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# BRINGING THE SOLAR SYSTEM TO LIFE: INTERACTIVE MORPH-BASED POWERPOINT TO ENHANCE ELEMENTARY STUDENTS' ENGAGEMENT

**Nanaz Nur Fadillah[1], Yayan Carlian[2], Ani Yanti Ginanjar[3], Djadjang Djuniardi[3]**
*[123]PGMI, Tarbiyah dan Keguruan, UIN Sunan Gunung Djati, Bandung*
*[4] SD Plus Al-Ghifari, Bandung*
nanazfadillah@gmail.com

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## *ABSTRACT*

*This study aims to develop and evaluate Morph-based interactive PowerPoint learning media to enhance elementary students' engagement in learning the solar system. Despite the growing use of digital learning media, limited studies have specifically examined Morph-based PowerPoint focusing on students' multidimensional engagement, including behavioral, emotional, and cognitive aspects. This study employed a Research and Development (R&D) approach by integrating the ADDIE model with Sukmadinata's development stages, including preliminary study, product development, and product testing. The participants consisted of 26 sixth-grade students. Data were collected using expert validation sheets, teacher observation sheets, and student response questionnaires and analyzed using descriptive percentage techniques. The findings indicate that the developed media achieved a feasibility score of 100% from both media and subject matter experts. Furthermore, student engagement reached 94% based on teacher observations and 96% based on student responses. These results demonstrate that Morph-based interactive PowerPoint media is effective in enhancing students' engagement in learning the solar system and contributes to the integration of interactive visualization in elementary science learning.*

***Keywords***: *Student engagement, interactive media, Morph PowerPoint, solar system*

## ABSTRAK

Penelitian ini bertujuan untuk mengembangkan dan mengevaluasi media pembelajaran PowerPoint interaktif berbasis Morph guna meningkatkan keterlibatan siswa sekolah dasar dalam mempelajari tata surya. Meskipun penggunaan media pembelajaran digital semakin meluas, penelitian yang secara khusus mengkaji PowerPoint berbasis Morph dengan fokus pada keterlibatan multidimensi siswa termasuk aspek perilaku, emosional, dan kognitif masih terbatas. Penelitian ini menggunakan pendekatan Penelitian dan Pengembangan (R&D) dengan mengintegrasikan model ADDIE dengan tahapan pengembangan Sukmadinata, termasuk studi pendahuluan, pengembangan produk, dan pengujian produk. Peserta terdiri dari 26 siswa kelas enam. Data dikumpulkan menggunakan lembar validasi ahli, lembar observasi guru, dan kuesioner tanggapan siswa, serta dianalisis menggunakan teknik persentase deskriptif. Temuan menunjukkan bahwa media yang dikembangkan mencapai skor kelayakan 100% dari para ahli media dan materi pelajaran. Selain itu, keterlibatan siswa mencapai 94% berdasarkan pengamatan guru dan 96% berdasarkan tanggapan siswa. Hasil ini menunjukkan bahwa media PowerPoint interaktif berbasis Morph efektif dalam meningkatkan keterlibatan siswa dalam mempelajari tata surya dan berkontribusi pada integrasi visualisasi interaktif dalam pembelajaran sains tingkat sekolah dasar.

**Kata Kunci**: *Keterlibatan siswa, media interaktif, Morph PowerPoint, tata surya*

## 1. Introduction

Information and Communication Technology (ICT) has significantly transformed various aspects of life, including education. The integration of digital technology into the learning process enables teachers to create more interactive, engaging, and meaningful learning experiences. Digital technologies have fundamentally reshaped education systems by promoting flexibility, accessibility, and student-centered learning environments (Haleem et al., 2022). In the context of the Merdeka Curriculum, technology plays a crucial role in supporting student-centered learning and enhancing student participation. Furthermore, the COVID-19 pandemic accelerated the adoption of digital learning through emergency remote teaching (ERT), which forced educators to rapidly adapt to online instructional environments (Bond et al., 2021).

Learning media serve as essential tools in facilitating the delivery of instructional content. The effective use of digital learning media can enhance students' attention, motivation, and conceptual understanding, particularly when dealing with abstract concepts that are difficult to observe directly (Mayer, 2021). Previous studies have also shown that innovative and interactive learning media can improve students' motivation, engagement, and affective aspects such as self-esteem (Umami et al., 2025; Novitasari et al., 2025). In addition, digital learning media designed with structured and contextual approaches have been proven to enhance students' conceptual understanding in science learning.

One of the most widely used digital tools in classrooms is Microsoft PowerPoint. This software allows teachers to present instructional materials using text, images, audio, and animations. With recent technological advancements, PowerPoint provides interactive features such as the Morph transition, which enables dynamic movement of objects through motion, scaling, and rotation effects. This feature supports the visualization of abstract concepts, such as planetary motion in the solar system, making them easier for students to understand (Cashman, 2022).

In elementary science education, many topics require strong visual representation. The solar system is one of the topics that involves abstract concepts, including the position of the sun as the center, planetary motion, and the phenomena of Earth's rotation and revolution. These concepts are difficult for students to observe directly; therefore, appropriate visual learning media are necessary to support conceptual understanding (Sung et al., 2020). Previous studies have demonstrated that multimedia-based learning media can improve the effectiveness of science learning by increasing students' motivation, participation, and understanding of scientific concepts (Clark & Mayer, 2016; Sung et al., 2020).

However, preliminary observations indicate that science instruction is still dominated by lecture-based methods using static PowerPoint presentations without interactive features. Although supporting facilities such as projectors are available, they have not been optimally utilized to create engaging learning environments. As a result, students tend to show low levels of engagement, which can be seen from limited participation in discussions, minimal interaction during learning activities, and reduced attention to instructional materials. This condition is consistent with previous findings that many learning practices during the transition to digital education remain teacher-centered and lack interactivity (Bond et al., 2021).

Student engagement is a crucial factor influencing learning success. Students who are actively involved in learning activities tend to achieve better understanding and learning outcomes (Hwang & Chien, 2022). Computer-based technology is known to have the potential to increase student engagement that includes behavioral, emotional, and cognitive aspects (Schindler et al., 2017).

Therefore, there is a need for innovative instructional media that can enhance students' engagement in a more interactive and meaningful way.Previous research has shown that the Morph feature in PowerPoint can improve the quality of learning. Studies by Firli and Fatihah (2024) and Kasman et al. (2025) indicate that Morph-based presentations can enhance students' creativity and learning outcomes. In addition, Nurwindasari et al. (2025) found that interactive PowerPoint media significantly improves student engagement during learning activities.

However, most previous studies have primarily focused on learning outcomes and creativity, while limited research has specifically examined the development of Morph-based PowerPoint media for solar system material with a focus on students' multidimensional engagement, including visual, verbal, cognitive, and emotional aspects. In line with Bond et al. (2021), previous research has largely emphasized student perceptions rather than deeper dimensions of engagement, indicating a research gap that needs to be addressed.

The use of visual media is also supported by cognitive learning theories. According to Piaget's theory, elementary school students are in the concrete operational stage, where they understand concepts more effectively through visual and concrete representations (Santrock, 2018). Furthermore, Mayer's Multimedia Learning Theory (2021) explains that the integration of text, images, and animations enhances learning through dual-channel processing, leading to better retention and understanding.

Therefore, this study aims to develop and evaluate Morph-based interactive PowerPoint learning media to enhance elementary students' engagement in learning the solar system. Specifically, this study aims to: (1) develop interactive learning media using the Morph feature, (2) determine the feasibility of the developed media through expert validation, and (3) examine its effectiveness in improving students' learning engagement.

## 2. Method

This study employed a Research and Development (R&D) method, which enables the systematic development, validation, and evaluation of instructional media. The R&D approach aims to produce a specific educational product through iterative processes of design, testing, and revision to achieve optimal quality (Okpatrioka, 2023). This study adopted the development stages proposed by Sukmadinata (2011), which consist of three main phases: (1) preliminary study, (2) design and development, and (3) testing.

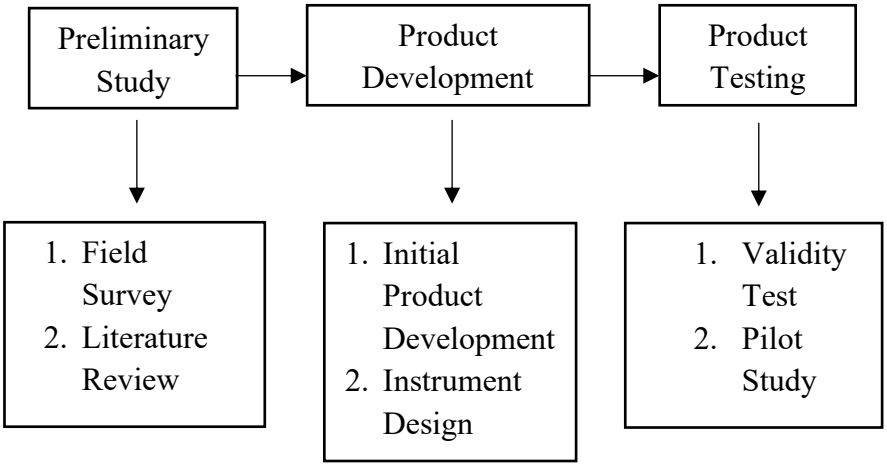



Figure 1: Diagram of the Research Stages by Sukmadinata (2011)

The research subjects consisted of 26 sixth-grade students. These participants were selected because they were studying the solar system topic in the IPAS curriculum, making them relevant to the objectives of this study. In addition, students at this level are in the concrete operational stage of cognitive development, where visual and interactive learning media are particularly effective in supporting conceptual understanding. Therefore, they were considered appropriate subjects for testing the developed learning media.

In the preliminary study stage, field observations and interviews with teachers were conducted to identify learning needs, existing problems, and the characteristics of students. A literature review was also carried out to support the development of the initial product design.

The design and development stage was carried out using the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) (Branch, 2009). Each stage of ADDIE was integrated into this phase as follows:

a. The analysis stage involved identifying students' learning needs and problems through observation and interviews, which corresponds to the preliminary study phase.
b. The design stage involved creating a storyboard and planning the structure of the interactive PowerPoint media, including content organization, navigation, and visual elements.
c. The development stage involved producing the Morph-based interactive PowerPoint media and conducting expert validation by subject matter experts and media experts.
d. The implementation stage involved conducting a limited trial of the developed media with sixth-grade students during the learning process.
e. The evaluation stage involved assessing the feasibility and effectiveness of the media based on expert feedback, teacher observations, and student responses.

The testing stage consisted of two types of evaluation: expert validation and field testing. Expert validation was conducted by subject matter experts and media experts to assess the content accuracy, design quality, and usability of the developed media. Field testing was carried out with 26 students and supported by the classroom teacher to evaluate the practicality and effectiveness of the media in enhancing student engagement.

Data were collected using expert validation sheets, teacher observation sheets, and student response questionnaires. The instruments were validated by experts prior to use to ensure their validity and reliability. The collected data were analyzed using descriptive percentage techniques to determine the feasibility and effectiveness of the developed learning media.

This study employed both qualitative and quantitative data analysis techniques. Qualitative data were obtained from suggestions and feedback provided by subject matter experts and media experts during the validation process. These data were used as the basis for revising and improving the developed learning media.

Quantitative data were collected through expert validation sheets, teacher observation sheets, and student response questionnaires. These data were analyzed using descriptive percentage techniques to determine the feasibility and effectiveness of the developed media.

The student and teacher questionnaires were designed using a Likert scale to measure student engagement, including indicators such as participation, attention, interest, and involvement in learning activities. The results were then analyzed to evaluate the level of student engagement during the implementation of the learning media.

The feasibility of the media was determined based on expert validation results, while its effectiveness was assessed through teacher observations and student responses. The media

was considered appropriate for use if it achieved at least a "good" category in expert validation and demonstrated high levels of student engagement during implementation.

The percentage of feasibility was calculated using the following formula:

$$P = \frac{\sum x}{\sum y} \times 100\%$$

Where:

P = Feasibility percentage

∑x = Total score obtained

∑y = Maximum score

The result were then categorized based on the following criteria:

Table 1. Feasibility Criteria

| Percentage | Category | Description |
|---|---|---|
| 85%–100% | Highly Acceptable | Very good for use |
| 65%–84% | Acceptable | Can be used with minor revisions |
| 54%–64% | Less Acceptable | Requires major revisions |
| 0%–44% | Unacceptable | Requires complete revision |

(Sari & Suswanto, 2017)

In addition, student response data were analyzed using the following formula:

$$R = \frac{\sum TSp}{\sum TSm} \times 100\%$$

Where:

R = Response percentage

TSp = Total score obtained

TSm = Maximum total score

Table 2: Practicality Criteria

| Practicality Level (100%) | Criteria | Description |
|---|---|---|
| 81%–100% | Highly Acceptable | Very good for use |
| 61%–80% | Acceptable | Can be used with minor revisions |
| 41%–60% | Less Acceptable | Requires major revisions |
| 21%–40% | Unacceptable | Requires complete revision |

Based on these criteria, the Morph-based interactive PowerPoint media is considered feasible and effective if it achieves a percentage score of at least 81%.

## 3. Result and Discussions

### 3.1 Result

An interactive Morph-based PowerPoint learning media on the Solar System was developed to support students' understanding of abstract concepts and enhance their engagement during the learning process.

#### 3.1.1 Preliminary Study

The preliminary study was conducted through classroom observations. The results indicated that the learning process was still dominated by textbooks and conventional PowerPoint presentations, resulting in less interactive learning environments. Consequently, students tended to show low levels of participation and engagement. Therefore, more interactive and visually supported learning media are needed to facilitate better understanding and increase student involvement.

#### 3.1.2 Product Development

**Analysis**

The analysis stage was conducted to identify the learning problems, student needs, and instructional conditions that form the basis for the development of Morph-based interactive PowerPoint media. This stage involved classroom observations and interviews with the sixth-grade IPAS teacher.

The results of the analysis revealed several key findings. First, the learning process was still dominated by teacher centered methods, primarily through lectures supported by static PowerPoint presentations. These presentations mainly contained text and images without interactive or animated elements. As a result, students tended to be passive and less involved during the learning process. This condition indicates a low level of student engagement, particularly in terms of visual attention, participation in discussions, and active involvement in learning activities.

Second, students experienced difficulties in understanding abstract concepts related to the Solar System, such as Earth's rotation, revolution, and the relationships between planets. These concepts require dynamic visualization; however, the available learning media did not adequately support this need. Consequently, students' conceptual understanding and learning engagement were not optimally developed.

Third, although the school had adequate technological facilities, such as projectors and speakers, these resources had not been utilized effectively to create interactive learning experiences. The use of technology remained limited to conventional presentation formats, which did not support active learning.

These findings are consistent with the problems identified in the introduction, which highlight the importance of student engagement as a key factor in successful learning. The lack of interactive and visual learning media contributes to low student participation and limited understanding of abstract scientific concepts.

Therefore, it is necessary to develop an interactive learning medium that can present dynamic visualizations and encourage active student involvement. Morph-based PowerPoint media was selected as a solution because it enables smooth animations and interactive features that can visualize abstract processes and foster student engagement during learning activities.

**Design**

In the design phase, an interactive PowerPoint learning media based on the Morph transition was planned. The design process began with the development of a storyboard that outlined the learning objectives, content structure, navigation flow, and visual design.

The media consists of several components, including a cover page, main menu, learning objectives, instructional materials, and interactive quizzes. The content covers key topics such as Earth's rotation, Earth's revolution, and the solar system, supported by images, animations, and Morph transitions. In addition, research instruments, including teacher and student questionnaires, were also developed at this stage to assess the practicality and effectiveness of the media.

3.1.3 Product Testing

**Development**

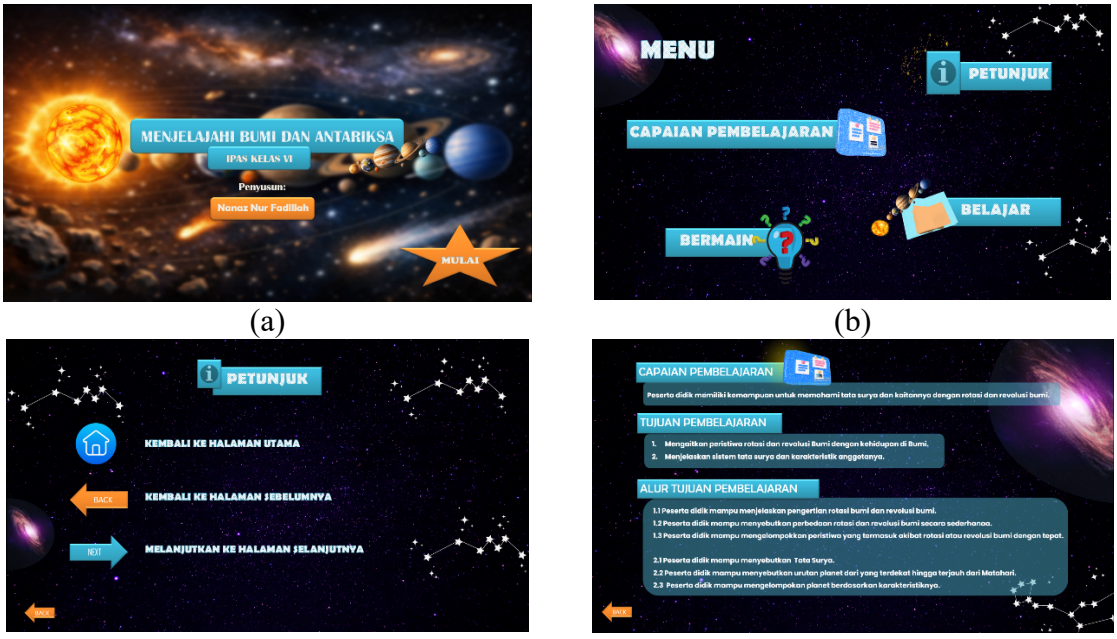
The design was then developed into a Morph-based interactive PowerPoint product. This process ensured alignment between the learning content and the curriculum, as well as clarity in visual presentation.

The Morph transition feature was utilized to create smooth and dynamic movements between objects and slides, allowing students to observe changes in position and motion more clearly. Through this approach, abstract concepts related to the solar system can be presented more concretely, thereby supporting students' understanding and engagement.

The developed media includes several main components, such as a cover page, learning objectives, instructional materials supported by animations and visualizations, and interactive quizzes for evaluation.

Each section of the media emphasizes interactivity, visual appeal, and user-friendly navigation. Navigation is supported by buttons and hyperlinks, enabling users to move between sections easily during the learning process.

The following is the initial display when the Morph-Based PowerPoint application is opened.




(a) (b)

(c) (d)

Figure 1 Morph-Based PowerPoint Start Menu Display: (a) cover, (b) menu, (c) navigation guide, (d) learning objectives

The appearance of the material content can be seen in Figure 3 below.

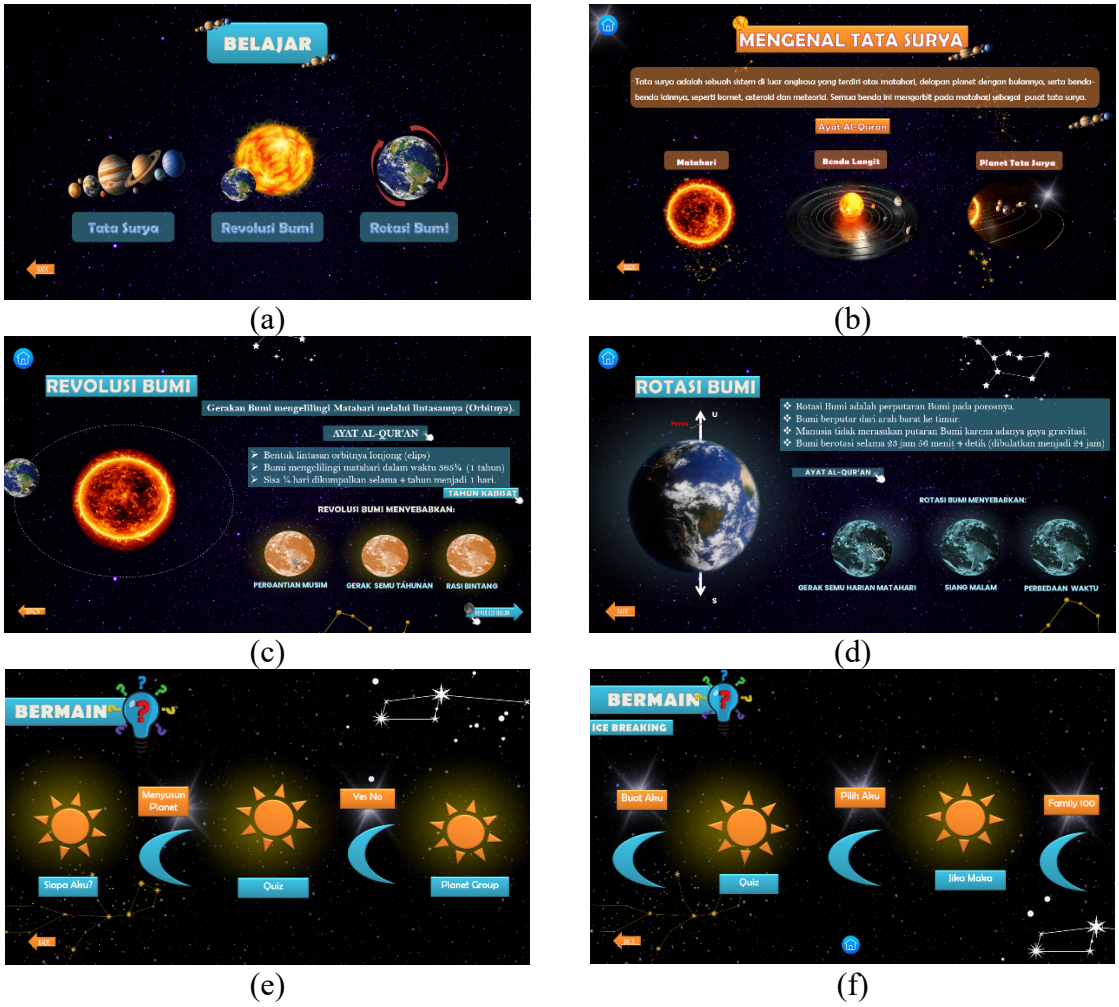



Figure 2 PowerPoint Morph-Based Content View dan Interactive Games

Figure 3 shows PowerPoint Morph-Based Content View and interactive games, which consists of (a) Content Selection Menu; (b) Solar System Content Select, (c) Earth's Revolution Content, (d) Earth's Rotation Content, (e) Interactive Solar System Game, and (f) Interactive Earth's Revolution and Rotation Game.

To provide readers with direct access to the developed product, the Morph-based interactive PowerPoint media can be accessed via the following link: [PowerPoint Interaktif Morph]. In addition, a QR code is provided in Figure 3 to facilitate quick and easy access. This accessibility allows users to explore the structure, content, and interactive features of the media, thereby enhancing the transparency and applicability of the research.

Figure 3. QR Code for Accessing the Learning Media

During the development phase, the media underwent validation by both media experts and subject matter experts to assess its feasibility. This validation aimed to ensure that the developed instructional media met the required standards in terms of content accuracy and media design.

Table 2. Results of Media and Subject Matter Expert Validation

| No | Indicator | Ideal Score | Score Obtained | Percentage (%) | Category |
|---|---|---|---|---|---|
| 1 | Learning Content | 50 | 50 | 100% | Very Good |
| 2 | Learning Media | 50 | 50 | 100% | Very Good |

The validation results indicate that the developed media achieved a score of 100% from both media experts and subject matter experts, categorized as "Very Good." These findings demonstrate that the Morph-based interactive PowerPoint media is highly feasible for use in IPAS learning on the Solar System topic at the elementary school level.

## Implementation

Following the expert validation, the implementation stage was conducted to evaluate the practicality of the developed media and to examine students' learning engagement during the instructional process.

The implementation involved 26 sixth-grade students with diverse learning abilities. During the lesson, the teacher utilized the Morph-based interactive PowerPoint media as the primary instructional tool. The media presented visual explanations of the solar system, including Earth's rotation, revolution, and planetary arrangements, through animations and Morph transitions.

During the learning process, student engagement was observed using several indicators, including visual attention, verbal participation, cognitive involvement, emotional responses, and participatory behavior. These observations aimed to assess how actively students were involved when the interactive media was used.

At the end of the lesson, students completed a response questionnaire designed to measure their engagement, including attention, participation, curiosity, and enthusiasm. The collected data from teacher observations and student responses were analyzed to determine the effectiveness and practicality of the developed media.

Table 3. Observation Result of Student Engagement

| No | Engagement Aspect | Observation Indicator | Score |
|---|---|---|---|
| 1 | Visual | Students pay close attention to the learning media. | 5 |
| | | Students pay attention to the teacher's explanations when the learning media is used. | 5 |

| No | Engagement Aspect | Observation Indicator | Score |
|---|---|---|---|
| 2 | Verbal | Students ask questions related to the learning material. | 4 |
| | | Students answer questions posed by the teacher during the lesson. | 5 |
| 3 | Cognitive | Students demonstrate curiosity about the learning material. | 4 |
| | | Students engage in active thinking during the lesson. | 4 |
| 4 | Emotional | Students appear enthusiastic while participating in the lesson. | 5 |
| | | Students show interest in learning using media. | 5 |
| 5 | Participatory | Students are actively involved in learning activities using media. | 5 |
| | | Students participate in learning interactions when media is used. | 5 |
| Total | | | 47 |
| Percentage | | | 94% |

The observation results show that students achieved a score of 94%, which falls into the "Very Good" category, indicating a high level of engagement during the learning process. This engagement can be further explained based on several observed indicators.

In terms of visual engagement, students consistently paid attention to the learning media displayed through the Morph-based PowerPoint and focused on the teacher's explanations, especially during the presentation of animated simulations of Earth's rotation and revolution. For verbal engagement, students actively participated by asking questions related to the learning material, responding to the teacher's questions, and engaging in classroom discussions when prompted.

Cognitive engagement was reflected in students' curiosity and active thinking processes. Students demonstrated this by attempting to explain the concepts in their own words, responding to problem-based questions, and showing efforts to understand the relationships between planetary movements. Meanwhile, emotional engagement was evident from students' enthusiasm, such as showing excitement during the learning activities, expressing interest in the media, and maintaining a positive attitude throughout the lesson.

In terms of participatory engagement, students were actively involved in learning activities using the media, including interacting with navigation features, participating in quiz sessions, and engaging in guided learning tasks provided within the PowerPoint. These forms of participation indicate that students were not only passive recipients of information but were actively involved in the learning process.

These findings suggest that the use of Morph-based interactive PowerPoint media effectively enhances students' behavioral, cognitive, and emotional engagement, particularly in learning abstract scientific concepts such as the solar system.

Table 4. Student Responses to the Learning Media

| No | Statement | Percentage |
|---|---|---|
| 1 | I pay close attention to the media and the teacher's explanations. | 100% |
| 2 | I feel confident asking or answering questions about the lesson. | 99% |
| 3 | I am curious and think critically while learning. | 92% |
| 4 | I feel happy and engaged while learning with this media. | 100% |
| 5 | I actively participate in learning activities using the media. | 90% |
| 6 | The media's presentation is attractive and clear. | 100% |
| 7 | The learning media makes learning more enjoyable. | 98% |
| 8 | The learning media is easy to use. | 90% |
| 9 | I find the lesson material easy to understand. | 92% |
| 10 | The text and language in the media are easy to read and understand. | 96% |
| Overall Percentage | | 96% |

The results of the student response questionnaire show an overall percentage of 96%, categorized as "Very Good." Students reported that the learning media was engaging, easy to use, and helped them better understand the material. In addition, the use of interactive media contributed to increased participation and enthusiasm during the learning process.

**Evaluation (Evaluasi)**

The evaluation phase represents the final stage of the ADDIE development model. This phase aimed to assess the overall feasibility and effectiveness of the developed instructional media. The evaluation was conducted based on multiple data sources, including expert validation results, teacher observations of student engagement during the learning process, student responses after using the media, and a post-learning assessment to measure students' understanding of the material.

The expert validation results showed that the Morph-based interactive PowerPoint media achieved a score of 100%, categorized as "Very Good," indicating that the media is highly feasible for instructional use. Furthermore, teacher observations revealed that student engagement reached 94%, which also falls into the "Very Good" category. In addition, the results of the student response questionnaire showed an overall score of 96%, categorized as "Very Good," reflecting positive perceptions of the media in terms of attractiveness, ease of use, and its ability to support students' understanding of the learning material.

To further evaluate students' comprehension, a post-learning test was administered after the implementation of the media. The results indicated that most students were able to correctly explain key concepts of the Solar System, such as Earth's rotation and revolution, and identify relationships between planetary movements. This suggests that the use of Morph-based interactive PowerPoint media not only enhances engagement but also supports students' conceptual understanding of abstract scientific topics.

Overall, these findings indicate that the developed media is both feasible and effective for use in IPAS learning. The integration of visual animations, interactive navigation, and Morph transitions contributes to the creation of a more engaging learning environment.

Therefore, the Morph-based interactive PowerPoint media demonstrates strong potential to enhance students' engagement and improve their understanding of abstract concepts in learning the Solar System.

3.2 Discussion

The findings of this study indicate that the developed Morph-based interactive PowerPoint media demonstrates a very high level of feasibility, as evidenced by the 100% validation scores obtained from both media and subject matter experts. This result suggests that the media fulfills essential criteria, including content accuracy, instructional design quality, visual clarity, and usability. Such high feasibility can be attributed to the systematic development process, which integrates structured instructional design with interactive visual elements, enabling the media to effectively support the delivery of abstract scientific concepts. This is in line with Arsyad (2015), who emphasizes that well-designed instructional media enhances the clarity and effectiveness of learning materials.

The implementation results further reveal that the use of Morph-based interactive PowerPoint media significantly enhances student engagement, with a score of 94% categorized as "Very Good." This improvement can be explained by the dynamic and interactive characteristics of the Morph feature, which transform static content into continuous visual representations. These features stimulate students' attention (behavioral engagement), encourage active participation (participatory engagement), and promote deeper cognitive processing (cognitive engagement). This finding supports Hwang and Chien (2022), who argue that meaningful learning occurs when students are actively involved in interactive learning environments. Moreover, this result aligns with broader findings that digital technologies can foster more interactive and student-centered learning experiences (Haleem et al., 2022).

In addition, the student response results (96%) indicate that learners perceive the media as engaging, easy to use, and helpful in understanding the material. This positive perception reflects not only the presence of multimedia elements but also the effectiveness of their integration in supporting students' cognitive processes during learning. This is consistent with prior research during the transition to digital learning environments, where student engagement and perception are strongly influenced by the quality of instructional media used (Bond et al., 2021).

These findings are consistent with previous research demonstrating that innovative learning media contribute to multiple dimensions of student learning. Digital learning media based on microlearning strategies have been shown to improve students' conceptual understanding and engagement in science learning (Ilham et al., 2025). Similarly, technology-based learning media have been proven to enhance students' motivation and learning outcomes (Umami et al., 2025). Furthermore, Novitasari et al. (2025) found that interactive 3D media integrated with the ARCS model effectively improve students' self-esteem, highlighting the role of learning media in supporting affective development.

From a theoretical perspective, these results can be explained through Mayer's Multimedia Learning Theory (2021), which posits that learning is more effective when information is processed through both visual and verbal channels. In this study, the Morph feature facilitates smooth transitions and continuous motion, reducing cognitive load and enabling students to construct clearer mental representations of abstract processes, such as planetary motion.

More specifically, the effectiveness of this media in teaching the Solar System lies in its ability to visualize dynamic and abstract phenomena that are otherwise difficult to observe directly. Unlike static images or conventional presentations, the Morph transition allows

students to observe continuous movement, such as Earth's rotation and revolution, in a more realistic and coherent manner. From a developmental perspective, this supports students in the concrete operational stage, as proposed by Piaget, where learning becomes more meaningful when supported by visual and concrete representations (Santrock, 2018).

Compared to previous studies, this research offers a more comprehensive contribution. Prior studies, such as those conducted by Firli and Fatihah (2024) and Kasman et al. (2025), primarily focused on improving learning outcomes and creativity through the use of PowerPoint Morph. However, these studies did not explicitly examine student engagement as a multidimensional construct, nor did they specifically address the visualization of abstract scientific concepts such as the Solar System. In line with Bond et al. (2021), previous research has also tended to focus more on student perceptions rather than deeper dimensions of engagement, reinforcing the relevance of this study.

Therefore, the novelty of this study lies in the integration of Morph-based interactive PowerPoint media with a specific emphasis on enhancing students' multidimensional engagement, including behavioral, cognitive, emotional, and participatory aspects. In addition, this study provides empirical evidence that the Morph feature is not only effective in improving learning outcomes but also plays a significant role in fostering active engagement through dynamic visualization of abstract content.

Overall, the findings suggest that the integration of interactive features, visual animations, and Morph transitions creates a more engaging and meaningful learning experience. This indicates that the developed media is not only feasible but also pedagogically effective in supporting elementary students' understanding of complex scientific concepts, particularly in the context of increasing digital transformation in education (Haleem et al., 2022).

## 4. Conclusion

Based on the results of the research and development process, it can be concluded that the Morph-based interactive PowerPoint learning media on the Solar System topic was successfully developed using the ADDIE model and Sukmadinata's development stages. The media obtained a 100% feasibility score from both material and media experts, indicating that it is highly feasible for use in sixth-grade IPAS learning. The implementation results also showed positive responses, with teacher observations reaching 94% and student responses reaching 96%, categorized as "very good." These findings indicate that the media can support more interactive, visual, and student-centered learning while increasing student engagement in understanding abstract science concepts.

However, this study was limited to one school and focused only on the Solar System topic, so the findings cannot yet be generalized to broader contexts. In addition, the research only measured feasibility and user responses without testing long-term learning outcomes. Therefore, future studies are recommended to involve larger samples, apply the media to different topics and grade levels, and examine its effectiveness in improving students' learning outcomes through experimental research designs.

## References

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*, 50. https://doi.org/10.1186/s41239-021-00282-x

Branch, R. M. (2009). *Instructional design: The ADDIE approach*. Springer.

Cashman, S. (2022). *Microsoft Office 365 & PowerPoint 2021 Comprehensive*. Boston: Cengage Learning.

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction* (4th ed.). Wiley.

Firli, R. M., & Fatihah, H. (2024). Pengaruh Media Pembelajaran Powerpoint Morph dalam meningkatkan Kreativitas Belajar peserta didik di SMP Negeri 18 Palembang. *Jurnal Ilmiah Mimbar Demokrasi, 23(20), 385-394. https://doi.org/10.21009/jimd.v23i2.41929*

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers, 3*, 275–285. https://doi.org/10.1016/j.susoc.2022.05.004

Nurwindasari, Ayu., Wibowo, E. S., & Hasmono, A. (2025). Interactive PowerPoint Development to Improve Elementary Grade II Students' Initial Reading Skills. *Jurnal Penelitian dan Pengembangan Pendidikan*, 9(1), 113–124. https://doi.org/10.23887/jppp.v9i1.87024

Hwang, G. J., & Chien, S. Y. (2022). Definition, roles, and potential research issues of the metaverse in education: An artificial intelligence perspective. *Computers and Education: Artificial Intelligence*, 1-6. https://doi.org/10.1016/j.caeai.2022.100082

Ilham, I., Srirahmawati, I., Sumiati, S., & Nurmalia, N. (2025). Developing a digital learning media for integrated science based on Muna Pa'a local wisdom through a microlearning strategy. *Al-Aulad: Journal of Islamic Primary Education, 8*(2), 134–142. https://doi.org/10.15575/al-aulad.v8i2

Mayer, R. E. (2021). *Multimedia Learning (3rd ed.).* Cambridge University Press.

Kasman., Kahar, A., & Nurmayanti. (2025). Efektivitas penggunaan media pembelajaran Morph PowerPoint terhadap peningkatan hasil belajar seni budaya siswa kelas VII SMP Negeri 3 Panca Rijang. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10 (4), 320–328. https://doi.org/10.23969/jp.v10i04.39869

Novitasari, D., Alfi, C., & Fatih, M. (2025). Development of Malilu Sipakainge 3D learning media based on the ARCS model and outdoor learning to enhance fourth-grade students' self-esteem in plant parts topic. *Al-Aulad: Journal of Islamic Primary Education, 8*(2), 110–122. https://doi.org/10.15575/al-aulad.v8i2

Okpatrioka. (2023). Research and development (R&D) penelitian yang inovatif dalam pendidikan. *Dharma Acariya Nusantara: Jurnal Pendidikan, Bahasa dan Budaya*, 1(1), 86–100. https://doi.org/10.47861/jdan.v1i1.154

Sari, H.V., & Suswanto. H. (2017). Pengembangan Media Pembelajaran Berbasis Web Untuk Mengukur Hasil Belajar Siswa Pada Mata Pelajaran Komputer Jaringan Dasar Program Keahlian Teknik Komputer dan Jaringan. *Jurnal Pendidikan*. 2(7), 1008-1016. http://dx.doi.org/10.17977/jptpp.v2i7.9734

Santrock, J. W. (2018). *Educational psychology (6th ed.).* McGraw-Hill.

Schindler, L. A., Burkholder, G. J., Morad, O. A., & Marsh, C. (2017). Computer-based technology and student engagement: A critical review of the literature. *International Journal of Educational Technology in Higher Education*, 14, 25. https://doi.org/10.1186/s41239-017-0063-0

Sung, Y. T., Chang, K. E., & Liu, T. C. (2020). The Effects of Integrating Mobile Devices with Teaching and Learning on Students' Learning Performance: A Meta-Analysis and Research Synthesis. *Computers & Education*, 94, 252–275. https://doi.org/10.1016/J.COMPEDU.2015.11.008

Sukmadinata, N. S. (2011). *Metode Penelitian Pendidikan.* Remaja Rosdakarya.

Umami, N. R., Djubaedi, D., & Nashruddin, W. (2025). The effectiveness of technology-based Islamic religious education learning media in improving motivation and learning outcomes of elementary school students. *Al-Aulad: Journal of Islamic Primary Education, 8*(2), 86–97.https://doi.org/10.15575/al-aulad.v8i2