psychomotor aspects during the learning process. Therefore, this study aims to analyze the effect of using dioramas on the learning outcomes of fourth-grade elementary school students in the IPAS subject, specifically regarding the water cycle, at Kasugengan Kidul Elementary School 1.

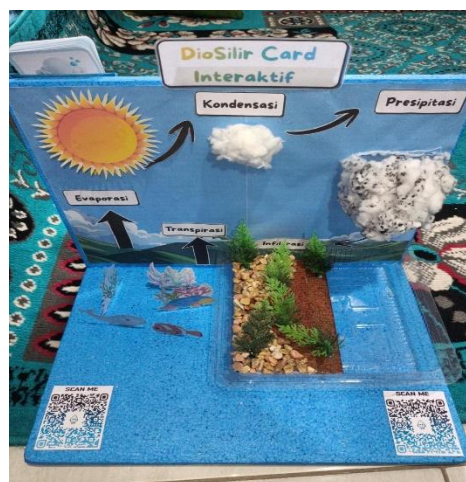


Figure 1. Media Diorama

Research Methods

This study employed a quantitative research method using an experimental design, specifically the pre-experimental design: one-group pretest-posttest design. This design involves only one group without a control group. The one-group pretest-posttest design was chosen because the study aimed to determine changes in students' learning outcomes before and after the use of dioramas as teaching media. This design was used because the study involved only one class as the research subject, making it impossible to form a control group.

In this design, the research group was given a pretest before the intervention—which involved the use of dioramas—and then a posttest. The research design is shown in Table 1.

Table 1. Research design

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
0 ₁	X	0 ₂

Keterangan:

0₁: *Pretest*

X: Treatment (The Use of Dioramas)

0₂: *Posttest*

This study was conducted in the fourth-grade class at Kasugengan Kidul Public Elementary School 1 in May of the second semester of the 2025–2026 school year. The study population served as a crucial source of information that helped yield significant results. According to Creswell cited in (Subhaktiyasa, 2024) a population can be defined as a group of people who share similar characteristics and serve as the basis for the data collection process. The population in this study consists of all students at Kasugengan Kidul Public Elementary School 1. According to Sugiyono in (Yudita et al., 2021) a sample is a part of a population that reflects the size and characteristics of that population thus, the sample in this study consists of 21 fourth-grade students at Kasugengan Kidul Public Elementary School 1, comprising 8 male students and 13 female students. The sampling technique *Nonprobability sampling*, which is a subjective sampling technique in which the sample is selected based on specific considerations.

The instruments used in this study were observation, documentation, and an essay-type test consisting of five questions. This test was administered twice before and after the intervention using dioramas as teaching aids. Before the instruments were used in the study, they were first tested for validity, reliability, difficulty, and discriminative power. Pretest The pretest was administered before instruction to assess students' initial abilities, while the posttest was administered after instruction using dioramas to assess students' learning outcomes following the use of dioramas. Observations were conducted during instruction. The observation sheets consisted of a student affective activity observation sheet, a student psychomotor observation sheet, a teaching module observation sheet, and a teacher performance observation sheet.

Before being used in the study, the research instruments first underwent expert validation conducted by PGSD faculty members and teachers with expertise in their respective fields. Furthermore, before the research instruments were used in the data collection process, they were first tested, which included validity testing, reliability testing, item difficulty testing, and item discrimination testing. The results of the validity test can be seen in Table 2.

Tabel 2. Validity Test

Question number	r_{hitung}	r_{tabel}	Information
1	0,754	0,373	Valid
2	0,717	0,373	Valid
3	0,661	0,373	Valid
4	0,774	0,373	Valid
5	0,722	0,373	Valid

Based on Table 2 above, the validity test results show that the calculated r values for each item—namely, 0.754, 0.717, 0.661, 0.774, and 0.722. Are greater than the critical r value of 0.373. Thus, all items are deemed valid. Consequently, the measurement instrument used meets

the validity requirements and is therefore suitable for use in this study to measure student learning outcomes. Now that the research instrument has been determined to meet the validity requirements, the next step is to analyze the research data.

Data analysis was then conducted using SPSS version 27. The analysis began with a normality test using the Shapiro-Wilk test to check whether the data followed a normal distribution. Next, an N-Gain test was conducted to determine the extent to which the diorama medium was effective in improving student learning outcomes. Hypothesis testing was performed using a paired t-test, with a significance level of 0.05. The test criteria used were as follows: if the significance value (2-tailed Sig.) was less than 0.05, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted, indicating that the diorama medium had a significant effect on the learning outcomes of fourth-grade students at SD Negeri 1 Kasugengan Kidul.

Result and Discussion

The results of the study indicate that the use of dioramas has a significant effect on the learning achievement of fourth-grade students at SD Negeri 1 Kasugengan Kidul. This effect is reflected in improvements in student learning outcomes, as measured by pretest and posttest scores, observation results, and data analysis—including normality tests, N-Gain tests, and hypothesis testing using a paired t-test. The results of the study on the effect of using dioramas on the academic achievement of fourth-grade students at SD Negeri 1 Kasugengan Kidul are clearly evident from the pretest and posttest data. The pretest and posttest results are presented in Table 3 below:

Table 3. Pretest and posttest results on student learning outcomes

Learning outcomes	N	Lowest Score	Highest Score	Average
<i>Pretest</i>	21	25	70	41,19
<i>Posttttest</i>	21	60	95	83,57

Based on Table 2 above, the learning outcome data prior to the use of dioramas showed an average score of 41.19, with a lowest score of 25 and a highest score of 70. This indicates that most students had not yet mastered the material and had not achieved the expected results. Meanwhile, students' learning outcomes after being taught using dioramas reached an average score of 83.57, with a lowest score of 60 and a highest score of 95. Thus, there was a difference in learning outcomes between the pre-test and post-test. The average score increased by 42.38 points, from an average of 41.19 to an average of 83.57. This improvement indicates that dioramas effectively help students understand the learning material by providing a more concrete learning experience, thereby allowing them to directly observe visual representations of the material being studied.

In accordance with the constructivist theory proposed by Vygotsky, which states that knowledge is actively constructed by students through learning experiences with their surroundings, the use of dioramas provides students with the opportunity to directly observe the water cycle, thereby making their understanding of this concept more meaningful, as discussed in the article (Herianto & Lestari, 2021) which explains that the implementation of constructivist-based learning encourages students to construct knowledge through active learning activities.

This is consistent with the theory of cognitive development proposed by *Jean Piaget*

(Imani et al., 2025) which states that children aged 7 to 11 are already capable of thinking logically; however, their thinking is still centered on real, concrete objects that can be observed directly. At this stage, students often have difficulty understanding abstract concepts if they are not supported by real-life experiences. Thus, the use of dioramas aligns with the cognitive development characteristics of fourth-grade elementary school students and demonstrates that student learning outcomes can be significantly improved through the use of dioramas during the learning process. This is supported by (Romdhon et al., 2024), who state that learning outcomes are the achievements students attain after participating in the learning process, characterized by an increase in understanding of the material, improved cognitive abilities, and active engagement in learning activities. The improvement in learning outcomes in this study indicates that learning processes involving student activities can help students better understand the material. This finding is consistent with (Řičan et al., 2022) who state that students' ability to monitor their own learning process (*metacognitive monitoring*) is one of the key factors contributing to learning outcomes.

In addition to using learning assessment tools, there are also observation tools—including observations of learning modules, teacher performance, affective aspects, and psychomotor skills—to assess student activities during the learning process using dioramas. The results of the observation sheets are presented in Table 4 below:

Table 4. Observation Results

Observation Aspect	Before	After	Criterion
Teaching Module	63%	85%	Very Good
Teacher Performance	71%	90%	Very Good
Affective	23%	81%	Good
Psychomotor	23%	85%	Very Good

Based on Table 3, the observation results show an improvement following the use of dioramas. Observations of the learning module indicate that scores increased from 63% to 85%, which is considered excellent. This improvement indicates that the use of dioramas supports more effective learning in line with the established learning objectives.

In addition, observations of teacher performance showed an increase from 72% to 90%, indicating that their performance was excellent. These results demonstrate that the use of dioramas has a positive impact on students, as it not only helps teachers manage the learning process but also enables them to present the material in a more engaging and relevant way. Furthermore, the use of this medium encourages teachers to adopt a more interactive pedagogical approach, which strengthens communication between teachers and students and allows teachers to explain the water cycle more concretely, thereby making the teaching-learning process more effective and helping students better understand the material being taught.

In addition, observations of students' learning activities during the learning process in the affective domain showed an increase from 23% to 81%. These results indicate that dioramas can increase students' interest, attention, enthusiasm, and participation throughout the learning process. During this process, students demonstrated a more active attitude by asking questions, providing answers, and showing a high level of curiosity about the topics being studied. This suggests that dioramas can make the learning process more enjoyable and engaging. There was also an improvement in psychomotor skills, with the percentage rising from 23% to 85%. This improvement indicates that the students not only gained cognitive understanding but also demonstrated their ability to observe and describe the objects in the diorama. This activity allowed the students to learn through hands-on experience, making the learning process more

active and meaningful. This is in accordance with Minister of Education and Culture Regulation No. 103 of 2014, as cited by (Rahayu & Azmy, 2025), which states that activity-based learning must be interactive, inspiring, and enjoyable, it must motivate students to participate actively and it must provide space for students' creativity and independence.

Overall, based on the results of the observations, it can be demonstrated that the use of instructional media can enhance all learning activities and processes, particularly teacher performance, the implementation of learning modules, and students' affective and psychomotor development. Dioramas not only serve as visual aids but also enhance student engagement in the learning process. As the intensity of students' learning activities increases, they have a greater opportunity to achieve better academic performance.

Before testing the hypothesis, a normality test was first conducted to determine whether the data were normally distributed. The research tests included a normality test, an N-Gain test, and a hypothesis test. The results of the normality test are shown in Table 4:

Table 4. Normality Test Results

	Test of Normality					
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.110	21	.200	.937	21	.188
Posttest	.169	21	.121	.940	21	.220

Based on Table 4, the normality test used the *Shapiro-Wilk* test as the basis for decision-making, since the sample consisted of only 21 students, fewer than 50. The Shapiro-Wilk test is considered more sensitive and more appropriate for determining whether data are normally distributed in small samples. The normality test indicates that the data are normally distributed, as the significance value (sig) is greater than 0.05. The significance value (sig) is 0.188 for the pre-test and 0.220 for the post-test. Since both values are greater than 0.05, the pre-test and post-test data are considered to be normally distributed.

After confirming that the data followed a normal distribution, an N-Gain test was conducted. The N-Gain test is used to measure the effectiveness of an intervention in improving conceptual understanding (Guntara, 2021). The results of the N-Gain test are shown in Table 5:

Table 5. N-Gain Test Results

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	21	.55	.88	.7314	.08767
Ngain_Persen	21	54.55	87.50	73.1415	8.76659
Valid N (listwise)	21				

Based on the N-Gain test results in Table 5, the average N-Gain score was 0.7314, with a minimum value of 0.55 and a maximum value of 0.88. This value falls into the high category because the N-Gain criteria range from $0.70 \leq g \leq 1.00$. This means that the use of dioramas is effective in improving students' learning outcomes. In addition, the average N-Gain percentage is 73.1415%, indicating that the effectiveness of using dioramas falls into the "effective" category. This improvement indicates that dioramas can help students better understand the water cycle through the depiction of concrete objects. Three-dimensional media allow students to connect abstract concepts with real-life situations, making the learning process more

meaningful. Therefore, dioramas can be used as an alternative teaching aid capable of improving the quality of science instruction in elementary schools.

Next, a t-test was conducted based on specific criteria to validate the research results. The criteria for hypothesis testing are as follows: if the significance level (Sig., two-tailed) is < 0.05 , then H_0 is rejected and H_1 is accepted. Conversely, if the significance level is > 0.05 , then H_0 is accepted and H_1 is rejected. The results of the hypothesis test using the t-test for paired samples are presented in Table 6:

Table 6. Results of the Paired-Sample t-Test

Paired Samples Test								
Paired Differences								
95% Confidence								
Interval of the								
Std. Deviation								
	Mean	n	Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Pretest - Posttest	-42.381	7.180	1.567	-45.649	-39.113	-27.051	20	.000

Based on the results of the t-test, the significance level (two-tailed) was found to be less than 0.001. In accordance with the criteria for hypothesis testing, since 0.001 is less than 0.05, the null hypothesis H_0 is rejected and the alternative hypothesis H_1 is accepted. With a degrees of freedom (df) of 20, the calculated t-value was greater than the table t-value, namely $27.051 > 2.086$. Based on Table 6, the mean difference was found to be -42.381, indicating an improvement in learning outcomes after the use of dioramas. Thus, this study shows that the use of dioramas has an effect on the learning outcomes of fourth-grade students at SD Negeri 1 Kasugengan Kidul. In addition to being statistically significant, the calculated effect size ($\eta^2 = 0.973$) falls into the large effect category, indicating that dioramas have a highly significant impact on improving student learning outcomes.

The results of this study are also consistent with research by (Fitriyani, 2024) which found that innovative diorama media can significantly improve learning outcomes in IPAS. This improvement was demonstrated by the results of the paired sample t-test and the N-gain test, which showed an increase in students' abilities after using dioramas. This indicates that the use of concrete media provides a more meaningful learning experience compared to instruction that relies solely on verbal explanations. The improvement in learning outcomes observed in this study was influenced by several factors identified during the learning process: specifically, the use of dioramas allowed for a three-dimensional presentation of the water cycle, making previously abstract concepts more concrete and facilitating students' understanding; furthermore, the use of dioramas encouraged students to actively engage in observing, discussing, and explaining the water cycle based on the materials used.

Further supporting research was conducted by (Yuniadi et al., 2025) which showed that the use of dioramas can effectively improve students' understanding of ecosystem-related concepts as well as their motivation to learn in the context of IPAS instruction. which showed that the use of dioramas was proven to be effective and successful and was able to improve science learning outcomes among fifth-grade elementary school students, indicating that the use of dioramas has a positive impact on student learning outcomes in the context of IPAS instruction in fifth-grade elementary school. Furthermore, a meta-analysis conducted by (Yu et al., 2022) shows that technology-supported learning can significantly improve students' academic achievement compared to traditional learning. The use of technology in learning can

enhance students' motivation, engagement, and understanding, which has a positive impact on their academic achievement. These findings are consistent with the results of this study, which show that the use of dioramas has a significant impact on student learning outcomes. Although dioramas are not digital media, they remain a creative learning tool that helps students gain more concrete and meaningful learning experiences.

The use of dioramas has a positive impact on teacher-student interaction. The learning process becomes more interactive, as teachers do not merely convey information but also help students use the dioramas to study and understand the material. This two-way interaction strengthens the bond between teachers and students and creates a more dynamic classroom atmosphere and an enjoyable learning experience. According to (Sati et al., 2021) one approach that can be taken is to recognize that teachers must take steps to reduce student boredom in the classroom, as their role is crucial and has a direct impact on learning outcomes and the quality of instruction. They can strive to create engaging learning experiences by utilizing various media, tools, and teaching methods.

This study shows that dioramas can be used as an alternative learning medium in science education to help students understand abstract concepts through more concrete, interactive, and meaningful learning. In addition, the integration of QR codes into dioramas encourages the use of learning resources during the learning process. This study is limited to the use of a *single-group pretest-posttest* design, a sample drawn from only one school, and the use of QR codes solely as a supplementary tool—not as the primary resource—with a focus on the water cycle. Therefore, it is recommended that future research involve a broader sample and test the effectiveness of dioramas across various subjects and different educational levels.

Conclusion

This study shows that the use of dioramas has a significant impact on improving the academic achievement of fourth-grade students at Kasugengan Kidul No. 1 Public Elementary School. This improvement is clearly demonstrated by higher scores on post-instruction tests, “high” N-gain test results, and the results of a paired t-test, which indicate a significant effect. In addition to helping improve students' cognitive understanding, dioramas also support the development of their affective and psychomotor skills by encouraging their active participation during the learning process. Thus, dioramas can serve as effective and creative teaching aids to help students understand various complex concepts in the IPAS curriculum in elementary school.

This study has limitations because it used a one-group pretest-posttest design without a control group; therefore, the effectiveness of the diorama teaching aid cannot yet be directly compared with that of conventional instruction. In addition, the study involved only one school with a relatively small sample size and was limited to the water cycle curriculum. Therefore, it is recommended that future studies use a quasi-experimental design that includes an experimental group and a control group, in order to compare the impact of using dioramas more objectively. These future studies could also involve a larger sample size, various educational levels, and other IPAS media, in order to enhance the generalizability of the results obtained.

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