



The Utilization of Google Earth in Improving Elementary School Students' Understanding of Environmental Concepts

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Abstract: This study aims to analyze the use of Google Earth in improving elementary school students' understanding of environmental concepts. The background of this study is the low level of student understanding of environmental materials due to conventional learning methods that do not use interactive digital media. The use of technology-based media such as Google Earth is expected to provide a more concrete, interesting, and contextual learning experience for students. This study used a quantitative approach with a quasi-experimental method with a pretest-posttest control group design. The subjects were fifth-grade elementary school students who were divided into an experimental class and a control class. The research instruments included an environmental concept understanding test, a student activity observation sheet, and a questionnaire about student responses to the learning media. Data were analyzed using descriptive and inferential statistical tests to determine differences in learning outcomes between the two groups. The results showed that the use of Google Earth had a positive effect on elementary school students' understanding of environmental concepts. Students in the experimental class showed a greater increase in learning outcomes than students in the control class. Furthermore, the use of this media increased students' learning motivation, active participation, and the ability to observe environmental phenomena visually and realistically. Based on these findings, Google Earth is effective as an innovative learning medium to improve understanding of environmental concepts among elementary school students. This media can function as an alternative technology-based learning tool that supports interactive, contextual, and meaningful science learning.

Keyword: Google Earth, Elementary School, Understanding of Environmental Concepts

INTRODUCTION

Science learning in elementary schools plays a crucial role in developing students' understanding of the environment and natural phenomena around them. Learning environmental concepts is expected to not only provide theoretical knowledge but also foster environmental awareness and critical thinking skills in students (Sari et al., 2021). However, in practice, science learning in elementary schools often still uses conventional methods, with teachers relying heavily on textbooks and lecture-based instruction. As a result, students tend to struggle to grasp abstract environmental concepts that are closely related to real-life

situations. The rapid development of digital technology has created opportunities for educators to integrate innovative learning media into classroom instruction (Filina & Sari, 2023). One technology that can support environmental learning is Google Earth. This application provides satellite imagery, maps, terrain visualizations, and virtual exploration features that allow students to observe environmental conditions directly and interactively. Through Google Earth, students can explore forests, rivers, oceans, mountains, urban areas, and various environmental changes in various regions of the world without leaving the classroom (Chuanzhu, 2025).

The use of Google Earth in elementary school science learning can create contextual and meaningful learning experiences. Students are able to connect theoretical concepts with real-life environmental conditions, thus facilitating their understanding of topics such as ecosystems, natural resources, environmental pollution, climate change, and natural disasters. Furthermore, interactive digital media can increase student motivation, participation, and curiosity during the learning process (Kasmini et al., 2024). Several previous studies have shown that technology-based learning media positively contributes to conceptual understanding and student learning outcomes. Interactive visualizations can help students grasp complex concepts more effectively than traditional teaching methods. The use of Google Earth in elementary school science learning, particularly in teaching environmental concepts, still requires further exploration and empirical investigation (Wahyuni et al., n.d.). This research focuses on the use of Google Earth in improving elementary school students' understanding of environmental concepts. This research is expected to contribute to the development of innovative technology-based science learning media that support interactive, contextual, and meaningful learning processes in elementary education (Maulida & Sari, 2024).

The use of Google Earth in elementary science learning can create more contextual, interactive, and meaningful learning experiences for students. In science education, particularly at the elementary level, students often face difficulties in understanding abstract concepts because learning activities are frequently limited to textbooks and verbal explanations (Kurniasari et al., 2021). As a result, students may struggle to connect scientific theories with the real-world environment around them. Through the integration of Google Earth, students are provided with visual and spatial representations of the Earth that help bridge the gap between theory and reality. One of the major advantages of Google Earth is its ability to present authentic environmental conditions through satellite imagery, 3D visualization, maps, and virtual exploration features. Students can directly observe forests, rivers, mountains, oceans, urban areas, and agricultural regions from different parts of the world (Yusnita et al., 2023). This visualization enables learners to understand environmental concepts more concretely and realistically. For example, when studying ecosystems, students can compare rainforest ecosystems with desert ecosystems and identify differences in vegetation, climate, and landforms. Such experiences encourage students to actively construct knowledge based on observation and exploration rather than relying solely on memorization (Harefa & Sumiyati, 2020).

In addition, Google Earth supports inquiry-based and student-centered learning approaches. Teachers can guide students to investigate environmental phenomena independently by observing geographical changes, identifying areas affected by deforestation, monitoring coastal erosion, or analyzing urban development (Nimodiya & Ajankar, 2022). This process encourages students to ask questions, collect information, analyze findings, and

draw conclusions, which are essential components of scientific thinking skills. Consequently, students become more actively involved in the learning process and develop critical thinking and problem-solving abilities (Novianti et al., 2025). The application also enhances students' understanding of environmental issues that are increasingly important in modern education, such as climate change, environmental pollution, and natural disasters. Through real-time imagery and geographical data, students can observe the effects of floods, volcanic eruptions, forest fires, or shrinking green areas in various regions. These experiences help students recognize the impact of human activities on the environment and develop environmental awareness and responsibility from an early age. Learning becomes more meaningful because students can relate classroom materials to actual environmental challenges occurring locally and globally

Interactive digital media such as Google Earth can significantly increase students' motivation and engagement during classroom activities. Elementary school students are generally more attracted to visual, interactive, and technology-based learning environments compared to traditional lecture methods. The ability to virtually "travel" around the world creates excitement and curiosity among learners, making science learning more enjoyable and less monotonous. Increased engagement often leads to higher participation levels, better concentration, and improved retention of learning materials. The use of Google Earth also supports collaborative learning activities. Teachers can organize group projects in which students explore specific regions, investigate environmental conditions, and present their findings to classmates. Such collaborative tasks not only improve students' scientific understanding but also enhance communication, teamwork, and presentation skills. These competencies are essential for developing 21st-century learning skills required in modern education.

Another important aspect is the accessibility of global information provided by Google Earth. Students are not limited to learning about their immediate surroundings; they can also explore environmental conditions in other countries and continents. This broadens students' perspectives and promotes global awareness. Students can compare environmental issues across regions and understand that environmental sustainability is a shared global responsibility. The integration of technology into elementary science education aligns with the demands of digital-era learning. The utilization of Google Earth encourages digital literacy skills, where students learn how to access, interpret, and utilize digital information responsibly. In this way, science learning does not only focus on content mastery but also prepares students to become technologically literate individuals capable of adapting to future educational and societal developments. The integration of Google Earth in elementary science learning provides significant educational benefits. It supports contextual learning, enhances conceptual understanding, increases motivation and participation, promotes environmental awareness, and develops critical thinking and digital literacy skills. As a result, Google Earth can serve as an innovative and effective learning medium to improve the quality of science education in elementary schools (Sari et al., 2019).

METHOD

This study employed a quantitative research approach using a quasi-experimental design. The purpose of the study was to examine the effectiveness of the utilization of Google Earth in improving elementary school students' understanding of environmental concepts. The research design used was the pretest-posttest control group design, involving an experimental class and a control class. The experimental class received science learning using Google Earth, while the control class received conventional learning methods.

RESULT AND DISCUSSION

This study was conducted to determine the effectiveness of the utilization of Google Earth in improving elementary school students' understanding of environmental concepts. The research involved two groups of participants, namely the experimental class and the control class. The experimental class received science learning using Google Earth, while the control class was taught using conventional learning methods. Before the treatment was implemented, both groups were given a pretest to measure their initial understanding of environmental concepts. The results showed that the average scores of the experimental and control classes were relatively similar, indicating that both groups had comparable initial abilities. Students generally experienced difficulties in understanding concepts related to ecosystems, environmental pollution, climate change, and natural disasters. The findings from the pretest also revealed that students had limited ability to connect theoretical concepts with real environmental conditions. Most students relied on memorization rather than conceptual understanding, which demonstrated the need for more interactive and contextual learning media.

Tabel: 1. Analysis Data Kuantitatif

Test	N	Mean	Std. Deviation	Minimum	Maximum
Pretest	40	60.45	7.82	45	74
Posttest	40	84.30	6.45	70	96

Based on Table 1, the average pretest score of students was 60.45, indicating that students' initial understanding of environmental concepts was still relatively low. After the implementation of learning using Google Earth, the mean posttest score increased to 84.30. This result indicates a substantial improvement in students' understanding of environmental concepts after the treatment. The increase in learning outcomes demonstrates that the use of interactive digital media helped students understand science concepts more effectively. Students became more engaged in learning activities because they could directly observe environmental conditions through satellite imagery and virtual exploration features.

Tabel: 2. Data N-Gain Score

Number of Students	Mean N-Gain	Category
40	0.61	Moderate

The average N-Gain score of 0.61 falls into the moderate category, indicating that the utilization of Google Earth was effective in improving students' conceptual understanding. After the implementation of learning activities, students were given a posttest to evaluate improvements in their understanding of environmental concepts. The results indicated a significant improvement in the experimental class compared to the control class. Students who learned using Google Earth achieved higher posttest scores and demonstrated better conceptual understanding. The control class also experienced improvement; however, the increase was not as significant as that of the experimental class. Students in the control class tended to depend on textbook explanations and showed less engagement during classroom activities. The findings of this study demonstrate that the utilization of Google Earth significantly improves elementary school students' understanding of environmental concepts.

The improvement in students' learning outcomes can be attributed to the contextual and interactive nature of the learning process facilitated by the application.

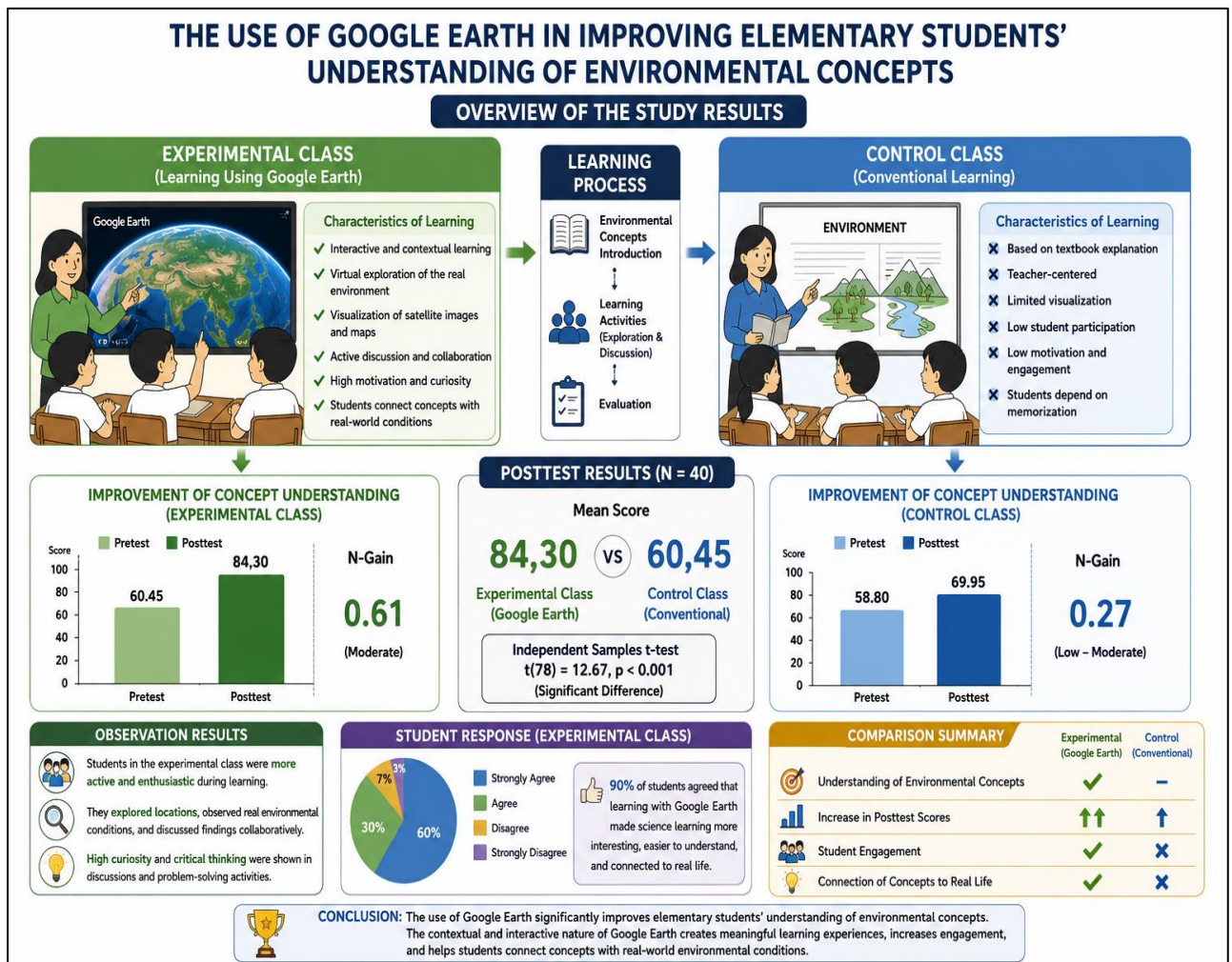


Figure: 1. Result and Discussion Research

One important factor contributing to the effectiveness of Google Earth is its ability to provide authentic visualizations of environmental phenomena. Students were not only learning abstract theories but were also directly observing real-world environmental conditions through satellite imagery and virtual maps. This approach aligns with constructivist learning theory, which emphasizes that students build knowledge more effectively through direct experiences and active exploration. The use of visual and spatial representations also helped students understand complex environmental concepts more easily. For example, students could observe differences between urban and rural environments, identify areas affected by environmental damage, and analyze changes in land use. These experiences made learning more concrete and meaningful compared to conventional instructional methods.

The integration of Google Earth increased students' motivation and participation during classroom activities. Elementary school students are generally attracted to technology-based learning environments that provide interactive and engaging experiences. The opportunity to virtually explore different regions of the world created excitement and curiosity among students, leading to greater classroom engagement and active participation. Another important

finding was the development of students' critical thinking and problem-solving skills. Through observation and discussion activities, students were encouraged to analyze environmental issues and propose possible solutions. This indicates that the use of Google Earth not only improves conceptual understanding but also supports the development of higher-order thinking skills. The findings of this study are consistent with previous research indicating that technology-based learning media can improve students' learning outcomes, conceptual understanding, and learning motivation. Interactive digital tools provide opportunities for students to learn independently, collaboratively, and contextually.

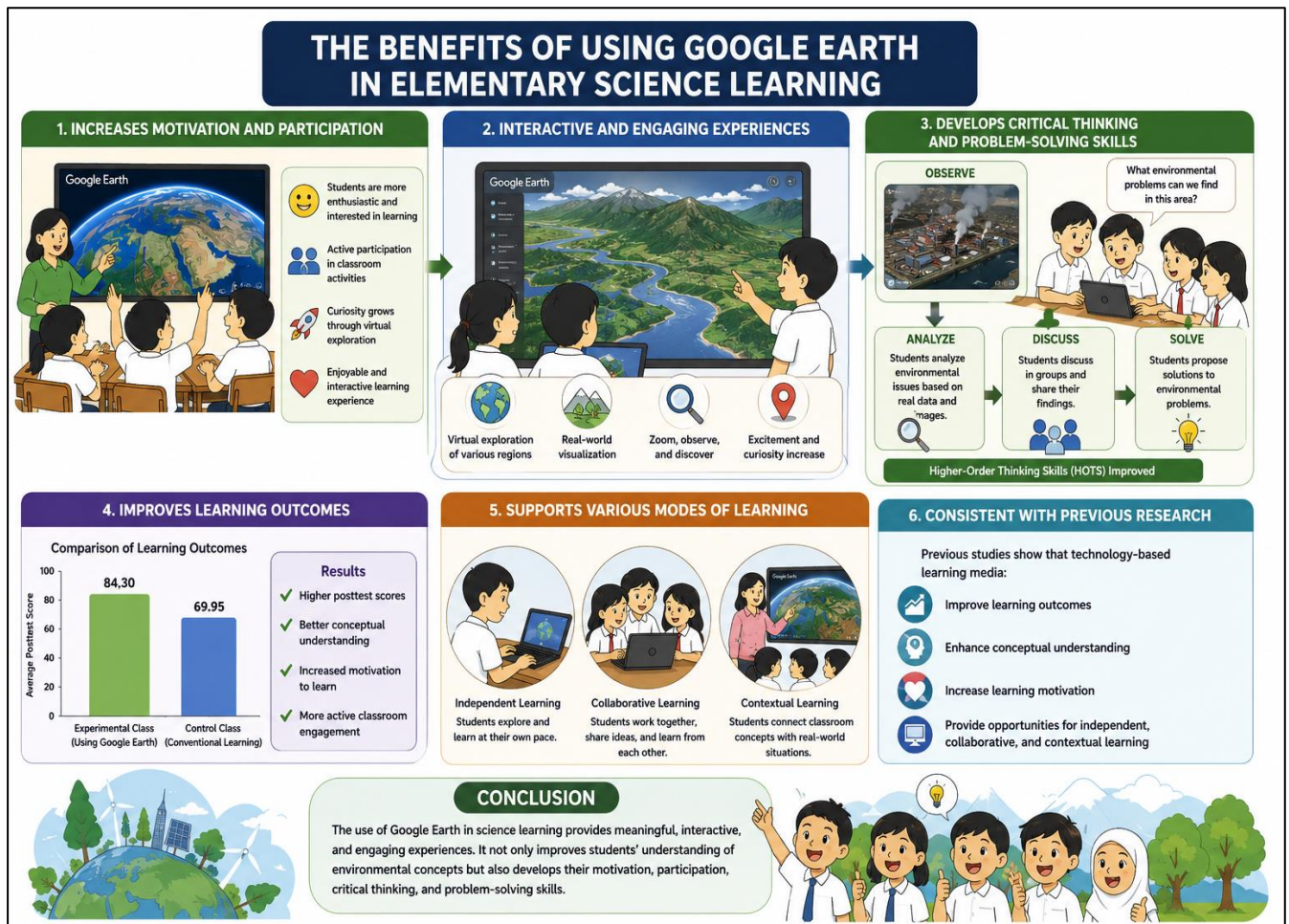


Figure 2. Implementation of google Earth on Learning

Several challenges were also identified during the implementation process. Some students initially experienced difficulties in operating the application due to limited digital literacy skills (Maulida & Sari, 2024). In addition, the effectiveness of learning depended on the availability of technological infrastructure such as computers, internet access, and classroom facilities. Teacher guidance and adequate technological support are necessary to maximize the effectiveness of technology-based learning media. The findings indicate that Google Earth is an effective and innovative learning medium for elementary science education. The application supports meaningful learning experiences, enhances environmental understanding, increases student engagement, and promotes critical thinking skills. Therefore, integrating Google Earth into science learning can contribute positively to improving the quality of elementary education in the digital era (Sari et al., 2023).

CONCLUSION

Based on the findings of the study, it can be concluded that the utilization of Google Earth significantly improves elementary school students' understanding of environmental concepts. The integration of interactive digital technology into science learning creates contextual and meaningful learning experiences that help students connect theoretical knowledge with real-world environmental conditions. The use of Google Earth was proven to increase students' motivation, participation, curiosity, and engagement during classroom activities. Students became more active in exploring environmental phenomena, discussing findings, and participating collaboratively in the learning process. In addition, the visual and interactive features of the application helped students understand complex environmental concepts more effectively compared to conventional learning methods. Another important finding of this study is that the use of Google Earth supports the development of higher-order thinking skills, particularly critical thinking and problem-solving abilities. Through observation, analysis, and discussion activities, students were encouraged to identify environmental issues and propose possible solutions based on real-world situations. The statistical analysis results also confirmed that students who learned using Google Earth achieved higher posttest scores compared to students who experienced conventional instruction. This indicates that technology-based learning media positively affect students' learning outcomes and conceptual understanding. Google Earth can be considered an effective and innovative learning medium for elementary science education. Its implementation not only enhances students' understanding of environmental concepts but also supports interactive, collaborative, and student-centered learning in the digital era.

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