

LEVERAGING AI-BASED VISUAL LEARNING MEDIA TO ENHANCE ELEMENTARY STUDENTS’ READABILITY AND LEARNING MOTIVATION

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ABSTRACT

This study aims to explore the effectiveness of using Artificial Intelligence (AI) in the creation of child-friendly infographics through a case study at SDIT Nurul Amal. The background of this research is based on the need for visual learning media that are engaging, easy to understand, and appropriate for the cognitive development stage of elementary school students. The research method employed a qualitative approach with a simple experimental design, involving 30 fourth-grade students randomly divided into an experimental group using AI-generated infographics via Canva and a control group using manually designed infographics. The research instruments included comprehension tests, observations, student reflection sheets, and semi-structured interviews. The findings revealed that the experimental group achieved higher comprehension and retention scores compared to the control group. Observations and interviews further demonstrated that students were more enthusiastic, found it easier to grasp the content, and felt more motivated when engaging with AI-based infographics. In contrast, manual infographics presented readability challenges and often led to boredom. These results align with multimedia learning theory, which emphasizes the importance of combining text and visuals, and strengthen the notion that AI can serve as a creative collaborator in educational design. This study recommends the use of Canva AI in developing visual learning media in elementary schools to enhance readability, motivation, and student retention.

Keywords: Canva AI, Child-friendly Infographics, Elementary School, Readability, Visual Learning

1. INTRODUCTION

The presentation of visual information in the form of infographics has become one of the key strategies in education, particularly at the elementary school level. Infographics make it possible to convey complex messages in a simpler, more engaging, and more understandable way for children. In elementary school environments, important information such as school regulations, class schedules, safety procedures, and health literacy needs to be packaged in a format that aligns with students’ cognitive development. This aligns with Mayer’s multimedia learning theory (2009), which emphasizes that the integration of text and visuals can enhance learners’ comprehension and information retention. However, conventional infographics designed manually often face limitations in terms of readability, language appropriateness, and visual appeal for young learners.

The advancement of Artificial Intelligence (AI) technologies offers new opportunities in designing educational media and visual communication. AI is increasingly being used in generative design, visual element selection, and content personalization. According to Holmes et al. (2019), the application of AI in education can improve the effectiveness of content delivery while supporting more adaptive learning experiences. In graphic design contexts, AI can quickly generate multiple visual alternatives, adjust colours, icons, and layouts based on audience needs. This is particularly relevant for elementary school students, who cognitively require visual materials that are simple, colourful, and easy to remember (Yamamoto & Nakano, 2020).

The use of AI in designing child-friendly infographics also aligns with the concept of child-centered design. Read and Markopoulos (2017) argue that child-friendly design must consider aspects of developmental psychology, visual preferences, and literacy abilities. Properly designed infographics can help children understand abstract information through concrete visual representation. Research by Zhang and Li (2021) found that using simple visual icons and bright colours in educational media can improve students’ focus and learning motivation. Thus, AI has the potential to optimize the design process while adhering to these principles.

Several recent studies have also highlighted the benefits of AI in elementary education. For instance, Luckin et al. (2016) reported that AI can support teachers in providing learning materials tailored to student characteristics. Similarly, Sun et al. (2021) showed that AI-based visualization helps students understand abstract concepts more effectively than manual visualization. In visual communication contexts, Kim et al. (2020) demonstrated that AI-powered automated design systems are capable of producing posters and infographics that are aesthetically consistent and more efficient in terms of production time.

In Indonesia, visual literacy among elementary school students continues to face challenges. Many schools use visual media that are less appealing and not child-friendly. Nugroho and Suryanto (2018) found that monotonous visual

presentations often fail to capture students' attention. In fact, elementary students are more likely to understand information through visual representation than through long texts (Prastowo, 2020). Therefore, innovation in infographic design for schools is urgently needed to make them more engaging, informative, and developmentally appropriate.

Sekolah Dasar Islam Terpadu (Integrated Islamic Elementary School/SDIT) Nurul Amal, led by Principal Munawaroh, S.Ag., M.M., is one of the institutions that requires effective visual communication media. As an integrated Islamic school, SDIT Nurul Amal not only delivers academic material but also emphasizes character education, discipline, and religious values. Therefore, presenting important information in child-friendly infographic form is crucial, both to support students' understanding of school rules and to foster their visual literacy. Like many other schools, however, the challenge lies in creating infographic designs that are consistent, appealing, and age-appropriate without requiring excessive time and effort from teachers.

AI provides a potential solution to this challenge. The technology can help generate child-friendly infographic designs by selecting psychologically suitable colors, using familiar illustrations, and simplifying language through Natural Language Processing (NLP). A recent study by Zhao et al. (2022) found that generative AI was able to produce educational illustrations that better matched children's visual preferences compared to manual designs. Additionally, Kumar et al. (2019) revealed that the integration of AI into educational design can increase interactivity and content personalization, making it more relevant to students' needs.

Nevertheless, the application of AI in producing child-friendly infographics still requires human involvement. Teachers and graphic designers play a crucial role in guiding content, ensuring cultural relevance, and assessing message appropriateness. As Cope and Kalantzis (2019) suggest, AI should be positioned as a creative collaborator rather than a replacement for human input, ensuring that the final design remains meaningful and contextually appropriate. With this collaborative approach, SDIT Nurul Amal can present more effective visual media for conveying important information to students.

Based on this rationale, the present study focuses on optimizing the use of AI in creating child-friendly visual infographics in elementary schools, with a case study at SDIT Nurul Amal. The objectives are to explore AI's potential in designing child-appropriate visuals, evaluate its effectiveness compared to manual designs, and identify critical factors to ensure that the resulting infographics are truly child-friendly. This research is expected to contribute to the development of visual literacy at SDIT Nurul Amal and encourage more creative uses of AI technology in elementary education.

2. METHOD

This study employed a qualitative approach with a simple experimental design. This approach was chosen not only to focus on quantitative results in the form of test scores but also to gain a deeper understanding of students' experiences when interacting with AI-based Canva infographics compared to manually designed infographics. Thus, the experiment served as a trigger for the learning experience, while the qualitative analysis explored how students interpreted, responded to, and assigned meaning to the media used. The research subjects were 30 fourth-grade students from SDIT Nurul Amal, selected purposively. This number was considered adequate for conducting the experiment while allowing the collection of rich qualitative data. Inclusion criteria included parental consent, student attendance during the research activities, and sufficient basic reading skills to follow instructions.

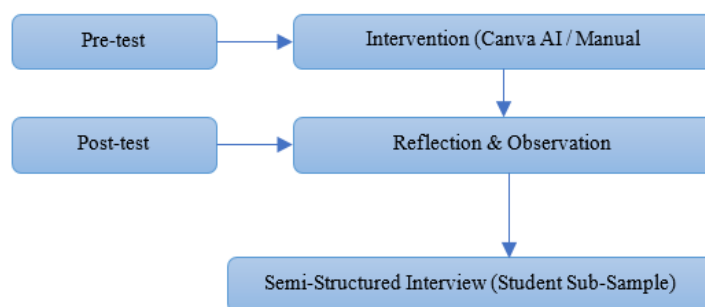


Figure 1. Experimental Qualitative Research Flow

Research Procedure

The procedure was conducted in three main stages:

- a. Pretest – Students completed simple questions related to school rules and daily routines (such as discipline, cleanliness, and cafeteria etiquette) to map their prior knowledge.
- b. Intervention – Students were randomly divided into two groups. The experimental group used infographics developed with Canva AI, while the control group used conventional infographics manually designed by teachers. The exposure lasted around 20–25 minutes with uniform teacher instructions. Afterward, students completed a short post-test to measure their comprehension of the material.
- c. Reflection and Interview – Students were asked to complete a short reflection sheet, and a purposively selected group of 10 students participated in semi-structured interviews to explore their subjective experiences.

Research Instruments

Several instruments were used to collect both cognitive and experiential data:

- a. Comprehension Test: Ten multiple-choice questions were developed based on infographic content, used for both the pre-test and post-test. The items were validated by teachers and literacy experts to ensure developmental appropriateness.
- b. Observation Guide: Focused on students' expressions, behaviours, and interactions while engaging with the infographics. Aspects observed included facial expressions, time spent reading, and spontaneous responses such as comments or questions.
- c. Student Reflection Sheets: Contained three simple open-ended questions: (1) the part they found easiest to understand, (2) the part they found confusing, and (3) the aspect they found most interesting.
- d. Semi-Structured Interview Guide: Conducted with 10 purposively selected students. Questions explored their experiences with the infographics, perceptions of readability, visual appeal, and comparisons between Canva AI and manual infographics.

Data Analysis

Quantitative data from the tests were analysed descriptively to compare pre-test and post-test comprehension scores. Qualitative data from observations, reflections, and interviews were analysed thematically by coding, grouping codes into categories, and identifying key themes. Data validity was ensured through source triangulation (tests, observations, interviews), discussions with classroom teachers, and member-checking with selected students.

Ethical Considerations

Ethical aspects were upheld by obtaining parental consent, ensuring student data confidentiality, and guaranteeing that the activities were safe and non-burdensome. After the study concluded, all students were given access to the Canva AI infographics to ensure fairness of treatment.

3. RESULTS AND DISCUSSION

This study was conducted with 30 fourth-grade students of SDIT Nurul Amal, who were randomly divided into two groups of 15 students each. The experimental group used infographics developed with Canva AI, while the control group used manually designed infographics created conventionally by the teacher. The aim of this research was to identify differences in the effectiveness of the two types of infographics in improving comprehension, readability, retention, and student engagement in the learning process.

Comprehension Test Results

Comprehension tests were given before and after the intervention. In the pre-test, the average scores of both groups were relatively similar: the experimental group scored 5.2 and the control group scored 5.0 out of a maximum score of 10. This shows that the students' initial abilities were at a comparable level. After the intervention, the post-test results showed an increase in comprehension scores in both groups, but the experimental group demonstrated a more significant improvement. The average score of the experimental group increased to 8.6, while the control group only reached 7.1. The 1.5-point difference indicates that Canva AI-based infographics were more effective in improving student comprehension compared to manual infographics.

Table 1. Average Student Comprehension Scores

Test Stage	Experimental (Canva AI)	Control (Manual)
Pretest	5.2	5.0
Posttest	8.6	7.1
Retention (1 week)	7.8	6.2

The data in the table above also shows that retention results one week after the intervention were higher in the experimental group. Their average score remained stable at 7.8, while the control group decreased to 6.2. This means that Canva AI infographics not only strengthened immediate comprehension but also proved more effective in maintaining students' memory of information.

Observation Results

Observations conducted during the intervention revealed striking differences between the experimental group using Canva AI infographics and the control group using manual infographics. In the experimental group, students appeared more lively during the activity. They actively pointed at icons or images displayed, with some even explaining their meanings to seatmates. Cheerful facial expressions such as smiling, giggling, and focused eyes indicated positive emotional engagement. Students also tended to spend more time observing visual details rather than just reading the text, which signalled strong curiosity.

In contrast, the control group showed a more passive classroom atmosphere. Students were seen reading long texts seriously but frequently lost focus. Some frowned, yawned, or looked away, indicating boredom or difficulty understanding the presented material. Peer interaction was minimal, and confused expressions often appeared when they encountered long paragraphs without sufficient visual support. This difference confirms that child-friendly visualization, with a combination of simple icons, bright colours, and neat layouts as generated by Canva AI, can enhance students' engagement both cognitively and emotionally. Observations also indicated that higher infographic readability encouraged active participation and strengthened students' information absorption.

Student Reflection Results

Analysis of students' reflection sheets revealed clear differences in perception between the two groups. In the experimental group, most students stated that Canva AI infographics made it easier for them to understand the material. Many wrote that pictures and colours helped them remember information without needing to read all the text. One student wrote, "I quickly understood because the pictures were clear, so I knew the meaning even without reading everything." Another comment mentioned that the bright colours made the infographics feel fun, so they felt more enthusiastic about learning.

Students also highlighted the parts they found most interesting, such as the use of funny icons or illustrations close to their daily experiences. Several noted that these icons helped them remember school rules more easily. These reflections indicate that visuals were not merely decorative, but played an important role in supporting comprehension. In the control group, student reflections contained more complaints about the large amount of text. Some students wrote that the long sentences confused them and made them quickly tired of reading. Comments such as "Too much writing makes it confusing to read; I prefer when there are pictures" reflected the limitations of manual infographics in capturing students' attention. Although they still understood the content, the learning experience felt heavier and less enjoyable.

These findings from the reflections reinforce the observational results, showing that Canva AI could provide a more child-friendly learning experience by combining visual appeal with message simplicity, thus increasing student motivation and comprehension.

Interview Results

Semi-structured interviews with 10 purposively selected students offered deeper insights into their experiences. In the experimental group, students consistently stated that Canva AI infographics were more enjoyable and easier to understand. One student said, "I like the colourful infographics; I remember the message even when I get home." This illustrates how appealing visuals can strengthen memory and information retention. Another mentioned that simple icons helped them understand school rules without reading long texts: "If there's a picture of a trash bin, I immediately know it means to throw garbage in the bin." Beyond comprehension, students also emphasized motivation, reporting greater enthusiasm when learning with Canva AI compared to manual infographics. The colourful visuals made them less bored and more focused on the material.

Conversely, interviews with students in the control group revealed different experiences. Although they admitted to understanding the content of manual infographics, several emphasized that reading long texts was tiring. One student said, "I understand, but it's exhausting to read." This suggests that while information was conveyed, the cognitive load from long texts reduced the effectiveness of the medium. Overall, the interviews demonstrated that Canva AI successfully provided more child-friendly learning media, both in terms of readability and visual appeal. These

infographics not only improved comprehension but also provided a more enjoyable and meaningful learning experience for elementary school students.

Synthesis of Findings

When synthesized, the findings of this research can be summarized as follows:

- a. Canva AI infographics are more effective in improving students' comprehension compared to manual infographics, as evidenced by post-test and retention scores.
- b. Students were more enthusiastic, engaged, and showed positive expressions when using Canva AI infographics, while manual infographics tended to cause confusion and boredom.
- c. Simple visualizations in the form of icons, colours, and neat layouts in Canva AI played an important role in enhancing readability and strengthening students' memory.
- d. Manual infographics, which emphasized long texts, created a heavier cognitive load for elementary school children.

Discussion

The findings of this study are consistent with Mayer's multimedia learning theory, which states that learning is more effective when information is presented through a combination of text and visuals that complement each other. Canva AI infographics were able to present information in a concise and relevant visual form, thereby reducing students' cognitive load. Furthermore, these findings align with Piaget's theory of cognitive development, which explains that elementary school children are in the concrete operational stage, where they more easily understand information represented visually and concretely. Visualizations such as illustrations of children lining up or a trash bin icon serve as important aids in facilitating their understanding.

From an affective perspective, Canva AI infographics successfully fostered learning motivation because of their attractive appearance. This is in line with the findings of Day et al. (2024), which showed that the format of information presentation influences children's motivation and attention. Students who were more engaged also tended to have better retention, as demonstrated in the retention test results of the experimental group.

Manual infographics, although delivering the same content, often caused readability barriers. Small text size, dense sentences, and the absence of visualizations made students lose focus and feel bored. These findings support Sutthiworapon et al. (2024), who proved that digital infographics are more effective than conventional media in improving literacy. Thus, this study emphasizes the importance of using AI-based media such as Canva AI in elementary school learning. Such media not only help students understand information more easily but also enhance their emotional and social engagement.

Table 2. Synthesis of Research Findings

Aspect	Canva AI (Experimental)	Manual (Control)	Implications
Comprehension	Posttest score 8.6; retention 7.8	Posttest score 7.1; retention 6.2	Canva AI improves comprehension and retention more effectively
Engagement	Enthusiastic, positive expressions, discussions	Passive, bored, confused expressions	Attractive visuals foster social engagement
Readability	Concise text, clear icons, bright colors	Dense text, small size, minimal images	Canva AI is more child-friendly for elementary students
Information Retention	Easier to remember with visual support	Weak memory, easily forgotten	Visuals function as memory cues
Student Perception	"Easy to understand, fun"	"Understandable, but tiring to read"	Positive perceptions strengthen learning motivation

Conclusion

This study affirms that the use of Canva AI-based infographics significantly contributes to improving comprehension, readability, motivation, and information retention among elementary school students. Test results showed that the experimental group using AI-based infographics achieved higher post-test and retention scores compared to the control group using manual infographics. This indicates that structured visual design, contrasting colour selection, and the use of contextually relevant icons can help students understand material more quickly and remember it for longer.

Qualitative data from observations, reflections, and interviews reinforced the quantitative findings. Students in the experimental group demonstrated more positive emotional engagement, such as enthusiasm, active discussion, and

facial expressions indicating comprehension. Conversely, students in the control group tended to display boredom, difficulty reading long texts, and easily distracted concentration. These findings confirm that AI-supported visual learning media can provide a more child-friendly learning experience, aligned with their cognitive developmental stage.

These results are consistent with Mayer's multimedia learning theory and Sweller's cognitive load theory, which emphasize that learning is more effective when information is presented through complementary text and visuals without causing excessive cognitive load. Additionally, the findings also support Piaget's theory of the concrete operational stage, in which elementary school students understand abstract concepts more easily through visual representation.

Therefore, this research provides practical implications for teachers and elementary schools to utilize AI-based technologies, particularly Canva AI, in designing learning media. AI-based infographics function not only as visual aids to clarify information but also as tools to increase student engagement, strengthen motivation, and support better learning outcomes. In the future, the application of AI in elementary education can extend beyond infographics to the development of other interactive media that are more adaptive, innovative, and tailored to student characteristics.

Recommendations

Based on the results and discussion, several recommendations can be proposed for both educational practitioners and future researchers:

a. For Elementary School Teachers

Teachers are encouraged to use Canva AI in creating learning infographics, especially for conceptual subjects or those requiring visual explanations. AI-based infographics can serve as an effective alternative to reduce student boredom and increase engagement during the learning process.

b. For Schools

Schools can integrate AI-based technology into visual literacy and learning media programs. Special training for teachers on the use of Canva AI and other digital media is needed so that this innovation is sustainable and not just a temporary trend.

c. For Students

AI-based infographics should be positioned as child-friendly learning media rather than mere reading materials. Teachers can involve students in visual exploration, such as discussing the icons or colours used, making the learning process more participatory.

d. For Media Developers and Educational Technology Practitioners

Canva AI and similar applications can be further developed to meet the needs of elementary school children. For example, by providing templates designed specifically for children's cognitive development stages and visual preferences, ensuring that the designs are more contextual and supportive of educational goals.

e. For Future Researchers

This study is limited to a relatively small number of subjects (30 students) and the context of a single school. Future research could expand the scope by involving more schools and diverse student backgrounds. Additionally, exploring AI use in other interactive learning media such as animated videos or educational games is also necessary to enrich the understanding of technology's impact on elementary education.

f. For Education Policy

The findings of this research can inform policymakers to support the integration of AI-based technology into the curriculum, particularly in the development of digital and visual literacy. Policy support may include providing infrastructure, teacher training, and early technology literacy programs.

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4. REFERENCES

- Aguilera-Hermida, A. P., Lavigne, N. C., & Sellas, V. P. (2021). Students' use and acceptance of infographics for learning. *Australasian Journal of Educational Technology*, 37(3), 1–22. <https://doi.org/10.14742/ajet.6774>
- Bogaert, N., Desoete, A., & Aesaert, K. (2023). Development of the Reading Comprehension Strategies Questionnaire for late elementary schoolchildren. *PLOS ONE*, 18(1), e0280558. <https://doi.org/10.1371/journal.pone.0280558>
- Cope, B., & Kalantzis, M. (2019). Making sense of the AI revolution in education. *Educational Philosophy and Theory*, 51(6), 587–603. <https://doi.org/10.1080/00131857.2018.1526387>
- Day, E., Chow, J. C., Kalb, S., Goldberg, S., & Weisleder, A. (2024). How does the format of informative materials influence children's comprehension, motivation, and attention? *Education Sciences*, 14(8), 854. <https://doi.org/10.3390/educsci14080854>
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Boston: Center for Curriculum Redesign.
- Kim, J., Park, H., & Lee, S. (2020). AI-based automated design system for poster generation. *Design Studies*, 67, 102–118. <https://doi.org/10.1016/j.destud.2020.03.001>
- Kumar, V., Singh, A., & Sharma, R. (2019). AI-driven educational content design for personalized learning. *International Journal of Educational Technology in Higher Education*, 16(1), 1–15. <https://doi.org/10.1186/s41239-019-0177-8>
- Lee, S. J., & Kwon, K. (2024). A systematic review of AI education in K-12 classrooms from 2018 to 2023: Topics, strategies, and learning outcomes. *Computers and Education: Artificial Intelligence*, 6, 100211. <https://doi.org/10.1016/j.caeai.2024.100211>
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence Unleashed: An argument for AI in Education*. London: Pearson.
- Nugroho, A., & Suryanto, T. (2018). Efektivitas media visual dalam meningkatkan minat belajar siswa sekolah dasar. *Jurnal Pendidikan Dasar Indonesia*, 3(2), 112–121.
- Prastowo, A. (2020). Visual learning strategies for elementary school students: An Indonesian case study. *Indonesian Journal of Education Research*, 4(1), 23–34.
- Read, J. C., & Markopoulos, P. (2017). Child-computer interaction. *International Journal of Child-Computer Interaction*, 13, 1–4. <https://doi.org/10.1016/j.ijcci.2017.05.002>
- Sun, Y., Wang, Y., & Zhao, J. (2021). Visualization with AI in elementary education: Enhancing conceptual understanding. *Computers & Education*, 168, 104198. <https://doi.org/10.1016/j.compedu.2021.104198>
- Sutthiworapon, S., Vichitkunakorn, P., Choomalee, K., & Ngamchaliew, P. (2024). Effect of online infographics for enhancing health literacy among patients with type 2 diabetes in primary care unit during the COVID-19 pandemic: A randomized controlled trial. *BMC Primary Care*, 25, 87. <https://doi.org/10.1186/s12875-024-02335-2>
- Yamamoto, T., & Nakano, Y. (2020). Child-friendly design principles for educational interfaces. *International Journal of Child-Computer Interaction*, 24, 100–112. <https://doi.org/10.1016/j.ijcci.2020.100182>
- Yim, I. H. Y., Wong, M. S., Chai, C. S., Looi, C. K., & Chen, W. (2025). Artificial intelligence learning tools in K-12 education: A systematic review. *Smart Learning Environments*, 12, 27. <https://doi.org/10.1186/s40561-025-00273-1>
- Zhang, H., & Li, Y. (2021). The role of visual simplification in elementary education infographics. *Journal of Visual Literacy*, 40(2), 91–109. <https://doi.org/10.1080/1051144X.2021.1903621>
- Zhao, K., Liu, J., & Chen, H. (2022). Generative AI for educational illustrations: A user study with children. *Computers in Human Behavior*, 135, 107383. <https://doi.org/10.1016/j.chb.2022.107383>