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Interactive Media Requirements for Elementary Solar System Education: A Needs Analysis Study

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Abstract
Science learning, particularly on the topic of the solar system, involves a variety of conceptual understandings. The solar system material can be categorized into four types of concepts: abstract concepts (43%), concrete concepts (14%), abstract concepts with concrete examples (29%), and descriptive concepts (14%). Given the dominance of abstract consept, the role of interactive multimedia is essential in helping students develop a solid understanding of the subject matter. Interactive media-based learning is considered an essential innovation in science education, offering new ways to engage students and support conceptual comprehension through visual and interactive elements. This study aims to analyze the initial needs for interactive media in teaching the solar system as part of promoting innovative science learning. This research employed a qualitative descriptive method, utilizing both literature reviews and field observation as its primary data collection techniques. Data were gathered through teacher interviews, student questionnaires, and a review of relevant references. The findings revealed that students tend to prefer using interactive media in learning, and teachers also favor digital media in the classroom. However, the current use of digital media is still limited, mostly relying on PowerPoint presentations and online videos that are not specifically designed for the learning objectives.

INTRODUCTION

Science education in elementary schools plays a crucial role in developing students' scientific thinking and foundational understanding of scientific concepts. Through the science learning, students are equipped with the ability to observe natural phenomena and cultivate critical and objective thinking skills (Salsabila & Aslam, 2022). One of the science topics taught in elementary school is the solar system, which consists of various concepts with differing levels of complexity. The content and concepts in science instruction are often abstract in nature, thus requiring learning media that can effectively visualize the material to make it more accessible and comprehensible for students (Salsabila & Aslam, 2022). The predominance of abstract concepts in the solar system topic presents a unique challenge for elementary students, who, according to Jean Piaget's theory (2000), are still in the stage of concrete operational cognitive development.

In this context, the presence of interactive media is highly strategic (Li, 2024) in bridging the gap between the abstract content and the cognitive development of the students. Interactive learning media play a critical role in facilitating the delivery of content in an engaging manner that is easier for students to comprehend, while also fostering an interactive and supportive learning environment that promotes effective and efficient instruction (Audia et al., 2021). Interactive media provide detailed visualizations and practical learning experiences (Siston et al., 2023) enabling students to understand

scientific concepts more realistically and within broader contextual frameworks. Moreover, the use of media helps clarify instructional content, thereby supporting the achievement of learning objectives in an optimal way (Kustandi & Darmawan, 2020).

Teachers, as the front line in the effort to educate the nation, must be able to adapt to the evolving times by integrating technology into educational practices (Feri & Zulherman, 2021). Learning in the digital era differs significantly from conventional methods, where the teacher traditionally served as the central source of information (Kuswara & Sumayana, 2020; Suartama et al., 2020). Technological advancement has brought about a transformative impact on education, influencing not only thinking patterns, work structures, and lifestyles (Efriyanti & Annas, 2020; Roza et al., 2021) but also enhancing teaching processes for educators and expanding learning resources for students (Djannah et al., 2021; Pratiwi et al., 2021). The integration of technology into the learning process is essential for shaping students who are adaptive, critical, collaborative, and globally competitive (Gamboa-Rosales & López-Robles, 2023).

Numerous previous studies have examined the effectiveness of interactive media in improving student learning outcomes; however, most of these studies have primarily focused on evaluating existing media products and their implementation phases. There is still a lack of research that specifically addresses the identification of needs for interactive media, particularly in the context of teaching the solar system. In fact, needs analysis is a crucial foundation in the media development process to ensure that the resulting product is aligned with the real conditions, challenges, and specific needs of its users—namely, teachers and students.

Accordingly, this study holds a significant position in addressing gaps within the existing literature by focusing on the initial stage of instructional innovation-specifically, the needs analysis for interactive media in science education. Employing a qualitative approach, the research explores in depth the perceptions of both teachers and students regarding the use of media in teaching the solar system, while also identifying challenges and expectations toward ideal media design. This study is expected to contribute meaningfully to the development of innovative, digital-based science learning tools and serve as an early reference for media developers in designing instructional aids that are relevant, effective, and contextually aligned with the needs of elementary school learners.

The interview result from six classroom teachers at SDN Suru Ponorogo indicate that the abstract nature of science content presents unique challenges in the learning process. Teachers reported that students often struggle to grasp concepts that cannot be directly observed, such as planetary motion or the structure of the solar system. In this context, the presence of digital-based instructional media is deemed essential to create learning experiences that are more engaging, interactive, and meaningful through concrete visualization. Such media not only serve as supporting tools but also act as a means to transform conventional teaching into a more innovative approach, aligned with the needs of today's learners. Therefore, it is necessary to conduct research that specifically focuses on identifying the content and media needs in order to ensure that any media developed is truly relevant and contextually suited to the conditions and challenges faced in elementary school settings.

METHODS

This study adopted a qualitative descriptive design. This approach emphasizes the processing and presentation of data in a descriptive manner to obtain an objective depiction of a condition or phenomenon (Djam'an Satori, 2011). A descriptive qualitative method was used to describe the research phenomenon without manipulating the research variables, with data collection carried out through interviews (Bahri, 2017).

Data collection involved both literature review and field study. The literature review began with gathering findings from previous research and identifying relevant references related to the topic. This stage also included an analysis of concepts within the solar system material, serving as a theoretical basis for the need for interactive media (Shofa et al., 2020). Meanwhile, the field study consisted of

semi-structured interviews with teachers at SDN Suru and the distribution of questionnaires to sixth-grade students at the same school. Accordingly, the study's respondents included six teachers and seventeen sixth-grade students from SDN Suru Ponorogo.

The research instruments comprised a semi-structured interview guide administered to the six teachers and a questionnaire completed by the seventeen students. The interview instrument was organized into four indicators, each containing three to five semi-structured questions. This format allowed for the inclusion of follow-up questions based on the respondents' answers. The questionnaire consisted of ten statements that required students to choose between two alternative responses. The following section presents, in sequence, the table of semi-structured interview instruments and the student questionnaire instrument.

Table 1. Semi-structured interview instuments for teachers

Num.	Indicator	Semi-Structured Question
1.	Teachers' experience in using interactive media	1. Have you ever used digital media? 2. Was that digital media created by yourself? 3. How did you obtain the media? 4. What types of media do you often use? 5. How do you access the media?
2.	The importance of media in the learning process	1. How important is the use of interactive media in learning? 2. Do all subjects require interactive media? 3. How important is the use of interactive media in the topic of the solar system?
3.	The role of media in teaching and learning	1. What are the roles and functions of media in learning? 2. Can interactive media foster students' motivation and enthusiasm for learning? 3. Can the use of interactive media help students better understand the material?
4.	Criteria for effective instructional media	1. What are the criteria for good learning media? 2. Are there any specific elements that must be included in good media? 3. Should the media contain engaging educational videos?

Table 2. Questionnaire instrument for students

Num.	Question
1.	Is a projector and speaker facility available in the classroom?
2.	Has the teacher ever used learning media?
3.	What media does the teacher often use in the classroom?
4.	Does the teacher frequently use interactive media in the classroom?
5.	Are you able to understand the teacher's explanation without a simulation video?
6.	Do you like it when the teacher uses media during the learning process?
7.	Are you more motivated to learn when learning media is used?
8.	Has the teacher ever used interactive media in teaching?
9.	Do you prefer to access interactive learning media through a smartphone or a laptop?
10.	Does the solar system topic require the use of interactive media?

RESULTS AND DISCUSSION

Result

The initial stage in the development of interactive multimedia begins with a needs analysis. This analysis is a crucial step, as it involves identifying the necessary elements to ensure that the developed media truly addresses instructional requirements. In conducting the needs analysis, an in-depth literature review is carried out to understand the characteristics and implementation of interactive media, thereby establishing a strong theoretical foundation. Additionally, the analysis

includes a review of the content concepts to be presented in the interactive media, ensuring that the material is relevant to the learning objectives and capable of supporting students' competency achievement. Accordingly, the results of this study serve as the primary foundation that will determine the direction for designing and developing effective and innovative learning media.

This section presents the results of the analysis of the solar system concepts taught in elementary school, as well as the need for interactive media based on findings from semi-structured interviews with teachers and questionnaires distributed to sixth-grade students. To analyze the content, the concept identification framework developed by Herron (1977) was employed. Herron categorized science concepts into eight levels of abstraction and complexity: (1) concrete concepts, (2) abstract concepts, (3) abstract concepts with concrete examples, (4) principle-based concepts, (5) concepts involving symbols, (6) process-oriented concepts, (7) descriptive concepts which expressing properties and attributes, and (8) concepts expressing the nature and names of attributes.

Table 3. Identification material concepts of the solar system topic

Num.	Sub Topics	Definition	Concept
1.	Definition of solar system	The solar system is a collection of planets, moons, and other celestial bodies that orbit the Sun.	Abstract
2.	Layers of the earth	The Earth is composed of four main layers: the crust, the mantle, the outer core, and the inner core. • The crust is the Earth's outermost layer and serves as the habitat for all living organisms. • The mantle lies beneath the crust and is made up of rocks rich in iron, magnesium, and other elements. • The outer core is a liquid layer located above the inner core and beneath the mantle. • The inner core is the Earth's deepest layer, composed primarily of solid metal.	Abstract
3.	Earth's rotation and revolution	Earth's rotation is the spinning of the Earth on its axis from west to east, taking approximately 24 hours to complete one full rotation. Earth's revolution is the Earth's movement around the Sun along an elliptical orbit, taking about 365.25 days, or one year, to complete one cycle.	Abstract
4.	Effects of earth's rotation and revolution	The rotation of the Earth causes the daily cycle of day and night. The revolution of the Earth results in seasonal changes across different parts of the world and affects the varying length of day and night in each hemisphere.	Abstract concept with concrete example
5.	Definition of planet	A planet is a celestial body that orbits a star—such as the Sun—and is nearly spherical in shape. The Sun is the center of the solar system and is a very glowing hot star.	Abstract concept with concrete example
6.	Planets in the solar system	The solar system consists of eight planets, each with unique characteristics: • Mercury is the closest planet to the Sun, experiencing extreme heat and is uninhabitable. • Venus is very bright and extremely hot. • Earth is the only known planet that supports life. • Mars is known for its red appearance. • Jupiter is the largest planet and has many moons. • Saturn is famous for its prominent rings. • Uranus is tilted on its axis and has a bluish-green color. • Neptune is a distant gas giant with strong winds and numerous moons.	Descrition concept
7.	Impact of the human activities on environmental changes	Human activities such as deforestation, air and water pollution, and excessive plastic use have caused significant environmental damage. These impacts include climate change, pollution, and disruptions to the balance of ecosystems.	Concrete

Herron's theoretical framework enables an in-depth analysis of the cognitive difficulty level of each concept taught and serves as the basis for designing instructional media that aligns with identified needs. In this context, the solar system, as a topic in elementary science education, involves varying levels of conceptual complexity that cannot be fully explained using conventional teaching methods. Therefore, understanding Herron's concept classification is highly relevant as a theoretical foundation in developing interactive media that can bridge students' difficulties in understanding abstract concepts. This theoretical framework not only strengthens the content analysis but also guides the design of instructional media as an innovation in science education.

Based on the identification of subtopics within the solar system subject matter (table 3), a classification of concept types was conducted referring to the theory or approach proposed by Herron. This theory categorizes concepts into several types, each possessing distinct characteristics relevant to the learning process. Following this identification, a conceptual mapping diagram was developed as a visual representation illustrating the relationship between the subtopics and the types of concepts contained within them. The results of the conceptual analysis of the solar system material can be observed and understood through the concept mapping diagram presented below.

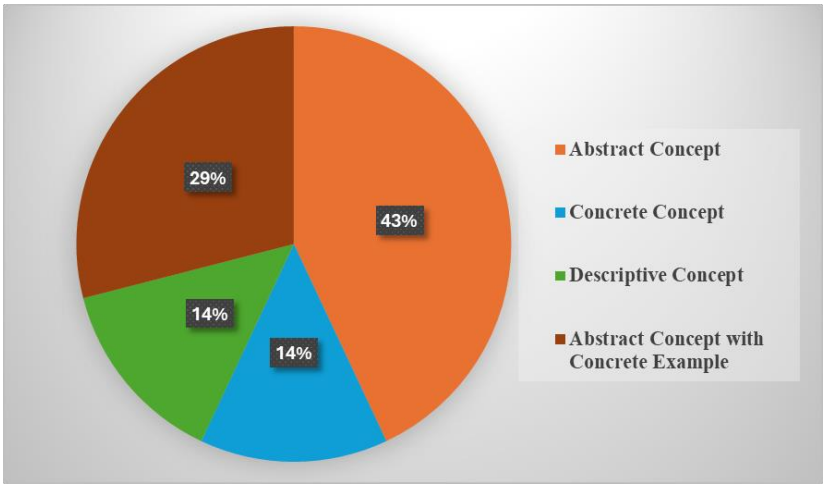

Figure 1. Percentage Analysis of Conceptual Content in the Solar System Topic

Based on the concept mapping the diagram (figure 1), it can be observed that the concepts within the solar system topic are classified into four distinct types: (1) abstract concepts (43%), (2) concrete concepts (14%), (3) abstract concepts with concrete examples (29%), and (4) attribute-describing concepts (14%). Among these, abstract concepts represent the highest proportion, accounting for 43% of the overall content in the solar system topic. Abstract concepts with concrete examples comprise 29% of the material. Meanwhile, concrete concepts and attribute-describing concepts each constitute 14% of the total content.

The subsequent stage involves analyzing the needs of both students and teachers regarding the use of interactive media in the learning process. This step is crucial to ensure that the media being developed aligns with the actual needs of its users—teachers and students alike. Involving students and incorporating their input in media development not only enhances the quality and relevance of the content but also contributes to making the media more engaging and user-oriented (McLachlan & Tippett, 2024) Data collection was conducted through interviews with teachers to explore their needs and readiness in utilizing interactive media, as well as through the distribution of questionnaires to sixth-grade students to identify their needs related to the use of interactive media in classroom learning activities.

The interviews were conducted with six teachers from SDN Suru, Ponorogo. The selection of participants was based on the total number of classroom teachers available at the school and their

direct involvement in teaching the solar system topic to sixth-grade students. The results of the interviews revealed that teachers expressed a strong need for interactive media in the classroom, particularly for teaching the solar system content, which includes abstract phenomena that cannot be directly observed by the human eye.

Based on the responses from the informants related to Indicator 1, which concerns experience in using media, Informant 1 stated that they consistently use teaching media in the form of self-created PowerPoint presentations for all subjects, not limited to the solar system topic (I1/N1-DR). In contrast, Informant 2 expressed a preference for using video media downloaded from online platforms such as YouTube, as they believe videos are much more effective in capturing students' interest compared to text-only presentations (I1/N2-KS).

Regarding Indicator 2, which addresses the importance of media in learning, Informant 2 emphasized that media plays a critical role in the learning process. They often observe students losing focus during class, especially close to dismissal time. Therefore, presenting engaging media helps refocus students on the lesson. Informant 2 further stated that all abstract topics require media to facilitate students' understanding and comprehension of the material (I2/N2-KS). Similar sentiments were expressed by Informant 3, who suggested that whenever possible, all topics should occasionally incorporate media. This aligns with the advancement of technology, which should be optimized in classrooms to foster innovation in science education (I2/N3-BR).

Further responses related to Indicator 3, concerning the role of media in learning, were provided by Informants 4 and 5. Informant 4 explained that the use of media is no longer optional but a critical necessity for teachers, especially when teaching complex topics like the solar system. Relying solely on one-way explanations makes it difficult for students to grasp the material, leading to boredom during lessons. Therefore, media presence is considered essential in such situations (I3/N4-RL). Additionally, Informant 5 highlighted that incorporating media creates a more enjoyable learning atmosphere. When teachers use engaging animation videos, students are more likely to respond actively and ask questions, thereby stimulating curiosity and learning motivation (I3/N5-BK).

According to Informant 5, the criteria for teaching media, aligned with Indicator 4, must support the learning objectives. Furthermore, the media should be accessible to students at home or anywhere else, allowing them to review the material at any time (I4/N5-BK). Informant 6 added that good teaching media should foster students' interest, enthusiasm, and motivation. This is particularly achievable through effective and efficient use of interactive media. Interactive media not only presents material in text form but also includes illustrations such as simulation videos, related videos, and images tailored to students' characteristics (I4/N6-OW).

The next step involved distributing questionnaires to all sixth-grade students at SDN Suru Ponorogo. The respondents consisted of the entire population of sixth-grade students at the school. The questionnaire results indicated that students desire and need the use of instructional media in the classroom. This is evidenced by the fact that 100% of students agreed that they like it when teachers use media during the learning process. Furthermore, 88% of students reported feeling more motivated to learn when instructional media is used in class. This need arises because not all students are able to fully grasp the material delivered by the teacher; 35% of students admitted they did not understand the teacher's explanation, thus requiring supplementary media as a more effective means of conveying the material. However, teachers currently tend to be limited to using media such as PowerPoint presentations or videos downloaded from online platforms like YouTube. According to the students, 59% indicated that teachers most often use PowerPoint, while 41% reported the use of instructional videos. Specifically, regarding the solar system topic, 82% of students expressed the need for instructional media, and 76% stated that the solar system material is difficult to visualize without the support of such media.

After completing all field activities, the next stage was the collection of supporting literature related to the need for instructional media in the classroom. The literature review focused on studies conducted within the last five years. The findings from these previous studies were analyzed to

determine how they support the results of the current research. The summary of these previous studies is presented in the table below.

Table 4. Literature review from the relevant previous studies

Num.	Research Title	Research Finding	Reference
1.	Pengembangan Media Pembelajaran Augmented Reality Mata Pelajaran IPA Sistem Tata Surya	The development of augmented reality (AR) media yielded positive outcomes in delivering the solar system material to students, enabling them to comprehend the content effectively.	Susilaningsih et al. (2023)
2.	Pengembangan Multimedia Sistem Tata Surya pada Muatan IPA Kelas VI	The interactive multimedia for the solar system was found to be valid and effective for use in teaching the solar system topic.	Putra et al. (2021)
3.	Pengembangan Media Berbasis Android pada Materi Sistem Tata Surya untuk Meningkatkan Penguasaan Konsep Siswa	The Android-based application as an interactive medium for the solar system material has been tested and deemed feasible for use as a learning tool.	Siti Deti Nurhamidah et al. (2022)
4.	Pengembangan MediaPembelajaran Interaktif Sistem Tata Surya Menggunakan Metode Development Life Cycle	The design test conducted using the multimedia development life cycle for the solar system material produced favorable results, confirming its suitability for educational purposes.	Eka Widiati et al. (2023)
5.	Pengembangan Media Interaktif Pengenalan Sistem Tata Surya Menggunakan Frame Work MDLC	The developed interactive media successfully increased student engagement during the learning process and demonstrated positive effects.	Astuti et al. (2019)
6.	Pengembangan Multimedia Interaktif (SITAYA) Sistem Tata Surya untuk Siswa Kelas 6 di SDN Kraton Kabupaten Kediri	The SITAYA media developed for the solar system topic at SDN Kraton Kediri proved valid, practical, and effective, making it appropriate for classroom use.	NINGTIYAS et al. (2024)
7.	Implementasi Media Pembelajaran Interaktif "Sistem Tata Surya" untuk Kelas VI Sekolah Dasar	The interactive media for the solar system material effectively facilitated students' understanding of the subject matter.	Sri Nugraha & Hidayat (n.d.)
8.	Pengembangan Media Interaktif Berbasis Articulate Storyline pada Pembelajaran IPA Materi Sistem Tata Surya untuk Meningkatkan Literasi SAINS	During media testing, the interactive media scored 86% on validity (categorized as valid), 100% on practicality, and achieved a moderate effectiveness level with an N-Gain score of 0.57. These results indicate that the media is suitable for use.	Supeno et al. (2022)
9.	Pengembangan Multimedia Pembelajaran Interaktif Sistem Tata Surya Berbasis Literasi Sains untuk Siswa SD	The validity test showed excellent results, recommending the media as a supportive tool for science learning, particularly for introducing and deepening students' understanding of the solar system.	Najib et al. (2023)
10.	Augmented Reality Berbasis Android sebagai Media Pembelajaran Sistem Tata Surya	The augmented reality-based interactive media integrates real and virtual worlds, ensuring the material is delivered clearly and comprehensively.	Fatma et al. (2021)

Discussion

In the research findings outlined above, the concepts embedded within the solar system material are classified into four distinct types according to Herron's (1977) theoretical framework. The concepts within the solar system topic consist of: (1) abstract concepts (43%), (2) concrete concepts (14%), (3) abstract concepts with concrete examples (29%), and (4) descriptive concepts (14%). Each of these concept categories possesses different cognitive characteristics, thereby requiring tailored strategies and specific types of media for effective teaching. Abstract concepts in the solar system material include ideas such as orbital paths, Earth's rotation and revolution, interactions between celestial bodies, and the Earth's internal layers—phenomena that cannot be directly observed. Herron emphasizes that abstract concepts demand higher-order thinking skills and heavily rely on the teacher's or media's ability to facilitate visualization and meaningful comprehension. With a

dominance of 43%, abstract concepts highlight the critical need for interactive media to assist in transforming these intangible ideas into more concrete and meaningful learning experiences (Dita et al., 2021).

Concrete concepts pertain to tangible objects or phenomena that can be perceived and directly observed, such as the impact of human activities on environmental changes. In the solar system material, concrete concepts account for 14% of the content, indicating that only a limited portion of the material involves directly observable elements. According to Herron, these concepts are relatively easier for students to grasp as they do not require advanced abstraction processes. Therefore, while the necessity for media support is less urgent for concrete concepts, the use of media can still enrich the learning process as a valuable innovation. The third type, abstract concepts with concrete examples, constitutes 29% of the overall content. This category is distinctive in that it combines abstract ideas with associations to tangible phenomena. For instance, the effects of Earth's rotation causing day and night, and Earth's revolution resulting in seasonal changes, can be theoretically explained while being supported by real-life illustrations. In addition, discussions about the planets can be enhanced with concrete representations such as planetary models. According to Safirah & Suhartiningsih (2023), this type of concept is best conveyed through a contextual approach that integrates theoretical understanding with practical application. Interactive media play a crucial role in bridging students' comprehension through simulations, animations, or videos that illustrate real-world scenarios.

Concepts that describe properties account for 14% of the total material. This type of concept involves describing the characteristics of planets or celestial phenomena, such as planetary size, surface temperature, color, and distances between celestial bodies. Herron refers to these as descriptive concepts, which require data representation and object comparison to reinforce understanding. For this type of concept, interactive media are essential in presenting vivid visualizations of each planet, allowing students to observe and compare their properties systematically and engagingly. The need for interactive media, based on the concept classification, is further supported by interview findings with six teachers, all of whom emphasized the importance of using media in science education—particularly for the solar system topic—as a means to enhance students' understanding of abstract concepts. Teachers generally prefer digital tools such as PowerPoint presentations and online videos, which are perceived to attract students' attention and reduce classroom monotony. However, most of the media currently employed remain passive and lack full interactivity (Ramadhani & Asrul, 2024). Teachers overwhelmingly asserted that media should not merely serve as supplementary tools, but rather as essential components of science learning. Engaging media are considered effective in improving student focus, sparking curiosity, and creating a more enjoyable learning atmosphere. Additionally, teachers expressed a desire for learning media that students can access outside of the classroom to support continuous learning.

Furthermore, the results of student questionnaires revealed that all sixth-grade students enjoyed the use of instructional media, and 88% reported feeling more enthusiastic when media were used during lessons. These findings underscore the crucial role of media in enhancing both student motivation and the effectiveness of science learning. A total of 35% of students admitted having difficulty understanding the teacher's direct explanations, highlighting the necessity of media as a visualization aid—especially for abstract content such as the solar system. Unfortunately, the media used by teachers remains limited to PowerPoint (59%) and online videos (41%), both of which tend to be one-directional and lack interactivity. Specifically regarding the solar system topic, 82% of students stated that they require instructional media, while 76% reported struggling to visualize the concepts without visual support.

These findings underscore the urgent need to develop interactive media as an innovative approach to science education. Both teachers and students rely on the presence of media as an essential support for the learning process. Interactive media that align with the characteristics of elementary school students not only assist in visualizing abstract concepts but also foster a learning

environment that encourages interaction and meaningful student engagement(Blyznyuk & Kachak, 2024; Imansyah & Hasanah, 2024). Such innovation is consistent with the demands of 21st-century education, which emphasizes meaningful, student-centered learning. Moreover, the use of educational media contributes to the development of students' scientific understanding, which is valuable for their continued learning at higher levels of education (Georgieva-Tsaneva & Serbezova, 2022).

Previous studies have demonstrated that the development of interactive learning media for the solar system topic has made a significant contribution to improving the quality of science education at the elementary level. For instance, findings by Susilaningsih et al. (2023), Fatma et al. (2021), and Najib et al. (2023) confirm that the use of augmented reality (AR) technology and science literacy-based multimedia significantly enhances students' understanding of abstract concepts in the solar system. These media have been proven effective in providing concrete visualizations, strengthening information retention, and increasing active student participation during the learning process. Furthermore, studies conducted by Putra et al. (2021), Siti Deti Nurhamidah et al. (2022), and Supeno et al. (2022) reinforce these findings by stating that Android-based media and applications developed using Articulate Storyline have been found to be valid, practical, and effective for science instruction. Interactive media developed through instructional design approaches, such as the Multimedia Development Life Cycle (MDLC), also received positive responses from both students and teachers, as evidenced in the research conducted by Eka Widiati et al. (2023) and Astuti et al. (2019).

When compared with the findings of this study, it can be concluded that there is a strong alignment between the empirical needs observed in the field and the emerging trends in science education media innovation. The results reveal that most teachers are still limited to using presentation-based media such as PowerPoint or passive instructional videos. On the other hand, student questionnaire responses indicate a high level of interest in interactive and visual learning media, especially for the solar system topic, which is largely composed of abstract concepts that are difficult to visualize directly. Accordingly, the findings of this study provide contextual and factual evidence regarding the actual needs of both teachers and students for more innovative and adaptive learning media. In addition to reinforcing the results of previous research, this study also highlights the urgency of developing interactive media that align with the characteristics of the subject matter, students' learning needs, and the advancement of modern educational technology. However, this study has several limitations. First, the sample involved only one elementary school, which limits the generalizability of the findings to other schools. Second, the scope of the research was confined to the solar system topic in sixth-grade science, meaning the results may not be applicable to other subjects or grade levels. Third, the study only focused on identifying the initial needs of teachers and students and did not proceed to the development stage of the learning media. As such, no tangible product has yet been created for immediate implementation.

CONCLUSION

Science education at the elementary level often involves abstract concepts that are difficult for students to grasp and internalize. In the solar system topic, abstract concepts account for 43% of the total content taught. Moreover, other types of concepts may also require the support of interactive media. The findings of this study indicate that both teachers and students share a common need for the presence of interactive media in the learning process. In addition to its crucial role in visualizing abstract concepts that are otherwise inaccessible to students, interactive media is also expected to enhance students' interest, enthusiasm, and motivation in learning science. The integration of interactive media as a teaching aid reflects a positive response to educational modernization in line with rapid technological advancement.

Based on the findings of this study, which highlight a mutual need among both teachers and students for interactive media in learning—particularly in the solar system topic—several recommendations can be made. Teachers, as educators, require media tools to foster an effective and

productive learning environment, as well as to facilitate students' understanding of solar system content. Students, on the other hand, express the need for interactive media because the abstract nature of the solar system is more comprehensible when supported by visual illustrations that represent phenomena not directly observable.

Therefore, the implication of the study's findings is the urgent need for the development of interactive media that can address the learning challenges faced by both teachers and students. Future research is encouraged to develop digital-based interactive media tailored to the identified needs of teachers and students, particularly for topics involving abstract content. Furthermore, it is essential to assess the effectiveness of such media to determine its impact on conceptual understanding and student learning outcomes in a broader and more generalizable context.

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