Journal of Indonesian Elementary Education
ISSN (e): 3032-6222
Vol. 2, No. 2, December 2024, pp. 72-80

Enhancing Solar System Understanding: The Impact of Interactive Learning Media

Intan Nurlita Rahmadhania[1], Shofa Salsabila Tafidaj[2], Diana Lutfiana Ulfa[3]*
[1,2,3]Universitas Islam Negeri Sayyid Ali Rahmatullah Tulungagung, Indonesia
diana.lutfiana@gmail.com*

Abstract: This Solar System research aims to describe the structure of the Solar System as it relates to Earth and to enhance the effectiveness of learning media, making it more useful for students and university learners in understanding the Solar System. The study adopts a qualitative method, involving the analysis of scientific literature, access to credible data, and the use of secondary data approaches. This enables students or young learners to engage directly with the subject through simulations and interactive activities supported by learning media, thereby stimulating their curiosity and deepening their understanding of Solar System concepts. According to the Minister of Research, Technology, and Higher Education, Mohammad Nasir, Indonesia is increasingly falling behind in scientific and technological advancement due to declining student interest in science, particularly topics like the Solar System, which are often viewed as challenging. This research seeks to overcome the limitations of conventional learning approaches by developing more engaging learning media, with the hope that it will contribute significantly to improving educational tools and fostering a better understanding of Solar System concepts.

Keywords*: Solar System, Learning Interactive media, Natural Science*

Abstrak: Penelitian tentang Tata Surya ini bertujuan untuk menggambarkan struktur Tata Surya dalam kaitannya dengan Bumi serta meningkatkan efektivitas media pembelajaran agar lebih bermanfaat bagi siswa dan mahasiswa dalam memahami konsep Tata Surya. Penelitian ini menggunakan metode kualitatif, yang melibatkan analisis literatur ilmiah, akses terhadap data yang kredibel, serta pendekatan data sekunder. Hal ini memungkinkan siswa atau pelajar muda untuk berinteraksi langsung dengan topik tersebut melalui simulasi dan aktivitas interaktif yang didukung oleh media pembelajaran, sehingga dapat merangsang rasa ingin tahu mereka dan memperdalam pemahaman tentang konsep Tata Surya.

Menurut Menteri Riset, Teknologi, dan Pendidikan Tinggi, Mohammad Nasir, Indonesia semakin tertinggal dalam kemajuan ilmu pengetahuan dan teknologi karena minat siswa terhadap sains, terutama topik seperti Tata Surya, semakin menurun karena dianggap sulit. Penelitian ini bertujuan untuk mengatasi keterbatasan metode pembelajaran konvensional dengan mengembangkan media pembelajaran yang lebih menarik, dengan harapan dapat memberikan kontribusi signifikan dalam meningkatkan alat pembelajaran dan mendorong pemahaman yang lebih baik tentang konsep Tata Surya.

Kata Kunci: *Tata Surya, Media Pembelajaran Interaktif, IPA*

INTRODUCTION

The Solar System is a collection of objects in the sky that consists of the Sun at its center, along with the planets, meteoroids, comets, and asteroids that surround it. The Solar System includes eight identified planets with elliptical orbits, five minor planets, 173 known natural satellites, and millions of other objects such as meteoroids, asteroids, and comets. Most of the planets move along elliptical tracks. The path taken by the planets around the Sun is called the orbital field, while the path followed by the Earth is known as the ecliptic field.

Based on research results, teachers are required to develop their teaching skills and innovate their methods, including the use of strategies, media, and effective learning opportunities to convey knowledge to students, although there are various obstacles that need to be addressed. Media is a very important element in the world of education, as the success of the learning process is greatly influenced by the type of media used. Media plays a role as a primary tool to capture attention, improve motivation, convey information, and spread technology, making it an essential part of the learning activity. Therefore, the use of interactive learning media is one innovation that can be applied by educators.

Instructional media plays a very significant role in supporting the teaching and learning process in the classroom. Presentations can be made through various forms such as graphics, videos, slides, photos, or computer-based learning. The utilization of learning media not only helps in conveying information but also allows for better data storage and processing. This creates a more interactive, communicative, effective, and efficient teaching process.

The aim of Natural Science learning is to increase students' understanding of concepts related to Natural Science in everyday life. This understanding is key to success in the learning process, as comprehension is a more advanced stage of cognitive development compared to simply having knowledge or memorizing information. Natural Science learning should encourage students to understand

the concepts being taught not just remember or collect information without understanding its meaning. Students need to realize the importance of studying Natural Science and the value they gain from it, so that they are motivated to learn with enthusiasm.

On the topic of the solar system, students cannot directly observe the processes discussed, as they occur outside our planet. These processes include the Earth's rotation, revolution around the Sun, the orbital paths of the planets, and so on. Therefore, tools are needed to help explain the material more deeply so that students can better understand the concepts being taught.

To help students understand the lesson material, the use of interactive media can make abstract concepts easier to comprehend. Interactive media includes learning tools that engage all five senses of students. This type of media can present lesson content clearly and in an interesting way for students. Some benefits of using interactive media include accelerating the learning process, encouraging students to become more active, improving the quality of learning, and increasing the effectiveness of the teaching process. This can positively impact students' overall attitude toward studying.

The use of media in learning can motivate students, improve their desire to learn, and assist in designing better learning activities. In addition, learning media can have a positive psychological impact on children (Putra & Ishartiwi, 2015). However, the implementation of digital technology as a learning support tool has not yet been optimized. Common obstacles include difficulty in selecting or designing appropriate learning media for the material being taught and limited skills in using information technology-based media. As a result, the learning process may not be engaging enough, causing students to have limited learning experiences and preventing learning objectives from being achieved effectively.

According to Rusdewanti & Gafur (2014), one of the main problems in schools related to the use of media is the lack of availability of interactive learning media, along with the lack of teacher skills in creating such media. This statement is reinforced by research that shows teachers' creativity in utilizing learning media for various subjects is still not optimal (Elvadola et al., 2023).

By using learning media that presents the solar system concept, the quality of learning can be enhanced, and students' understanding of the material can become more in-depth. This media allows students to learn, conduct experiments, and think analytically, making the learning process more enjoyable and providing a deeper understanding of Natural Science in general. Research has shown that the development of appropriate learning media can increase students' understanding of concepts, particularly in Natural Science lessons. The application of appropriate learning methods is believed to significantly improve students' understanding of the solar system.

To address this issue, the researcher has developed an interactive learning media solution for solar system material at the elementary school level, which has advantages over previous studies. This learning media is designed interactively by integrating various elements such as audio, text, video, images, graphics, and sound. These elements are designed to capture students' interest, enhance their involvement, and create a more engaging and active learning process (Shirajuddin, 2022).

METHOD

The research method used in this research is qualitative, which involves collecting data through scientific work, information gathering, and analyzing secondary data. Secondary data refers to information obtained from existing sources, such as media reports, websites, the internet, and other resources. The qualitative approach is used to study a specific social condition and accurately describe the reality at a particular time. The aim of this method is to evaluate the effectiveness of interactive learning media, with the hope of increasing students' understanding of the solar system concept.

RESULT AND DISCUSSION

Analysis

In the analysis stage, there are three sub-stages: needs analysis, analysis of student characteristics, and analysis of the learning environment. In the needs analysis phase, observations are made to determine the types of teaching materials needed by students. The observation results show that students are somewhat active in the learning process, but the teacher mostly uses books, pictures, and lectures as teaching tools. This method makes the classroom environment less engaging, and students struggle to understand the material being taught. Therefore, there is a need for media that can present explanations in an interesting way to help students better understand the topics being studied.

Next, a characteristic analysis was conducted to determine the type of media that could attract students' interest. Technological innovation has reached many groups, including children in elementary schools. Students at this level are already familiar with the use of smartphones that have the Android operating system in their daily lives. Based on observations, students are very fond of watching videos, playing games, and other activities via Android smartphone devices. They can spend quite a long time using the smartphone. This is due to the attractiveness of the display on the smartphone which is very attractive to children. The full-color display, interesting animations, and fun way of operating by pressing the buttons on the smartphone screen are the main attractions. Therefore, it is very important to provide media that is attractive in terms of color, writing,

visuals, and animations, as well as media that is user-friendly and easy for children to understand.

Then, analysis of the learning environment, which is done to find out what type of media can be used by students according to their situation, conditions, and accessibility in learning. It is known that the elementary school studied has the potential for an internet network that can be used to improve the teaching and learning process. Both teachers and students have smartphones that support the use of Android-based applications. Thus, Android-based learning media can be an educational innovation that is suitable for students in elementary schools.

Design

On In the second stage of design, a product design is made that is adjusted based on the analysis that has been done previously. In this stage, the researcher creates a flowchart and storyboard for an Android-based product. This flowchart and storyboard are made to provide an overview of the appearance and content of the product to be made (Siahaan et al., 2021) . The planned product is a solar system application. At this stage, the researcher decided to use the Smart Apps Creator software version 3.0 in making the application. In addition, the researcher began to collect various assets such as images, backsound, sound effects, materials, and others to support application development. For the assessment instrument, a questionnaire sheet was created for product validation by material and media experts, as well as a questionnaire for teachers who teach science in elementary schools. In addition, the pretest and posttest questions consisted of multiple-choice questions to measure the effectiveness of the media produced in helping students understand the concept better

Developtment

The third stage of development is when the media is created according to the previously produced design. At this stage there are two processes, namely the creation of media based on design and validation by experts. By using Smart Apps Creator version 3.0, media creation is carried out at the initial stage. Here, all elements of the application that have been prepared, such as images, backsound, sound effects and materials, are combined and arranged neatly to form an Android application. The media developed is an application about the solar system. This application aims to help teachers and students understand scientific concepts related to the solar system. The solar system application displays audio and visual illustrations in the form of images and animations that can attract students' interest during the learning process. In addition, this application is equipped with interactive buttons that when pressed or clicked will emit sound effects and take the user to the desired display. The application also provides a user guide, Core Competencies and Basic Competencies, materials,

videos, quizzes, games, bibliographies, and developer profiles. With the presence of this Android-based solar system application, it is hoped that it can be a useful learning tool and help students understand the solar system better.

Next, the next step is to validate by experts. At this stage, the validator consists of a material expert and a media expert. The material expert validator is a lecturer who has expertise in science, while the media expert validator is a lecturer who has expertise in multimedia. According to the material experts, the media that has been designed provides clear direction and dense information to attract the attention and interest of students while learning. The assessment from the material experts produced a value with a percentage of 88.6% and is classified as very valid. This is in line with the opinion that states that learning media must be interesting for students and also valid. From the assessment of the material experts, there are no suggestions or things that need to be improved, so that the product can be tested. Furthermore, the assessment by media experts is related to the audio-visual aspects and software development.

The assessment by media experts on audio-visual elements and software development scored 95.4%, placing it in the very valid category, as listed in table 2. This Android-based application has multimedia input features so that it is not monotonous, and the menus and icons in the application can be easily understood and used even on Android devices with low memory capacity. Learning media designed in application format has an aesthetic appeal and is easy to use. This is in line with the opinion that easy access to applications can increase students' interest in learning the material presented. The solar system application as a learning media has met the criteria as an interesting and interactive learning media in terms of visuals, colors, writing, and animation, and is easy to use, based on the assessment results of material and media experts. Therefore, this application is worthy of being tested.

Implementation

After The fourth stage in the implementation process, namely the educational media that has been developed, in the form of a solar system application, is tested on teachers and students. The goal is to assess the extent to which the solar system application can be used as a teaching tool and how effective the application is in helping students understand the concept of the solar system. The assessment was carried out through a questionnaire given to science teachers at the elementary school level along with pretest and posttest questions given to students.

Based on the evaluation results regarding the feasibility of the media that has been created, where the solar system application gets a score of 95%, which is

included in the very feasible category. This shows that the solar system application is very appropriate to be used as a learning tool in elementary schools.

Based on the next stage is the pretest and posttest. At this stage, a one group pretest-posttest design was applied which was carried out with 10 students. Before conducting the experiment, a normality test was first conducted to determine whether the further analysis used parametric or nonparametric methods. The normality test was carried out using Shapiro-Wilk because the number of samples tested was less than 50 people. This process utilizes SPSS software version 25. The hypotheses tested include

H0: There is no difference between the pretest and posttest scores, and H1: There is a difference between the pretest and posttest scores. The testing criteria used are to accept H0 if the probability value obtained is smaller or equal to the significance level (sig. = p-value ≤ α), which indicates that the data is not normal, and reject H0 if the probability value obtained is greater than or equal to the significance level (sig. = p-value ≥ α), which indicates that the data is normal.

Based on the results of the normality test using Shapiro-Wilk, it was revealed that the significance value (Sig.) for all data was more than 0.05. This indicates that the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. Thus, the data studied follows a normal distribution. After ensuring that the data is normally distributed, the next testing step can be carried out using the parametric method. Furthermore, a Paired Sample t-Test was conducted to evaluate whether there was a difference in student scores before and after using the Android-based solar system learning application, as well as to assess how effective the application was in improving student understanding of solar system material. In this study, H0 is accepted if the probability value obtained is equal to or greater than the significance level (sig. = p-value ≥ α), and H0 is rejected if the probability value obtained is lower or equal to the significance level (sig. = p-value ≤ α). Hypothesis H0 states that there is no difference in student abilities before and after using the solar system application, while H1 indicates that there is such a difference. Then, the average pretest and posttest scores will be analyzed to determine whether the application is effective in improving students' conceptual understanding of the solar system material.

Based on the analysis results of the Paired Sample t-Test, the Sig = 0.000 was obtained, which means that H0 is rejected because the Sig = 0.000 value is smaller than α = 0.05, indicating a difference in the initial abilities of students before and after using the solar system application. The average value for the pretest was recorded at 56.00, while the posttest showed 81.00. Thus, it can be seen that the pretest value is lower than the posttest value, which indicates an increase in student performance after utilizing Android-based learning media in the form of a solar

system application. Therefore, the Android-based solar system application can improve students' conceptual understanding (Siti Deti Nurhamidah et al., 2022).

Evaluation

The fifth step is evaluation which includes suggestions and opinions based on the results of testing and validation of the solar system application system. According to the validator experts, the use of images and colors is very good, and the appearance of the application is quite striking. The solar system application developed is an effective, modern, and easy-to-use learning media.

> Android-based learning media is a media that can help teachers to deliver materials better and more efficiently. This solar system application is an interactive and fun media because it presents various images, videos, text materials, songs, and games with an attractive and colorful appearance, making it not only easy to access but also entertaining. This is in line with the opinion of (Novitasari, 2016) which states that the combination of interesting images, animations, and sounds can reduce boredom in students because of varied learning and encourage their interest in understanding the material presented.

The presence of Android-based media can improve the quality of education and attract the interest of students and teachers because Android-based applications can improve students' learning achievements in lessons solar system and is very suitable for application at the elementary school level. The results of this study are consistent with previous studies which show that the use of Android-based educational applications is very effective in encouraging student motivation and learning outcomes (Siregar et al., 2021).

CONCLUSION

In improving students' conceptual understanding, a teaching approach is needed that provides them with experience. One innovation that can be applied in learning activities is to utilize Android-based technology. The solar system application is designed as a learning medium that can be used offline on Android devices. This media is very easy to use and efficient because it can be accessed anywhere and anytime, allowing students to learn more freely. Students' understanding increased after using the solar system learning application. Before using this application, students obtained an average score of 56.00 in the pretest. However, after using the application, their average score on the posttest increased to 80.00. Seeing the increase in value, it can be concluded that the solar system application as a learning medium is able to significantly improve students' understanding of the solar system material. The assessment by elementary school science teachers regarding the use of the solar system application for learning received a score of 95%, placing it in the very qualified category. So, this Android-

based solar system application is very suitable for use as a learning aid in elementary schools and has succeeded in increasing students' mastery of concepts.

BIBLIOGRAPHY

Elvadola, C., Juwantara, R. A., Kurniasih, T. I., & Rasitiani, A. (2023). Pengembangan Media Interaktif Tata Surya Pada Pembelajaran Untuk Meningkatkan Hasil Belajar IPA Kelas VI SDN 1 Gunung Terang. *Pedagogia: Jurnal Ilmiah Pendidikan Dasar Indonesia*, *5*(1), 149–156. https://doi.org/10.52217/pedagogia.v5i1.1219

Novitasari, D. (2016). Pengaruh Penggunaan Multimedia Interaktif terhadap Kemampuan Pemahaman Konsep Matematis Siswa. *FIBONACCI: Jurnal Pendidikan Matematika dan Matematika*, *2*(2), 8. https://doi.org/10.24853/fbc.2.2.8-18

Putra, L. D., & Ishartiwi, I. (2015). Pengembangan Multimedia Pembelajaran Interaktif Mengenal Angka dan Huruf Untuk Anak Usia Dini. *Jurnal Inovasi Teknologi Pendidikan*, *2*(2), 169–178. https://doi.org/10.21831/tp.v2i2.7607

Rusdewanti, P. P., & Gafur, A. (2014). Pengembangan Media Pembelajaran Interaktif Seni Musik untuk Siswa Smp. *Jurnal Inovasi Teknologi Pendidikan*, *1*(2), 153–164. https://doi.org/10.21831/tp.v1i2.2526

Shirajuddin, S. (2022). Pengembangan Media Pembelajaran Interaktif pada Materi Tata Surya di Sekolah Dasar. *Journal of Educational Review and Research*, *5*(1), 70. https://doi.org/10.26737/jerr.v5i1.3283

Siahaan, K. W. A., Hisar Marulitua Manurung, & Mungkap Mangapul Siahaan. (2021). Android-Based Learning Media Development Strategies During Pandemic Times to Improve Student Science Literature. *International Journal of Education and Humanities*, *1*(1), 34–42. https://doi.org/10.58557/ijeh.v1i1.4

Siregar, B. J., Ndruru, L., & Tamba, S. P. (2021). Android-Based Learning Media for Vocational High School Students. *International Journal of Natural Science and Engineering*, *5*(2), 39–48. https://doi.org/10.23887/ijnse.v5i2.37080

Siti Deti Nurhamidah, Atep Sujana, & Dety Amelia Karlina. (2022). Pengembangan Media Berbasis Android pada Materi Sistem Tata Surya untuk Meningkatkan Penguasaan Konsep Siswa. *Jurnal Cakrawala Pendas*, *8*(4), 1318–1329. https://doi.org/10.31949/jcp.v8i4.3190