Systematic Literature Review: The Influence of Learning Media on Student Learning Outcomes on Solar System Material

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Abstract

Learning about the solar system at the junior high school level poses challenges due to its abstract nature, making conventional methods less effective. This study aims to analyze the effect of learning media on junior high school students' learning outcomes on solar system material using the Systematic Literature Review (SLR) method. Research data were collected through Google Scholar using the PRISMA (Preferred Reporting Items for Systematic Reviews-Meta Analysis) technique through four stages: identification, selection, eligibility, and inclusion. From 240 articles, seven national journal articles were selected as research data because they met the criteria determined by the researcher in the last five years. The literature review shows that interactive learning media such as Flashcards, Augmented Reality (AR), Interactive Multimedia, Articulate Storyline, Virtual Reality (VR), Science Monopoly, and Unity 3D can make abstract solar system material more concrete, thereby increasing students' enthusiasm, spirit, motivation to learn, and learning outcomes, as well as helping the right brain to remember concepts. The immersive, contextual, and enjoyable learning experience provided by learning media encourages deeper student engagement. The integration of appropriate learning media is essential to improve student learning outcomes, and the evaluation and updating of learning media must be carried out continuously to adapt to the characteristics of 21st-century students.

Introduction

Effective science education, particularly at the junior high school level, aims to cultivate students' curiosity and scientific thinking skills (Darojat et al., 2022). A key topic in this curriculum is the solar system, which is an abstract concept that students cannot observe directly in their daily lives. To bridge the gap between this abstract concept and student comprehension, the use of learning media becomes critical. Media serves as a concrete, interactive tool that can help students visualize complex ideas, making it easier for them to understand the composition and characteristics of solar system components (Fitra, 2022; Najib et al., 2023). Furthermore, innovative learning media not only aids conceptual understanding but also significantly enhances students' critical thinking and problem-solving skills (Fadillah et al., 2025). By leveraging relevant media, the learning process becomes more engaging, diverse, and aligned with current technological advancements, which ultimately boosts students' motivation to learn (Darojat et al., 2022).

Learning about the solar system that relies solely on lectures and textbook-based media with static images is less effective in providing a comprehensive understanding of the material, which leads to difficulties for students in analyzing the solar system and fails to stimulate their learning enthusiasm due to its monotonous nature (Darojat et al., 2022; Anggraeni, 2023). This can cause boredom in students which causes learning objectives to be difficult to achieve (Darojat et al., 2022). Learning media plays a pivotal role in the effectiveness of the teaching and learning process by serving as a bridge that facilitates the transfer of knowledge between teachers and students. Media utilization can also accelerate and facilitate the learning process so that learning objectives can be achieved (Suparmi et al., 2024).

Students' conceptual understanding cannot be achieved if they only rely on teacher interpretation using conventional methods, so it requires the use of special media for delivery (Nurhamidah et al., 2022; Tanjung et al, 2020; Rahmatilla & Tanjung, 2020). Learning media functions as a means, intermediary, tool and connector used to convey information and ideas. Learning media serves as a bridge that connects the enhancement of educational quality with technological advancements, as it has the capacity to engage students emotionally, cognitively, and motivationally by stimulating their thoughts, interests, and focus. Interesting learning media (interactive) can stimulate students' attention, imagination, and motivation to learn so as to create a conducive and enjoyable learning environment (Nadzif et al., 2021; Makhasin & Utami, 2023; Fadillah et al, 2025).

The topic of the solar system is a topic that is difficult to observe in reality because it is conceptual, so it requires visualization or animation assistance to facilitate learning (Herianto et al., 2017; Nadzif et al., 2022). Therefore, the delivery of material needs to be designed creatively, innovatively, and interestingly in order to stimulate the active involvement of students in constructing their scientific knowledge (Indrawati et al., 2021: Tanjung et al., 2023). The utilization of appropriate learning media not only increases students' interest in learning, but also has an impact on improving learning outcomes, especially in understanding abstract concepts such as the solar system. Thus, this study aims to analyze the effect of learning media on the learning outcomes of junior high school students on solar system material.

Research Method

This research uses the SLR (Systematic Literature Review) method with a descriptive-qualitative approach. Data were collected through searching various current scientific sources, such as journal articles and books, using database sources on Google Scholar (Wijaya et al., 2021). The selection of sources focused on the last 5 years of publication for journals and the last 15 years for books, to ensure the relevance of the information. The relevance of the information was determined based on the relevance of the journal and book contents to the focus of the research, namely the effect of learning media on the learning outcomes of junior high school students on solar system materials. Therefore, the search for selected sources used keywords such as learning

media, learning outcomes, junior high school students, and solar system material. The sources used are journals and books that review the effectiveness of learning media in the context of science, especially on solar system material, and include data on improving student learning outcomes through the use of media. Thus, the information obtained really supports the purpose and scope of this research.

Below is a flowchart of the selection of articles to be reviewed in the results and discussion, using the PRISMA (Preferred Reporting Items for Systematic Reviews-Meta Analysis) technique, which consists of four stages, namely identification, screening, eligibility, and inclusion (Festiyed et al., 2024). In the identification stage, articles were searched for and collected using Google Scholar based on the keywords "Learning Media on the Solar System" with publication restrictions from 2020 to 2025. A total of 240 articles were found in the initial search. These articles were then screened by evaluating the titles and abstracts, and only articles at the junior high school level were selected. The third stage was to examine the eligibility of the selected articles by looking at the focus of the research in the articles, and only articles that discussed the effect of learning media on solar system material in the context of ease, motivation, and learning outcomes were selected. The selected articles proceeded to the inclusion stage to be reviewed, analyzed, and summarized to describe the findings related to the effect of learning media on solar system material.
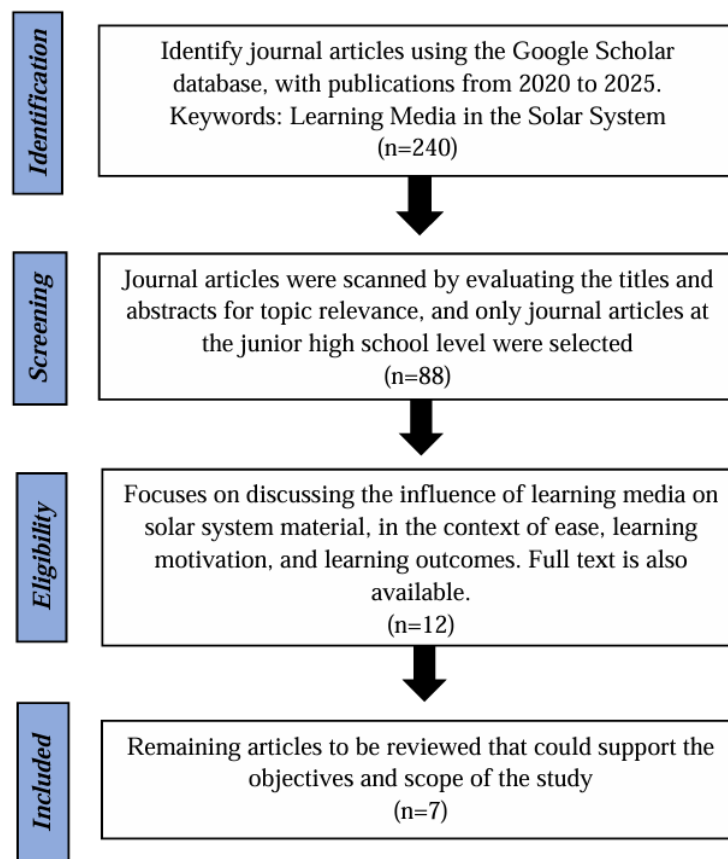

Figure 1. Flowchart of Article Selection

Result and Discussion

The research data in this literature review is a synthesis of various articles that discuss the effect of using learning media in solar system material on student learning outcomes. Students'

responses during the learning process using media on the topic of the solar system reflect how many learning outcomes are to be achieved. The high enthusiasm and interest of students during the learning process are positive indications of the success of the learning process.

Below are presented a number of types of learning media used in solar system materials and their impact on student learning interest. This information was obtained through collecting and analyzing various previous research results.

Table 1. Article Data on the Effect of Learning Media on Solar System Materials

Author(s)	Type of Learning Media	Impact of Learning Media on Solar System Learning
Anil Yusuf, I Nyoman Suardana, Kompyang Selamet. (2021)	Science Flashcards	– Flashcards are visual media in the form of cards that present images and information according to the lesson topic. – Helps the right brain work in remembering concepts through a combination of words and visuals. – Designed for learning while playing, making it more practical, interactive, and fun. – Attractive colors can attract students' attention to learn more enthusiastically.
Yulia Fatma, Armen Salim, Regiolina Hayami. (2021)	Android-based Augmented Reality	– Augmented Reality (AR) is a technology that combines two or three-dimensional virtual objects with the real world, complete with animation and sound. – Facilitate students to more easily understand the material through a three-dimensional visual display. – Overcoming the limitations of physical props that were previously an obstacle in learning. – Increase students' understanding and interest in the solar system.
Nanda Kresna Putra Pratama, Eka Pramono Adi, Saida Ulfa. (2021)	Interactive Multimedia	– The material is displayed using pictures The planet is equipped with audio. – Able to get students' attention and arouse enthusiasm and motivation to learn. – Presenting material clearly and easily understood by students. – Interaction is not only one-way from the teacher, students are also actively looking at and running the media. – Able to improve understanding, learning achievement and display data more interestingly.
Muhammad Nadzif1, Yudha Irhasyuarna, Sauqina. (2022)	Articulate Storyline	– Articulate storyline learning media is supported by text content, interesting quiz content, audio, images, including videos that can be arranged according to learning objectives. – The results of learning media expert validation show that this media is proven to be able to present complete material and support interactivity well. – Student learning outcomes have improved and are better than conventional media.

		–	Students are enthusiastic in learning using Articulate Storyline learning media and are helped in learning.
Muhammad Abid Darojat, Saida Ulfa, Agus Wedi. (2022)	Virtual Reality	–	Virtual Reality media makes it easier for students to understand the arrangement of the solar system because the display is 360 degrees, so users feel as if they are directly in space.
		–	Student learning interest increases thanks to the supporting media used during the learning process.
Miftia Ainul Arifah, Fenny Widiyanti. (2023)	Science Monopoly Media	–	The Teams Games Tournament (TGT) model using monopoly game media can improve student learning outcomes on the topic of the solar system.
		–	Students' pretest and posttest scores increased by 50% after using IPA monopoly media on solar system material.
		–	Students in one class managed to get a score of ≥ 70.
Ni Wayan Suparmi, Ngurah Mahendra Dinatha, Maria Yuliana Kua. (2024)	Unity 3D	–	The average score of students who learn with Unity 3D-based learning media on solar system material is higher than students who use traditional media.
		–	Unity 3D media supports the improvement of learning outcomes of solar system materials.
		–	Unity 3D media makes learning materials delivered effectively and the learning process becomes more interesting.

The research data in this literature review is a synthesis of various articles that discuss the effect of using learning media in solar system material on student learning outcomes. Students' responses during the learning process using media on the topic of the solar system reflect how much learning outcomes are likely to be achieved. The high enthusiasm and interest of students during the learning process is a positive indication of the success of the learning process. Below are presented a number of types of learning media used in solar system materials and their impact on student learning interest. This information was obtained through collecting and analyzing various previous research results.

Based on the information listed in Table 1, the utilization of a variety of interactive learning media significantly contributes to improving student learning outcomes, especially for a complex topic like the solar system. The findings show a clear pattern: each type of media analyzed was effective in making the abstract concepts of the solar system more concrete and accessible to students, while also increasing their motivation and engagement. This aligns with the view that visual media is effective for helping students grasp difficult concepts.

Visualization and interactive simulations in digital media are also considered effective in supporting student understanding (Rahmawati et al., 2021). Furthermore, Handayani & Fitria (2022) also emphasized that interactive media can increase student participation in the learning process. Kurniawan et al. (2021) even emphasized that the presence of digital media can generate enthusiasm for learning and more optimal learning outcomes. Alifah et al. (2023) also supported this by stating that the use of digital media in thematic learning made a positive contribution to student learning achievement.

Findings from a Systematic Literature Review (SLR) indicate that the effective use of learning media for solar system material at the junior high school level is crucial for enhancing student comprehension. Various studies in the field highlight the importance of innovative media. For instance, media that combines visual, interactive, and textual elements has been found to be highly effective in stimulating the right brain activity of students who are more responsive to colors and illustrations, as shown by research from Yusuf et al. (2021).

Moreover, the SLR reveals that media emphasizing active student participation can create a more engaging and less monotonous learning atmosphere. Sari and Putra (2022) found that this type of media, such as flashcards, can significantly increase student involvement, particularly in science learning. This finding is supported by Ain et al. (2023) and Irmadani (2024), who concluded that media with strong visual and interactive elements are highly beneficial for improving student memory. More specifically, Wulandari & Nurhadi (2023) proved that flashcards can significantly deepen students' understanding of the solar system concept. Based on these findings, it can be concluded that the use of engaging and communicative media strongly supports the achievement of learning objectives by transforming abstract concepts into concrete and easily understood visuals.

On the other hand, Android-based Augmented Reality (AR) technology also shows an extraordinary ability to present learning objects in three dimensions. Students can observe the solar system model in 3D with sound and animation, making learning feel more real (Fatma et al., 2021). Compared to conventional methods like lectures, technology-based learning approaches offer a more contextual and engaging learning experience, aligning with the rapid advancements of the current digital era (Lubis et al., 2016). The use of learning media in the form of interactive multimedia, such as images and audio, has also proven effective in supporting student understanding. When the material is presented visually and not monotonously, students' interest and motivation increase (Pratama et al., 2021). This is in accordance with Arsyad's (2017) view, which states that interactive media can strengthen students' understanding and engagement with the subject matter.

Articulate Storyline media is also an interesting solution, because it is able to combine text, images, video, audio, and interactive quizzes, all of which are designed in accordance with learning objectives (Nadzif et al., 2022). The quiz feature shows the application of scientific-based learning that emphasizes exploration and self-evaluation (Sani, 2014). In addition, the use of Virtual Reality (VR) allows students to directly experience space simulations, exploring the solar system in a more real context (Darojat et al., 2022). This approach certainly presents a learning experience that cannot be felt only through textbooks or lecture methods alone, while strengthening the principle of learning based on direct experience or learning by doing (Arsyad, 2017). Educational games such as Monopoly Science also show their effectiveness. Through the combination of game aspects and positive competition, students show increased motivation and involvement in the learning process (Arifah & Widiyanti, 2023). Such an approach is in line with the theory of constructivism, which emphasizes that knowledge will be more easily formed through direct learning experiences (Trianto, 2013).

Unity 3D-based media is an important breakthrough in learning abstract concepts such as the solar system. Its three-dimensional display and interactive features make the material feel more real and easily digested by students. Not only that, the use of this media is also able to liven up the classroom atmosphere and make the learning process more enjoyable. According to Suparmi et al. (2024), the use of Unity 3D in learning is effective in creating a learning experience

that is far from boring. This reinforces Sani's (2014) opinion that digital media needs to be an important part of the implementation of scientific-based learning.

Overall, the various studies reviewed show harmony between empirical findings and learning theories contained in educational literature. Modern learning media are proven to not only improve learning outcomes from the cognitive side, but also have an impact on affective aspects, such as learning motivation, curiosity, and active participation of students. This is in line with Suparman's (2021) view, which emphasizes the importance of relevant media to answer students' learning needs in the digital era. Handayani & Fitria (2022) also conveyed that contextual and interactive learning media make students feel closer to the material being studied, so that their involvement in the classroom becomes higher.

It should be realized that although learning media does not necessarily directly improve students' final grades, media that suits their characteristics and interests will provide a strong motivational boost. In the end, it is the motivation that determines learning outcomes. Research by Auli et al. (2023) shows that students with high motivation show more effort in achieving learning targets. Putri & Hidayat (2020) also revealed that learning media that emphasize visual and interactive aspects have a significant impact in increasing students' enthusiasm for learning. Kurniawan et al. (2021), that media that support exploration and learning experiences can encourage students to be more active and independent. Therefore, it is important for teachers to continue to update and adapt the media used to the character of students and technological developments. That way, the media applied will be aligned with students' learning styles (Tanjung et al., 2023), and ultimately have a positive impact on improving the quality of their learning outcomes. In other words, the right learning media greatly contributes to optimal learning achievement.

Conclusion

Flashcards, Augmented Reality (AR), Interactive Multimedia, Articulate Storyline, Virtual Reality (VR), Science Monopoly, and Unity 3D—significantly improves junior high school students' understanding of solar system material. These media not only help transform abstract concepts into more concrete and easily understood ideas but also foster student interest and motivate them to be more active in the learning process. The use of appropriate media makes students more concentrated, actively involved, and more motivated, which leads to a more striking development in their academic achievement when compared to conventional learning methods.

The immersive, contextual, and fun learning experiences provided by these media encourage deeper student engagement, as seen in the improved learning outcomes of students who participated in technology-based learning. This finding highlights the importance of integrating learning media that is relevant to technological advancements and the needs of 21st-century students. Therefore, educators must continuously evaluate and develop their media to ensure it remains relevant to the characteristics and learning styles of their students, ultimately leading to optimal learning achievement.

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