

The Effect of Augmented Reality-Assisted Semantic Mapping Strategies on Fourth-Grade Students' Reading Skills in Fables

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Article Info

History Articles

Received:

24 May 2026

Accepted:

17 June 2026

Published:

20 June 2026

Abstract

The ability to read fables is one of the competencies that elementary school students need to master. However, many students still struggle to identify and understand the intrinsic elements contained in fables. This study aims to analyze the effect of the Augmented Reality (AR)-assisted Semantic Mapping strategy on the fable-reading skills of fourth-grade students at SDN 1 Ciwaringin. The study employed a quantitative approach using a quasi-experimental method and a nonequivalent control group design. The sample consisted of 67 students selected through purposive sampling. Data were collected using a fable text reading skills test consisting of 10 multiple-choice questions that measured the ability to identify the intrinsic elements of fable texts, including characters and characterization, setting, theme, plot, point of view, and moral. The data were analyzed using the Wilcoxon test, the Mann-Whitney U test, and the N-Gain measure. The results showed a significant difference between the experimental and control groups, with a significance value of 0.00 (< 0.05). The experimental group achieved an average N-Gain score of 0.77 (77.41%), classified as high, while the control group achieved 0.29 (29%), classified as low. These findings indicate that the Augmented Reality (AR)-assisted Semantic Mapping strategy is effective in improving elementary school students' fable reading skills. The implications of this study suggest that the integration of the Semantic Mapping strategy and Augmented Reality (AR) technology can serve as an alternative reading instruction method that helps students understand the intrinsic elements of fables in a more structured and interactive manner.

Keywords:

Augmented Reality, Fable Text, Reading Skills, Semantic Mapping

How to cite:

Sintiani, D. P., Gusrayani, D., & Iswara, P. D. (2026). The effect of augmented reality-assisted semantic mapping strategies on fourth-grade students' reading skills in fables. *Didaktika*, 6(2), 183-195.

Info Artikel

Riwayat Artikel

Dikirim:
24 Mei 2026
Diterima:
17 Juni 2026
Diterbitkan:
20 Juni 2026

Abstrak

Kemampuan membaca dongeng merupakan salah satu kompetensi yang harus dikuasai oleh siswa sekolah dasar. Namun, banyak siswa yang masih mengalami kesulitan dalam mengidentifikasi dan memahami unsur-unsur intrinsik yang terkandung dalam dongeng. Penelitian ini bertujuan untuk menganalisis pengaruh strategi Pemetaan Semantik yang dibantu oleh Augmented Reality (AR) terhadap keterampilan membaca dongeng siswa kelas IV di SDN 1 Ciwaringin. Penelitian ini menggunakan pendekatan kuantitatif dengan metode kuasi-eksperimental dan desain kelompok kontrol tidak setara. Sampel terdiri dari 67 siswa yang dipilih melalui pengambilan sampel purposif. Data dikumpulkan menggunakan tes keterampilan membaca teks dongeng yang terdiri dari 10 soal pilihan ganda yang mengukur kemampuan mengidentifikasi unsur-unsur intrinsik teks dongeng, termasuk tokoh dan karakterisasi, latar, tema, alur cerita, sudut pandang, dan pesan moral. Data dianalisis menggunakan uji Wilcoxon, uji Mann-Whitney U, dan ukuran N-Gain. Hasil menunjukkan adanya perbedaan yang signifikan antara kelompok eksperimen dan kelompok kontrol, dengan nilai signifikansi 0,00 ($< 0,05$). Kelompok eksperimen mencapai skor N-Gain rata-rata sebesar 0,77 (77,41%), yang diklasifikasikan sebagai tinggi, sedangkan kelompok kontrol mencapai 0,29 (29%), yang diklasifikasikan sebagai rendah. Temuan ini menunjukkan bahwa strategi Pemetaan Semantik yang dibantu oleh Augmented Reality (AR) efektif dalam meningkatkan keterampilan membaca dongeng siswa sekolah dasar. Implikasi dari penelitian ini menunjukkan bahwa integrasi strategi Pemetaan Semantik dan teknologi Realitas Tertambah (AR) dapat menjadi metode pengajaran membaca alternatif yang membantu siswa memahami unsur-unsur intrinsik dongeng dengan cara yang lebih terstruktur dan interaktif.

Kata Kunci:

Augmented Reality, Teks Fabel, Keterampilan Membaca, Pemetaan Semantik

Cara mengutip:

Sintiani, D. P., Gusrayani, D., & Iswara, P. D. (2026). The effect of augmented reality-assisted semantic mapping strategies on fourth-grade students' reading skills in fables. *Didaktika*, 6(2), 183-195.

INTRODUCTION

In the context of elementary education, Indonesian language learning plays a crucial role in developing students' literacy skills. Reading skills serve as a vital foundation for students' cognitive and affective development (Putri & Maknun, 2024). Reading involves more than simply recognizing letters and words; it also encompasses understanding the content of what is read, interpreting meaning, and the ability to connect the information gained with prior experiences and knowledge (Butterfuss et al., 2020).

Nevertheless, the reading proficiency of elementary school students in Indonesia remains a problem that requires attention. Data from the World's Most Literate Nations report indicates that Indonesia ranks 60th out of 61 countries in reading literacy (Khusna et al., 2022). Furthermore, results from the Indonesia National Assessment Program (INAP) indicate that 46.83% of students fall into the "below average" category for reading literacy, while only 6.06% achieve the "good" category (Tahmidaten & Krismanto, 2020). This situation indicates that the majority of students still struggle to comprehend the content of what they read, identify key information, and interpret the meaning conveyed in the text (Puspitaningrum et al., 2025).

This issue is also observed in the teaching of fables in elementary schools. A fable is a fictional story featuring animals as main characters who behave like humans and conveys a moral message that can serve as a model for daily life (Kartiwi & Rostikawati, 2022). In understanding fables, students are expected to identify various intrinsic elements, such as characters and characterization, setting, theme, plot, point of view, and moral message (Lisnawati, 2023). However, in classroom practice, some students still struggle to understand the relationships among these elements, resulting in an incomplete grasp of the text's content. This situation is influenced by the use of learning strategies that do not fully help students systematically connect key concepts in the reading material. The strategies used by educators are one of the main factors that determine the success of learning (Setiani et al., 2026).

One strategy that has the potential to improve reading skills is Semantic Mapping. This strategy helps students organize and connect various concepts in a text through a visual representation in the form of a concept map, so that the relationships between ideas can be understood more clearly and in a structured manner (Hapsari et al., 2020). Through the Semantic Mapping strategy, students create a concept map by placing the main word in the center, then developing semantic connections in the form of branches leading to various related word associations (Damanik et al., 2025). By mapping the relationships between elements in the text, students can connect their prior knowledge with new information obtained from the reading, thereby deepening their understanding of the text's content.

The effectiveness of Semantic Mapping in improving reading skills has been proven through various studies. Zamrizal (2022) found that the Semantic Mapping strategy is effective in improving students' comprehension of various types of reading materials. Similar findings were also reported by Mouchrif et al. (2023) who demonstrated that the use of Semantic Mapping can enhance reading comprehension by organizing concepts and relationships between pieces of information in a more systematic manner. These findings indicate that the Semantic Mapping strategy consistently improves reading comprehension by helping students connect prior knowledge and new information in a more structured manner. However, these studies still focus on the use of Semantic Mapping as a learning strategy without the support of learning media that can concretely visualize the content of the text.

When studying fables, students are expected to understand the characters and characterization, setting, theme, plot, point of view, and moral of the story. Therefore, teaching

materials are needed to help students visualize the text's content in a more vivid and interactive way. One technology with the potential to meet this need is Augmented Reality (AR), as it can combine virtual objects with the real environment, thereby providing a more engaging, interactive, and contextual learning experience (Pujianti, 2025). The integration of Semantic Mapping and Augmented Reality (AR) is expected not only to help students organize information within the text but also to make it easier for them to understand the content and intrinsic elements of fables through more concrete visualizations.

Advances in educational technology have brought about various innovations that can support learning, one of which is Augmented Reality (AR) (Afandi & Mahmudah, 2025). Augmented Reality (AR) is a technology that combines real and virtual objects in a real-world environment interactively and in real time, allowing users to interact with both through appropriate display technology and input devices (Sari et al., 2022). The use of Augmented Reality (AR) can enhance learning motivation and student engagement, as well as help students understand abstract concepts through more concrete visualizations (Nursyafitri et al., 2024). However, the application of Augmented Reality (AR) in reading instruction particularly with fable texts in elementary schools remains relatively limited.

Based on a review of previous research, there is a research gap that requires further investigation. Most studies have focused solely on the effectiveness of Semantic Mapping on reading skills or the use of Augmented Reality (AR) as a learning medium in isolation. No study has specifically examined the integration of Semantic Mapping and Augmented Reality (AR) strategies to improve elementary school students' reading skills in fables. The combination of the two has the potential to create more meaningful learning by integrating visual concept organization with interactive learning experiences. Based on the above description, this study aims to analyze the effect of the Augmented Reality (AR)-assisted Semantic Mapping strategy on the fable reading skills of fourth-grade students at SDN 1 Ciwaringin. This study is expected to contribute to the development of innovative reading learning strategies that are tailored to students' needs in the digital age.

METHODS

This study employed a quantitative approach using a quasi-experimental design of the nonequivalent control group type. The study involved two groups: the experimental group, which received instruction using the Semantic Mapping strategy aided by Augmented Reality (AR), and the control group, which received conventional instruction. The study population consisted of all fourth-grade students at SDN 1 Ciwaringin for the 2025/2026 school year. The sample was selected using purposive sampling, with Class IV C serving as the experimental group and Class IV A as the control group. Class IV A had 34 students, and Class IV C had 33 students, for a total of 67 students.

SDN 1 Ciwaringin was selected as the research site because initial observations revealed that fourth-grade students still struggled to understand the intrinsic elements of fables. Furthermore, reading instruction was still dominated by conventional methods, causing students to tend to be passive and less engaged in the process of comprehending the text. These conditions highlighted the need to implement more interactive and meaningful learning strategies to improve students' fable-reading skills. Fourth-grade Class A was designated as the control group and Fourth-grade Class C as the experimental group through purposive sampling, taking into account similarities in grade level, curriculum, and relatively equivalent student characteristics, based on the school's recommendations. To ensure equivalence in the initial abilities of both groups, the

pretest results were analyzed using the Mann-Whitney U test before the intervention was administered.

The instrument used a reading skills test on fables consisted of a pretest and a posttest, each comprising 10 multiple-choice questions. The pretest and posttest questions were designed based on the same indicators, namely the ability to identify and analyze intrinsic elements such as characters and characterization, plot, setting, theme, point of view, moral message, and the application of moral values contained in the fable text. Before use, the instrument underwent validity and reliability testing with 30 students. The validity test results showed that all test items had a calculated r value greater than the table r value (0.361), thus confirming their validity. Additionally, the reliability test yielded a Cronbach's Alpha value of 0.804, which falls into the "strong" category. These results indicate that all test items are valid and reliable for measuring students' fable text reading skills.

The study was conducted over two sessions for each group. In the first session, students took a pretest to assess their initial fable text reading skills, followed by instruction according to their respective groups. The experimental group participated in lessons using the Semantic Mapping strategy aided by Augmented Reality (AR), while the control group participated in conventional lessons. During the second session, instruction was again conducted according to the predetermined treatment, followed by a posttest to measure students' fable text reading skills after the treatment was administered.

The data obtained were analyzed using SPSS. The analysis began with descriptive statistics to determine an overview of the students' abilities. Next, a Mann-Whitney U test was conducted on the pretest data, followed by a normality test as a prerequisite. Based on the results of the prerequisite tests, hypothesis testing was performed using the Wilcoxon Signed-Rank Test to determine differences in ability before and after the intervention in each group, as well as the Mann-Whitney U Test to determine differences in results between the experimental and control groups. The effectiveness of implementing the Augmented Reality (AR)-assisted Semantic Mapping strategy was analyzed using the N-Gain calculation to determine the level of improvement in students' fable text reading skills.

RESULTS AND DISCUSSION

This study was conducted with fourth-grade students at SDN 1 Ciwaringin, consisting of Class 4A as the control group and Class 4C as the experimental group. Instruction for both groups was conducted over two sessions each. The control group participated in instruction on April 27, 2026, and April 28, 2026, while the experimental group participated on May 25, 2026, and May 26, 2026. During the first session, both groups took a pretest to assess their initial reading skills regarding fables before the intervention began. After the pretest was completed, instruction was conducted according to the treatment assigned to each group. During the second session, instruction was again conducted according to the assigned treatment and concluded with a posttest to assess the students' fable text reading skills after participating in the instruction.

The control group received conventional instruction, while the experimental group received instruction using the Augmented Reality (AR)-assisted Semantic Mapping strategy via an Augmented Reality (AR) flipbook. The medium used for the experimental group is shown in Figure 1 below.



Figure 1. Augmented Reality (AR) Flipbook

In the experimental group, students used the Augmented Reality (AR) Flipbook, which contained the text of the fable and barcodes at each key scene linked to virtual Augmented Reality (AR) objects. The application of the Semantic Mapping strategy in this study focused on the stages of categorization and updating the semantic map. Students read the fable texts available in the Augmented Reality (AR) flipbook displayed on a Smart TV, then identified the intrinsic elements of the story, such as characters and characterization, setting, theme, plot, point of view, and moral. The information obtained was then entered into the provided Semantic Mapping worksheet. After observing the visualization of each scene through Augmented Reality (AR), students complete, correct, or adjust the information on the semantic map based on their understanding. Finally, students discuss the results of the mapping they have created and draw conclusions about the content of the fable they have read. In this way, students not only organize information in the form of a semantic map but also utilize Augmented Reality (AR) visualizations to strengthen their understanding of the content and intrinsic elements of the fable. Below is one of the scenes displayed in Augmented Reality (AR).

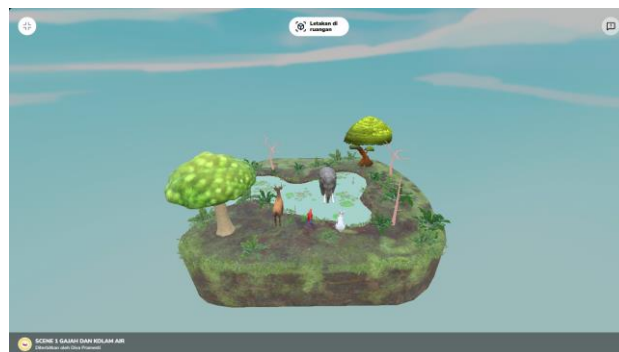


Figure 2. Example of a Scene in Augmented Reality (AR)

After the treatment was administered to the experimental group, the researcher proceeded with data analysis. The results of the descriptive statistical analysis showed an increase in fable reading skill scores in both groups. In the control group, the mean pretest score of 5.65 increased to 6.76 on the posttest. Meanwhile, in the experimental group, the mean pretest score of 6.39 increased to 9.09 on the posttest. In addition to showing a higher average increase, the experimental group also exhibited a smaller score dispersion on the posttest ($SD = 0.765$) compared to the control group ($SD = 2.090$). These results indicate that the students' fable reading

skills in the experimental group improved after receiving instruction using the Semantic Mapping strategy aided by Augmented Reality (AR). The descriptive statistics for the pretest and posttest results are presented in Table 1 below.

Table 1. Descriptive Statistics of Pretest and Posttest Results

Description	N	Min	Max	Mean	Std. Deviation
Control Class Pretest	34	0	8	5.65	2.073
Control Class Posttest	34	1	9	6.76	2.090
Experimental Class Pretest	33	1	8	6.39	1.478
Experimental Class Prosttest	33	8	10	9.09	.765
Valid N (listwise)	33				

After conducting descriptive statistical tests, a preliminary inferential analysis was performed to determine the equivalence of initial ability between the control group and the experimental group. The Mann-Whitney U test was used on the pretest data to determine whether there were differences in initial ability before the treatment was administered. Based on the results of the Mann-Whitney U test on the pretest data, an Asymp. Sig. (2-tailed) value of 0.112 (> 0.05) was obtained, so it can be concluded that there was no significant difference in initial ability between the control group and the experimental group. This indicates that both groups had relatively equivalent initial abilities before the research treatment was administered. The results of the pretest Mann-Whitney U test are shown in Table 2 below.

Table 2. Results of the Mann-Whitney U Pretest

	Value
Mann-Whitney U	438.500
Wilcoxon W	1.0343
Z	-1.588
Asymp. Sig. (2-tailed)	0.112

After conducting a test of equivalence of initial ability using the Mann-Whitney U test on the pretest data, the research data were then tested for normality using the Shapiro-Wilk test. The results of the normality test showed that all pretest and posttest data in both the control and experimental groups had a significance value of 0.000 (< 0.05). Thus, the research data were not normally distributed. The results of the normality test are presented in Table 3 below.

Table 3. Results of the Normality Test

Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest A (Control)	.244	34	.000	.834	34	.000
Posttest A (Control)	.251	34	.000	.816	34	.000
Pretest C (Experimental)	.243	33	.000	.805	33	.000
Posttest C (Experimental)	.216	33	.000	.808	33	.000

The research data shown in Table 3 indicate that the data are not normally distributed; therefore, hypothesis testing was conducted using nonparametric statistical tests. The Wilcoxon Signed-Rank Test was used to determine differences in fable reading skills before and after the intervention in each group, while the Mann-Whitney U Test was used to determine differences between the control and experimental groups in the posttest data.

The results of the Wilcoxon test for the control group showed a Z-value of -5.565 with an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05). These results indicate that there is a significant difference between the pretest and posttest scores in the control group. In other words, conventional instruction also improved the students' fable text reading skills. The results of the Wilcoxon test are shown in Table 4 below.

Table 4. Wilcoxon Test Statistics for the Control Group

	Posttest_Control – Pretest Control
Z	-5.565 ^a
Asymp. Sig. (2-tailed)	.000

In the experimental group, the Wilcoxon test results showed a Z-value of -5.208 with an Asymp. Sig. (2-tailed) of 0.000 (< 0.05). These results indicate a significant difference between the pretest and posttest scores after the students participated in learning using the Augmented Reality (AR)-assisted Semantic Mapping strategy. The improvement observed in the experimental group was greater than that in the control group, as indicated by a higher difference between the pretest and posttest means. The results of the Wilcoxon test for the experimental group are shown in Table 5 below.

Table 5. Wilcoxon Test Statistic for the Experimental Class

	Posttest_Experimental - Pretest_Experimental
Z	-5.208 ^a
Asymp. Sig. (2-tailed)	.000

Next, to determine the difference in fable reading skills between the experimental group and the control group after the intervention was administered, a Mann-Whitney U test was conducted. The results of the analysis showed a Mann-Whitney U value of 115.000 with an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05). These results indicate that there is a significant

difference between the experimental group and the control group. The results of the Mann Whitney U test for the experimental group are shown in Table 6 below.

Table 6. Mann-Whitney U Test Statistics for the Experimental Group

	Value
Mann-Whitney U	115.000
Wilcoxon W	710.000
Z	-5.737
Asymp. Sig. (2-tailed)	.000

In addition to hypothesis testing, the effectiveness of using the Augmented Reality (AR) assisted Semantic Mapping strategy was analyzed using the N-Gain calculation. The results of the analysis showed that the experimental group achieved an average N-Gain value of 0.77, or 77.41%, which falls into the high category. Meanwhile, the control group achieved an average N Gain score of 0.29, or 29%, which falls into the low category. These findings indicate that the improvement in fable text reading skills was greater in the experimental group than in the control group. Thus, the Augmented Reality (AR)-assisted Semantic Mapping strategy is considered effective in improving students' fable text reading skills. The N-Gain results are shown in Table 7 below.

Table 7. N-Gain Result

Group	Average N-gain	Percentage	Category
Control	0.77	77%	High
Experimental	0.29	29%	Low

Discussion

The results of the study indicate that the Augmented Reality (AR)-assisted Semantic Mapping strategy is more effective in improving students' reading skills in fables than conventional learning. This improvement occurs because the Semantic Mapping strategy helps students systematically organize important information in the text through concept mapping. During the learning activity, students identified and connected the intrinsic elements of fables—such as characters and characterization, setting, theme, plot, point of view, and moral—into the provided semantic map. This process enables students to understand the relationships between concepts more clearly, making the information obtained from the text easier to understand and remember. Through this mapping activity, students not only read the text linearly but also connect new information with their prior knowledge, thereby deepening their understanding of the text's content (Karim et al., 2025).

These findings are consistent with Ausubel's theory of meaningful learning, which emphasizes that knowledge is actively constructed by learners through the process of connecting new information with prior knowledge (Nugraha & Husni, 2025). In this study, students not only read the text but also identified, categorized, and linked the intrinsic elements of the fable text into the provided Semantic Map. Thus, the Semantic Mapping strategy not only serves as a visual

aid but also helps students connect various interrelated concepts, thereby enhancing memory, creativity, and critical thinking skills (Pratiwi & Abas, 2025). This improvement in reading skills is further reinforced by the use of Augmented Reality (AR), which provides a more concrete visualization of characters, settings, and events. Therefore, the improvement in reading skills is influenced not only by concept mapping activities but also by visual support that strengthens students' understanding of the text's content. Engaging visualizations can also increase students' attention and focus during the learning process, thereby making them more involved in reading and understanding the content of the fable (Pijay & Mastoah, 2025).

These findings support the research by Zamrizal (2022) and Mouchrif et al. (2023) which states that semantic mapping can help students connect prior knowledge with new information, thereby improving reading comprehension. Furthermore, the results of this study align with the findings of Nursyafitri et al. (2024) which show that Augmented Reality (AR) can boost learning motivation and help students understand material through more realistic visualizations. However, unlike those studies, which examined Semantic Mapping and Augmented Reality (AR) separately, this study integrates both into the teaching of fables in elementary school.

Therefore, the novelty of this study lies in the integration of the Semantic Mapping strategy with Augmented Reality (AR) technology in the teaching of fables in elementary school. This integration is based on the theory of meaningful learning, which emphasizes that students build understanding through the process of connecting new information with prior knowledge (Nugraha & Husni, 2025). Through Semantic Mapping, students can organize and connect key elements within the text, while Augmented Reality (AR) provides a more concrete visualization of the reading material. The combination of these two approaches is expected to enhance the effectiveness of reading instruction compared to using either strategy or medium separately. The use of Augmented Reality (AR) also provides a more interactive learning experience than conventional instruction (Hermawan & Hadi, 2024).

The implications of this study suggest that the integration of Semantic Mapping and Augmented Reality (AR) can serve as a more interactive, contextual, and appropriate alternative for teaching reading, tailored to the characteristics of elementary school students. However, this study has a limitation regarding the timing of the intervention, as it was not conducted simultaneously between the control group and the experimental group. This time difference occurred because the Augmented Reality (AR) medium used in the experimental group still required a development and revision process before it was deemed suitable for use. This situation has the potential to introduce external factors that the researcher could not fully control. Nevertheless, the researcher endeavored to minimize these effects by using the same materials, instruments, learning procedures, and treatment duration for both groups.

Based on these results and the discussion, it can be concluded that the integration of the Semantic Mapping strategy and Augmented Reality (AR) has an impact on improving fable text reading skills. Thus, the research hypothesis is accepted: there is a significant effect of using the Semantic Mapping strategy aided by Augmented Reality (AR) on the fable text reading skills of fourth-grade students at SDN 1 Ciwaringin.

CONCLUSION

Based on the research findings, it can be concluded that students who participated in learning using the Augmented Reality (AR)-assisted Semantic Mapping strategy showed a greater improvement in their fable reading skills compared to students who participated in conventional learning among fourth-grade students at SDN 1 Ciwaringin. The Semantic Mapping strategy helps

students identify, organize, and connect the intrinsic elements of fables in a more structured manner, while Augmented Reality (AR) visualization supports a more concrete and interactive understanding. Therefore, teachers can utilize this strategy as an alternative for reading instruction in elementary school. Future research is recommended to conduct the intervention over a shorter timeframe, involve a larger sample size, and test the application of the Augmented Reality (AR) assisted Semantic Mapping strategy across a wider variety of text types, educational levels, and learning durations so that its effectiveness can be assessed more comprehensively.

ACKNOWLEDGMENTS

The author would like to express gratitude to the Principal of SDN 1 Ciwaringin for granting permission to conduct this study, to the fourth-grade teachers of classes A and C for their assistance and cooperation throughout the research process, and to all students who participated in this study.

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