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## GOOGLE EARTH INTEGRATION IN LEARNING: A NARRATIVE REVIEW

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### ABSTRACT

*Technology integration in education is increasingly developing, including the use of Google Earth as an interactive learning medium. However, its utilization in Indonesia is still limited due to the lack of teacher training and access to technology. This research is intended to analyze the trend of Google Earth usage in learning through narrative review method. The study reviewed related literature to identify the fields of study that use it the most, the research methods applied, and the benefits and challenges found. The results show that Google Earth improves learning motivation, student engagement and spatial understanding. However, research is still dominated by short-term experimental methods, so longitudinal studies are needed to measure its impact in the long term. The implications of this research highlight the need for teacher training, supporting policy development, and further exploration in STEM and vocational education.*

**Keywords:** learning, Google Earth, educational technology, narrative review, research trend

### INTRODUCTION

One of the impacts of how technology develops is the integration of technology in various fields including in the world of education (Arbi, 2024; Djibran et al., 2024; Widodo et al., 2024). One form of this integration is utilizing digital-based technology as a learning media. Various technologies that are able to visualize abstract concepts are often adopted by teachers as innovative learning media. Google Earth, a geographic browser technology, is one application that has been proven to create more interactive learning (Faudah et al., 2023).

Despite its potential, the integration of Google Earth into learning still faces various challenges, especially in the context of formal education in Indonesia there are still various challenges in the process of integrating Google Earth into learning, especially in the context of formal education in Indonesia (Ali et al., 2024). Based on an initial review, many teachers in some regions have not utilized the full potential of Google Earth as a learning media (Astini, 2020; Pratama, 2024). In geography learning, for example, the use of conventional maps is still common. This often makes it difficult for students to understand spatial concepts concretely. In addition, in learning other fields such as history, literacy, or science, the use of Google Earth has not been a top priority. This situation creates a gap between the potential of available technology and the reality of implementation in the field.

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1 Many previous studies have revealed that the Google Earth application has had a positive impact on learning, especially in geography learning (Ali et al., 2024; Emalia & Indihadi, 2017; Faudah et al., 2023; Ghafur, 2023; Hadi et al., 2021; Putri & Sriyanto, 2022; Widodo et al., 2025; Yusuf et al., 2024). However, most studies still focus on how Google Earth is applied in learning. This means that there is a gap, namely the lack of research that examines literature to find trends in the use of Google Earth technology in learning, so researchers are interested in conducting studies that adopt a research method called narrative review. Through the integration of multiple Google Earth research findings, this work makes a novel contribution to the field of narrative review study. This method gives a more comprehensive picture of the advantages, disadvantages, and research trends of using Google Earth in different educational settings. Additionally, by investigating the use of this medium for subjects other than geography and its effects on digital literacy and 21st century skills, it aims to fill up earlier research gaps.

By adopting narrative review method, the study aims to assess the research trends related to the use of Google Earth in learning. This research aims to identify the fields of study that most frequently use Google Earth, the research methods applied, as well as the main results achieved in various studies, so as to provide a comprehensive overview of the benefits and challenges of Google Earth integration in education.

### Review of Related Literature

3 3 Google Earth is a virtual globe application that was first created by Keyhole, Inc., a company that John Hanke founded in 2001 and that Google later purchased in 2004. Roads, building locations, and other geographic data can be superimposed on a world map, topography, and terrain displayed by Google Earth, an easily navigable mapping and satellite imagery tool (Ghafur, 2023). Features of this technology include Voyager, Geographic information, Interactive navigation, Timelapse, 3D view, and customisation. Accordingly, Google Earth is highly adaptable, enabling its integration into a wide range of fields, including geography, biology, astronomy, language, history, sociology, art, mathematics, and information and communication technology (Widodo et al., 2025). From this explanation, Google Earth technology has great technical capacity in supporting digital literacy. With its advanced sophistication, Google Earth affords the possibility for users to perceive and analyse spatially-based or georeferenced information. It directly benefits students in various important aspects relevant to digital literacy. In addition, the integration of this technology in education has the potential to improve 21<sup>st</sup> century competencies including problem solving, critical thinking, collaboration and creativity.

In terms of its benefits, Google Earth is a very essential application in education. According to Ali et al., (2024) , Google Earth provides a variety of educational benefits as follows (1) Google Earth is able to visualize the real and qualified state of the earth, (2) Google Earth is able to improve historical understanding through its features, (3) By using Google Earth, students can recognize the global and local surroundings, (4) Google Earth assists educators in formulating spatially-based case studies, and (5) Google Earth is evidently increasing student engagement and enthusiasm. Thus, this is consistent with a study conducted by Hilman, (2012), this technology provides a platform for educators in order to develop learners' visual capabilities and assist learners in developing an understanding of international jurisdictions and cultural differences.

### RESEARCH METHOD

The narrative literature review method entails evaluating and contrasting current theories and looking for references to theoretical underpinnings that align with the issues under investigation (Nurcahyani, 2023). To describe the trend of Google Earth usage in learning, the narrative review method was adopted by the researchers. This method was chosen because it allows researchers to provide a broad and in-depth review of significant

literature. In the process, this study consists of several steps, namely collecting literature, determining inclusion and exclusion criteria for literature, analysing literature, presenting results, and making conclusions and implications.

The initial step in this research activity is to collect relevant literature. Literature relevant to the topic of "Google Earth integration in Learning" are selected and collected by researchers. The literature collected can be in the form of books, research articles, conference proceedings, theses, or dissertations. Researchers used several keywords to find the literature such as "Google Earth integration", "use of Google Earth", "Google Earth implementation", "Google Earth in learning", and "Google Earth research trends". The main databases used by researchers are Google Scholar and Research Gate. All literature identified by the researcher were managed using an application called Mendeley.

In the process of collecting literature, researchers determined inclusion and exclusion criteria so that the collected literature was relevant to the objectives of this study. The inclusion criteria for this study are: (1) research must discuss how Google Earth is used in learning, (2) selected articles are only articles in Indonesian and English, (3) selected articles are only articles published in the last 10 years (2015-2025). Meanwhile, based on the exclusion criteria, articles that are not relevant to the use of Google Earth in learning and articles that do not have full access to be analysed are not used by the researchers.

After the literature was selected and sorted, the researchers conducted an analysis of the literature. The analysis activities in this study were carried out qualitatively in order to identify the main trends in the research. The analysis in this study included the research methods used, the fields of study that most often use Google Earth, and the main innovations and findings of the research. After the analysis process, the results of this study were then presented by the researchers. The findings of this study were presented in narrative form and supported by tables or graphs to provide a more representative picture. After that, the researchers then concluded the main findings that were relevant to the main trends in the use of Google Earth in learning and they also wrote recommendations for further research.

## FINDINGS AND DISCUSSION

### Findings

Based on the analyzed results, the researchers obtained some literature in the form of research articles and conference proceedings. These studies were selected because they met the pre-determined inclusion criteria. To answer the objectives of this study relevant to Trends in Google Earth-Based Educational Research, a table was used to segment the findings. The table contains synthesized information that focuses on the author's name and year of publication, study focus, research method, and key findings.

Table 1. Trends in Google Earth-Based Educational Research

Author	Study Focus	Research Method	Key Findings
(Yusuf et al., 2024)	Geography	Classroom Action Research	<i>"The use of Google Earth applications in learning to improve the learning outcomes of grade XI IPS students in high school"</i>
(Ariani et al., 2020)	Integrated Social Studies	Quasi Experiment	<i>"Google Earth media helps students understand the material with active learning methods."</i>

(Putri & Sriyanto, 2022)	Geography	Experimental Research	<i>“Google Earth media improves high school students' geography skills.”</i>
(Emalia & Indihadi, 2017)	Indonesian Language Subject	Pre-Experimental Design	<i>“Google Earth media improves students' descriptive writing skills.”</i>
(Alfiyana et al., 2022)	Geography	Qualitative	<i>“Google Earth increases students' interest and motivation in map learning in elementary schools.”</i>
(Ghafur, 2023)	Geography	Control Group Pre-Test Post-Test Design	<i>“The implementation of Google Earth in remote sensing material is proven to enhance student learning outcomes when compared to other conventional methods.”</i>
(Ali et al., 2024)	Social Studies	Literature Review and Case Study	<i>“Google Earth fosters engagement and critical thinking in social studies learning through interactive and realistic visualizations of geographical and social phenomena. Challenges faced include accessibility and teacher training.”</i>
(Islami, 2018b)	Geosciences Education	Mixed Method (Guided Use + Survey)	<i>“Google Earth assists students in visualizing earth-related concepts, thus promoting greater understanding of geoscience.”</i>
(Nurbaiti et al., 2021)	Spatial Intelligence in Social Studies	Conceptual Paper	<i>“Google Earth Education proposes an excellent option to conventional media (map, atlas, globe), and enhances spatial intelligence and student engagement through the realistic visualization or realization of geography and history learning.”</i>
(Alfatikh et al., 2020)	Geography	Pre-Experimental Design (One-Shot Case Study)	<i>“Google Earth was found to be highly effective in promoting students' interest in learning. The data shows that 75% of the students became more active in the lessons, and their average score rose to 80, surpassing the school's passing standard.”</i>
(Islami, 2018a)	Earth Physics	Demonstration-Based Study	<i>“Using Google Earth, 92% of students successfully reconstructed processes like Earth's rotation, tilt axis effects, and tectonic subduction, enhancing understanding of Earth Physics concepts.”</i>
(Ahmad et al., 2023)	Tourism Geography	Qualitative (interviews & Thematic Analysis)	<i>“Google Earth improves students' learning experience by helping them comprehend and remember tourist attractions. It has the potential to be used in other tourism-related courses, such planning and tour guiding.”</i>
(Esmaeili & Rastegarpour, 2016)	Geography	Experimental Research	<i>“Google Earth application had positive impact on students' learning and retention geography. “</i>

(Fatayan, 2024)	Elementary School Learning Motivation	Mixed Method (Qualitative & Quantitative)	<i>“Google Earth, integrated with the RADEC model, increases learning motivation of Jakarta elementary school students by 23%, enhancing student engagement and fostering a positive learning atmosphere.”</i>
(Hadi et al., 2021)	Geography (Remote Sensing)	Quasi-Experimental Design	<i>“Students' spatial thinking skills (STA) are successfully improved by Google Earth-assisted remote sensing learning, which also has a favorable correlation with learning outcomes in disaster mitigation.”</i>
(Ria & Handayani, 2024)	Elementary Social Studies	Literature Study	<i>“Google Earth greatly improves social studies discovery learning in elementary schools, promotes visual exploration, and raises participation.”</i>
(Nós & Motta, 2024)	Mathematics (Spherical Geometry)	Activity Design (Qualitative)	<i>“Google Earth is an effective tool for teaching spherical geometry concepts, allowing interdisciplinary interactions with geography and cartography.”</i>

**Discussion**

Important insights into the significance of utilizing the digital map application are provided by the table that presents the analysis of research patterns on the use of Google Earth in education. The application is used at different levels and in various topic areas, according to research findings. The approaches taken in the literature have likewise varied. In light of this, the research findings offer a comprehensive picture that aligns with the goal of evaluating the educational potential of using Google Earth.

*a. Areas of Research that Make Use of The Google Earth*

Numerous subjects in schools have made extensive use of Google Earth, with geography being the most common one. Research undertaken by Yusuf et al. (2024), Putri and Sriyanto (2022), and Hadi et al. (2021) has demonstrated its constant application in enhancing the understanding of geography, mapping abilities, and spatial thinking. In addition to geography, it is used in social studies (Ariani et al., 2020; Ria & Handayani, 2024), mathematics (Nós & Motta, 2024), language instruction (Emalia & Indihadi, 2017), and the specialist subject of tourism geography (Ahmad et al., 2023). Despite the fact that these studies show Google Earth's multidisciplinary potential, there is a clear lack of integration with STEM disciplines other than mathematics, like environmental science, biology, and chemistry. Furthermore, not as much research has been done on its use in higher education outside geography-related fields as it has been in primary and secondary schools. Future studies may be able to fill these gaps by applying it to less-studied subject areas and educational levels.

*b. Research Methods Applied*

Numerous research techniques were employed in the examined studies, but the most common ones were experimental and quasi-experimental designs (e.g., Putri & Sriyanto, 2022; Hadi et al., 2021; Esmaeili & Rastegarpour, 2016). These designs primarily evaluate how well Google Earth enhances particular learning objectives, such as engagement, critical thinking, and spatial reasoning. Purely qualitative methods (Ahmad et al., 2023; Alfiyana et al., 2022) emphasize the influence on student motivation and engagement through thematic

analysis or interviews, while mixed methods (e.g., Fatayan, 2024; Islami, 2018b) offer richer data by combining quantitative results with qualitative insights.

A considerable gap exists in the sparse use of longitudinal studies in spite of this methodological variation. The long-term impacts of Google Earth integration on students' retention of knowledge and abilities have not been thoroughly investigated because the majority of studies concentrate on short-term effects, which are frequently examined right after the intervention. Furthermore, although experimental designs are frequently used, participatory or design-based research methodologies that include students and teachers in developing Google Earth-based learning activities have not received much attention.

#### *c. Key Findings and Benefits*

The reviewed published studies consistently highlight Google Earth's ability to enhance student engagement, motivation and active learning. Such studies, as those conducted by Alfiyana et al. (2022), and Fatayan (2024), reported significant increases in student participation and enthusiasm, while Nurbaiti et al. (2021) and Hadi et al. (2021) emphasized its role in developing spatial intelligence and critical thinking. Google Earth makes it easier to visualize abstract ideas in subject-specific situations, such as geoscience procedures (Islami, 2018a) and mathematical spherical geometry (Nós & Motta, 2024). Furthermore, as demonstrated in the fields of remote sensing (Ghafur, 2023) and tourism geography (Ahmad et al., 2023), Google Earth connects theoretical understanding with practical implementations. This illustrates how well it works as an adaptable and multidisciplinary teaching tool.

#### *d. Challenges*

Despite these numerous advantages, there are still implementation and accessibility issues. According to Ali et al. (2024), problems like unequal access to technology and a lack of teacher preparation could prevent Google Earth from being widely used in classrooms. Furthermore, there are not many studies that discuss technical issues like reliance on the internet or navigation complexity that teachers or students may have when using these apps. These difficulties highlight the necessity of professional development initiatives and infrastructure development to facilitate successful integration.

#### *e. Research Trends and Potential Impacts*

These results show that using Google Earth to support transdisciplinary and active learning at different educational levels is becoming increasingly popular. The heavy emphasis on gauging immediate effects is reflected in the prevalence of experimental research, but it also highlights the need for more varied strategies, such as longitudinal and participatory studies. Using Google Earth in less-explored STEM subjects and vocational education could further demonstrate its adaptability. The influence and accessibility will also be increased by addressing current issues through suitable legislation and teacher training initiatives.

#### *f. Strengths and Weaknesses of This Research*

Based on the data of this study, the researchers identified several advantages and disadvantages. On the positive side, this study uses a narrative review method that allows for an in-depth analysis of the trend of Google Earth use in education. In addition, the researchers also analyzed various types of sources, thus providing a broader understanding. In addition, this study identified various disciplines and analyzed various research methods. On the other hand, despite presenting various advantages, this study also has several disadvantages. First, this study lacks strong quantitative data because it does not include empirical data or statistical analysis to support its

findings. Second, another disadvantage of this study is that it did not include a meta-analysis. Third, there is no in-depth discussion of the long-term impact of Google Earth's use in education, especially in terms of knowledge and skill retention.

#### g. *Theoretical and Practical Implication*

The results of this study have various practical and theoretical implications. Practically, this study confirms the need for a training program for teachers to optimize the use of Google Earth in various subjects. Theoretically, this study contributes to the field of educational technology, especially in understanding the integration of geospatial technology in learning. This study also confirms the need for longitudinal research to assess the long-term impact of Google Earth use on students' knowledge retention and spatial thinking skills. Furthermore, this study opens up opportunities for the development of geospatial technology-based learning models that can optimize learning experiences among students. In addition, Google Earth has the potential to support the development of digital literacy and 21<sup>st</sup> century skills, such as critical thinking and collaboration, which are increasingly relevant in the context of modern education. In terms of research methodology, this study also highlights the importance of further exploration of more varied research approaches, such as design-based and participatory approaches, which can provide deeper insights into the effectiveness of Google Earth in various educational contexts.

## CONCLUSION

Google Earth, in the context of learning, is a very flexible application. The findings of this study prove the flexibility of this technology because it can be integrated into various fields of study, especially geography. However, the use of this technology in the field still needs to be explored to maximize its potential. With its ability to provide advanced visualization, Google Earth integration has been shown to increase motivation, student engagement, and critical thinking skills in students. The findings of the study also provide the conclusion that developing teacher skills in using Google Earth in learning is very beneficial because the success of learning implementation depends on teacher skills in using Google Earth. Research that focuses on Google Earth uses various methods but the most dominant is experimental and quasi-experimental. Research involving repeated observations with a long period of time still needs to be done.

Based on the research findings, the researchers formulated several suggestions or recommendations to several parties. First, further research should be conducted on the integration of Google Earth in STEM fields such as biology, chemistry, and other environmental sciences. Further research is also recommended for the exploration of Google Earth in the field of vocational and vocational training. In addition, Longitudinal research is very necessary. The researcher also suggests developing and improving technological infrastructure, such as the internet, software, and hardware, so that Google Earth access can be more assisted. The researchers also suggest that the authorities design policies that encourage the use of geospatial-based technology such as Google Earth in the curriculum.

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