Jurnal Tarbiyah dan Ilmu Keguruan Borneo
Volume 7, Nomor 1, 2026
E-ISSN: 2714-6030, P-ISSN: 2987-7725, Halaman 17-29
https://doi.org/10.21093/jtikborneo.v7i1.13766

The Effect Of Solar System Scope Learning Media on Student's Learning Outcomes In The Solar System Material

Silviani Sembiring*, Melva Silitonga
silvismb.4223151018@mhs.unimed.ac.id
Universitas Negeri Medan

Article History:
Received: 06 Juni 2026
Accepted: 14 Juli 2026
Published: 22 Juli 2026

Keywords:
Solar system scope, learning outcomes, solar system

Kata Kunci:
solar system scope, hasil belajar, tata surya

A B S T R A C T

This study aims to determine the learning outcomes of students who use the Solar System Scope, to determine the learning outcomes of students who use conventional learning media, and to determine the effect of using the Solar System Scope on student learning outcomes in the Solar System subject. This study was conducted at the UPT SMP Negeri 29 Medan from November 2025 to February 2026. The research design used was quantitative research with a quasi-experimental method with a non-equivalent pretest-posttest control group design. The study population consisted of all seventh-grade students at UPT SMP Negeri 29 Medan, which consists of 8 classes. The research sample was selected using purposive sampling, with Class VII-6 as the experimental class and Class VII-7 as the control class, totaling 64 students. The research instrument consisted of a multiple-choice test with 20 questions to measure students' cognitive learning outcomes. The results of the study showed that the average pretest score of the experimental class increased from 61 to 79 in the posttest, while the score of the control class increased from 51 to 72. The results of the independent sample t-test showed a significance value of 0.002 < 0.05 with a calculated t-value of 3.322. Based on these results, it can be concluded that the use of Solar System Scope learning media has a significant influence on student learning outcomes in the Solar System material.

A B S T R A K

Penelitian ini bertujuan untuk mengetahui hasil belajar siswa yang menggunakan media Solar System Scope, mengetahui hasil belajar siswa yang menggunakan media pembelajaran konvensional, serta mengetahui pengaruh penggunaan media *Solar System Scope* terhadap hasil belajar siswa pada materi Sistem Tata Surya. Penelitian ini dilaksanakan di UPT SMP Negeri 29 Medan pada bulan November 2025 hingga Februari 2026. Jenis penelitian yang digunakan adalah penelitian kuantitatif dengan metode quasi eksperimen menggunakan desain *non-equivalent pretest-posttest control group*. Populasi penelitian adalah seluruh siswa kelas VII UPT SMP Negeri 29 Medan yang terdiri dari 8 kelas. Sampel penelitian dipilih menggunakan teknik *purposive sampling*, yaitu kelas VII-6 sebagai kelas eksperimen dan kelas VII-7 sebagai kelas kontrol dengan jumlah sampel 64 siswa. Instrumen penelitian berupa tes pilihan ganda sebanyak 20 soal untuk mengukur hasil belajar kognitif siswa. Hasil penelitian menunjukkan bahwa rata-rata nilai *pretest* kelas eksperimen sebesar 61 meningkat menjadi 79 pada *posttest*, sedangkan kelas kontrol meningkat dari 51 menjadi 72. Hasil uji *Independent Sample t-test* menunjukkan nilai signifikansi sebesar 0,002 < 0,05 dengan nilai t hitung sebesar 3,322. Berdasarkan hasil tersebut dapat disimpulkan bahwa penggunaan media *Solar System Scope* berpengaruh signifikan terhadap hasil belajar siswa pada materi Sistem Tata Surya.

Citation: Sembiring, S. & Silitonga, M (2026). The Effect Of Solar System Scope Learning Media on Student's Learning Outcomes In The Solar System Material. *Jurnal Tarbiyah dan Ilmu Keguruan Borneo*, *7(1),* 17–29. https://doi.org/10.21093/jtikborneo.v7i1.13766

**** Corresponding Author:***

Silviani Sembiring: silvismb.4223151018@mhs.unimed.ac.id

A. Introduction

Rapid advances in science and technology have fundamentally transformed the structure of society and human nature. To adapt to these changes, it is essential to improve the education system and increase the application of science and technology in the learning process (Sahin & Yilmaz, 2020). Technology can significantly enhance the quality of education in Indonesia. Various innovations facilitate the learning process, ensuring it proceeds effectively toward its intended goals.

Education is not just about imparting information, but also emphasizes the importance of students developing their own knowledge and problem-solving skills. The presence of teachers is crucial in the educational process. Teachers serve as the center of learning, acting as a source of information, a guide, a mentor, a motivator, and an evaluator. If teachers perform their duties well, the learning process will be effective and have a significant impact. Therefore, teachers need to be able to develop effective teaching methods to capture students' interest, create a positive learning environment, and make students feel engaged in the learning process (Simatupang et al., 2024).

Science lessons on the solar system are a topic that often rely on visual aids to be taught effectively. This is because the vast distances involved and the sheer scale of the subject make it difficult to observe directly, so students often find these concepts hard to grasp. Therefore, the teaching of the solar system should be made more tangible so that students can more easily understand the material. The use of digital technology-based learning media is highly suitable for this subject, as it provides clearer visual representations, simpler understanding, and a more immersive and valuable learning experience.

Based on an interview conducted with a science teacher at UPT SMP Negeri 29 Medan, it was found that teachers often struggle to teach the solar system when relying solely on conventional methods, such as static images on the blackboard and the provided textbook. This situation is exacerbated by the limited availability of physical teaching aids; teachers acknowledge that without interactive media, the learning process becomes monotonous and less effective. This is supported by Wulandari et al. (2023), who state that without learning media, the learning process tends to be monotonous, less effective, and students are more likely to become bored. Therefore, teachers need to carefully plan the use of media when designing classroom instruction and recognize the importance of media in supporting the teaching and learning process.

Since media refers to anything related to delivery, and learning involves a process of interaction, it can be said that instructional media serves as an intermediary that facilitates interaction between teachers or learning resources and students, thereby enabling learning objectives to be achieved (Ningsih et al., 2024). In the learning process, teachers typically use instructional media to make learning materials easier for students to understand. The use of instructional media can spark new interest and motivation and have a positive impact on the learning process.

The use of engaging learning media must be supported by the implementation of appropriate instructional models to ensure optimal learning outcomes. Innovative learning tools such as the Solar System Scope app can be integrated with guided inquiry-based instructional models to encourage students' active participation in the learning process and conceptual development (Zahra et al.,

2020). Solar System Scope is a digital planetarium app used as a learning tool to interactively explore visualizations of space and encourage students to engage directly in the process of discovering concepts. The app's various features allow users to observe illustrations of celestial objects and their structures, study rotational motion more realistically, understand the direction of planetary rotation, and explore various other astronomical objects.

Research by Simamora et al. (2024) also shows that the use of the Solar System Scope app in teaching the solar system has a positive impact on improving the quality of students' learning processes and outcomes. This app helps students understand complex astronomical concepts through clear, interactive, and realistic visualizations. These visualizations help students identify the characteristics of celestial objects and understand the dynamics of their movements within the solar system.

The guided inquiry model is a learning approach that emphasizes investigative activities under teacher guidance, thereby preparing students to conduct experiments or observations independently in order to understand a phenomenon. Through this process, students are trained to observe events, formulate questions, and explore and discover answers based on the results of their investigations. The application of the guided inquiry model allows students to actively construct knowledge through their own learning experiences (Amelia & Wulandari, 2024).

Teachers serve as guides who support and direct students, both by providing clear instructions and by asking questions that facilitate the inquiry process (Erina & Heru, 2015). With this model, students can learn firsthand and gain a deeper and more comprehensive understanding, enabling them to apply the knowledge they acquire in their daily lives (Kuhlthau et al., 2007). The objective of guided inquiry learning is to enhance students' knowledge and skills independently through the use of various learning resources, both from within and outside the school environment. In this model, teachers are responsible for selecting and preparing materials and creating learning questions, while students are asked to design experiments, analyze data from the experiments conducted, and draw conclusions based on the results obtained.

Research conducted by Ningsih et al. (2025) indicates that the guided inquiry learning model has a significant effect on improving students' critical thinking skills, thereby enhancing their learning outcomes. This is also supported by research by Mutiara et al. (2025), which shows that a guided inquiry learning approach utilizing the Solar System Scope provides significantly better learning outcomes for students compared to other learning models. Kuhlthau et al. (2015) developed the Guided Inquiry Design (GID) framework, which consists of the following eight stages: Open, Immerse, Explore, Identify, Gather, Create, Share, and Evaluate. In the Open stage, the teacher guides an initial simulation of the solar system using Solar System Scope. During the Immerse stage, the teacher guides students in exploring planetary features. In the Explore stage, students compare the characteristics of various planets through observation using Solar System Scope. In the Identify stage, students formulate a focus for identification, such as differences in planetary distance and size. During the Gather stage, students collect detailed data on each planet from Solar System Scope. In the Create stage, students compile a comparison table and analyze their identification findings. In the Share stage, students present the results of their investigation. Finally, in the Evaluate stage, the teacher and students evaluate the learning process.

The solar system is one of the topics studied in the natural sciences. The study of the solar system encompasses a series of celestial objects orbiting a central star, the Sun, with all these elements interconnected by gravitational forces. The solar system consists of eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Based on their relative positions to the Sun, these planets are divided into two categories: inner planets and outer planets (Abdurrahman, 2019).

Learning outcomes refer to changes in student behavior that can be observed and measured through improvements in knowledge, attitudes, and skills (Nugroho & Warmi, 2022). In the educational process at various levels, it is naturally expected that satisfactory learning outcomes will be achieved (Hidayatullah, 2021). Therefore, improving learning outcomes is the primary goal. After completing various learning activities, these learning outcomes become the goals that individuals and groups aim to achieve (Fadhilah & Mukhlis, 2023).

A study conducted by Fauzi et al. (2023) found that the use of Solar System Scope can significantly improve the learning outcomes of junior high school students, as evidenced by an increase in pretest-to-posttest scores and moderate n-gain scores. This aligns with the research by Mutiara et al. (2025), which showed that the implementation of the Inquiry-Based Learning model supported by the Solar System Scope had a greater impact compared to other learning models that did not use interactive media. The Solar System Scope tool supports a more tangible understanding of solar system concepts, making it easier for students to observe, categorize, and draw conclusions. However, this study also noted obstacles such as limited learning time and technical issues with the device. Furthermore, research conducted by Wardanis et al. (2023) examined the impact of using the Solar System Scope app on the learning participation of junior high school students.

Meanwhile, research by Silfiani et al. (2024 also revealed that the use of the Solar System Scope without the integration of a systematic instructional model was still able to improve learning outcomes, though the improvement was not yet optimal. This was due to technical limitations and constraints in guiding students' learning activities. These findings indicate that the effectiveness of instructional media is highly dependent on the type of instructional model applied to guide students' learning activities.

This study positions the Solar System Scope as a central element that is systematically integrated into the inquiry-based learning model, rather than merely serving as a visual aid. In this way, the tool is utilized in harmony with each stage of the inquiry process. Furthermore, unlike previous studies, which primarily focused on improvements in science process skills, this study specifically emphasizes the measurement of student learning outcomes.

B. Methods

This study was conducted from November 2025 to February 2026 at UPT SMP Negeri 29 Medan, located at Jl. Letda Sujono Ujung/Benteng Hulu, Medan Tembung District, North Sumatra Province. This study focuses on science learning, specifically the solar system topic, for seventh-grade student. This study employs a quantitative research design using a quasi-experimental method, in which the experimental class and the control class are subjected to different treatments.

The population in this study consisted of all seventh-grade students at UPT SMP Negeri 29 Medan for the 2025/2026 academic year, comprising 8 classes with an average of 32 students per class. The sampling technique used was purposive sampling (non-probability sampling), in which classes were deliberately selected based on considerations of the equivalence of students' academic characteristics. The sample for this study consists of class VII-6 as the experimental class and class VII-7 as the control class. The independent variable in this study is the Solar System Scope learning medium (X). The dependent variable in this study is student learning outcomes on the Solar System material (Y).

The research design used in this study is a quasi-experimental design employing quantitative methods. This quasi-experimental study utilized pretests and posttests with non-equivalent groups. During the first session, prior to instruction, both classes were administered a pretest. The experimental class was taught using the Solar System Scope, while the control class used a science textbook. Subsequently, both classes were given a posttest, and the results were compared.

The data collected in this study consists of student achievement data. Student achievement data was obtained through tests administered before and after the intervention. The test instrument developed for this study to assess cognitive abilities consisted of 20 multiple-choice questions aligned with the established competency achievement indicators. This test instrument was first validated by a panel of experts. After being validated by the validation experts, the instrument was then pilot-tested on ninth-grade students at UPT SMP Negeri 29 Medan. The pilot test of the test instrument was conducted to determine its validity and reliability. The validity test of the instrument in this study was conducted using SPSS version 26.0, and all items were found to be valid. The reliability test used SPSS version 26.0 with Cronbach's Alpha, yielding a coefficient of 0.948 for the 20-item test. Data analysis was performed using IBM SPSS Statistics version 26 with a significance level of 0.05. The analytical techniques used included the Shapiro–Wilk test to check data normality, the Levene test to assess variance homogeneity, and the Independent Samples t-test to determine differences in student learning outcomes between the experimental and control classes.

C. Results

1. Student Learning Outcomes in the Experimental Class

Student learning outcomes in the experimental class were obtained from pretest and posttest scores administered before and after the learning process using the Solar System Scope. An analysis was conducted to determine the average student learning outcomes and the improvement observed following the use of this learning medium.

Based on Table 1, it was found that 32 students took the pretest and posttest. In the pretest results, the lowest score achieved by students was 35 and the highest was 95, while the mean score was 61.41 with a standard deviation of 12.52. After receiving instructions using the Solar System Scope, the posttest results showed improvement. The lowest score achieved by students rose to 55 and the highest reached 100, with an average of 79.38 and a standard deviation of 9.57. These results indicate that the instruction implemented in the experimental

class using the Solar System Scope had a positive impact on students' learning outcomes regarding the solar system.

Table 1. Descriptive Statistics of Learning Outcomes in the Experimental Class

Data	N	Minimum	Maximum	Mean	Standard Deviation
Pretest	32	35	95	61.41	12.52
Posttest	32	35	100	79.38	9.57

2. Student Learning Outcomes in the Control Class

Learning outcomes in the control class were obtained from pretest and posttest scores administered before and after instruction using the textbook as the primary learning resource.

Table 2. Descriptive Statistics of Learning Outcomes in the Control Class

Data	N	Minimum	Maximum	Mean	Standard Deviation
Pretest	32	20	70	50.63	10.64
Posttest	32	45	90	71.72	9.20

Based on Table 2, it was found that 32 students took the test. In the pretest results, the lowest score obtained by students was 20 and the highest was 70, with a mean of 50.63 and a standard deviation of 10.64. These findings indicate that students' prior knowledge was quite low before participating in instruction using the textbook. After the learning process took place, the posttest results showed an increase in student scores. The lowest score increased to 45 and the highest reached 90, with an average of 71.72 and a standard deviation of 9.20. The increase in the average score from 50.63 on the pretest to 71.72 on the posttest indicates that student learning outcomes in the control class improved after the learning process. Additionally, the decrease in the standard deviation on the posttest indicates that the distribution of student scores became more even compared to before the learning process. These results show that the learning process in the control class, which used textbooks, also improved student learning outcomes, even without the special interventions applied in the experimental class.

3. The Effect of Using the Solar System Scope

It is important to determine the effect of using the Solar System Scope learning medium on student learning outcomes in order to assess the medium's effectiveness in the learning process. Before testing the hypothesis, data prerequisite tests were first conducted to ensure that the data used met the requirements for statistical analysis. These prerequisite tests include a normality test and a homogeneity test. The normality test is used to determine whether the student learning outcome data is normally distributed, while the homogeneity test aims to ensure that the data variances from both research groups the experimental class and the control class are similar or homogeneous.

A normality test was conducted using the Shapiro-Wilk test in SPSS version 26.0 because the sample size for each class was less than 50. The results of the normality test conducted using SPSS version 26.0 are presented in Table 3.

Table 3. Results of the Normality Test

Group	Statistic	Df	Sig.
Control Pretest	0.945	32	0.105
Experimental Pretest	0.944	32	0.100
Control Posttest	0.939	32	0.072
Experimental Posttest	0.973	32	0.572

Based on the results of the data normality test, significance values were obtained for each data group. In the control class pretest, the significance value was 0.105, while in the experimental class pretest it was 0.100. Furthermore, in the control class posttest, the significance value was 0.072, and in the experimental class posttest it was 0.572. Based on the normality test criteria, data is considered normally distributed if the significance value is greater than 0.05. These results indicate that all significance values in the pretest and posttest data for both the control and experimental classes are greater than 0.05. Thus, it can be concluded that the student learning outcome data for both classes is normally distributed.

A homogeneity test was conducted to determine the equality of variances between the experimental and control classes. The test used Levene's test with the assistance of SPSS version 26.0. The results of the homogeneity test are shown in Table 4.

Table 4. Results of the Homogenity Test

Learning Outcomes	Levene's Statistic	Df1	Df2	Sig.
Based on the mean	0.156	1	62	0.694
Based on the median	0.251	1	62	0.618
Based on the median with adjusted df	0.251	1	61.998	0.618
Based on trimmed means	0.122	1	62	0.728

Based on the results of the homogeneity of variance test using Levene's test, several significance values were obtained based on different calculation methods. In the test based on means, a significance value of 0.694 was obtained. Furthermore, in the test based on the median, a significance value of 0.618 was obtained, while for the median with adjusted degrees of freedom, a significance value of 0.618 was also obtained. Meanwhile, in the test based on the trimmed mean, a significance value of 0.728 was obtained. Based on the homogeneity test criteria, the data is considered homogeneous if the significance value is greater than 0.05. From these results, it is evident that all significance values obtained are greater than 0.05. Thus, it can be concluded that the variance of student learning

outcomes in the experimental and control classes is homogeneous. This indicates that both research groups have relatively similar levels of data variability, thus meeting the requirements for hypothesis testing using the independent samples t-test. The hypothesis test used was the independent samples t-test. The following are the results of the hypothesis test.

Table 5. Independent Samples t-Test

Learning Outcomes	Test Results					95% confidence interval difference	
	F	Sig.	T	Df	Sig. (2-tailed)	Lower	Upper
Equal variances assumed	0.156	0.694	3.322	62	0.002	3.050	12.263
Unequal variances assumed			3.322	61.63	0.002	3.049	12.263

Based on Table 5, it is evident that the significance value (2-tailed) of 0.002 is less than 0.05. There is a significant difference between the learning outcomes of the experimental class and the control class. The mean difference of 7.656 indicates that the experimental class achieved higher learning outcomes than the control class. The use of the Solar System Scope learning medium based on the guided inquiry model had a significant effect on students' learning outcomes regarding the solar system material.

D. Discussion

1. Student Learning Outcomes in the Experimental Class

The results of the study conducted in the experimental class indicate that the use of the Solar System Scope learning tool is effective in improving students' learning outcomes regarding the solar system. This is evident from the average pretest score of 61.41, which increased to 79.38 on the posttest. This improvement demonstrates that the use of interactive, visually-based learning tools can help students better understand the concepts of the solar system.

This improvement in learning outcomes occurred because the Solar System Scope learning tool allows students to directly observe the visual and dynamic representations of the shapes, sizes, distances, and movements of the planets within the solar system. This tool provides a more immersive learning experience compared to instruction that relies solely on textbooks or verbal explanations. The visual representations in this media help students understand abstract concepts regarding the solar system, such as the comparison of planetary sizes, the distances between planets, and the revolutions of the planets. Therefore, students do not merely memorize concepts but are also able to observe and comprehend the phenomena occurring within the solar system.

These research findings align with previous studies stating that the use of visual media and simulations can deepen students' conceptual understanding in science education. In the study by Putri et al. (2025), it was noted that there was a difference in science learning outcomes on solar system material between

students taught using the Solar System Scope and those taught using conventional media. The study by Fauzi et al. (2023) also noted that the Solar System Scope application proved effective in improving middle school students' learning outcomes on solar system material. Research conducted by Khatimah et al. (2023) in Southern Thailand also showed that the use of Solar System Scope is effective in improving students' understanding of solar system material. Interactive media can increase students' interest in learning and make it easier for them to understand abstract concepts. Additionally, the use of technology-based media can also increase student engagement in the learning process because students can directly explore the material being studied.

The results of the study indicate that the use of the Solar System Scope has a positive impact on improving student learning outcomes. This tool can help students understand the concept of the solar system in a more concrete way, increase their interest in learning, and make it easier for them to observe phenomena that are difficult to explain through text or verbal explanations alone. The use of technology-based learning tools such as the Solar System Scope can be an effective option in science education, particularly when teaching material on the solar system. Abdurrahman (2019) states that the use of planetarium media in solar system instruction can improve learning outcomes because students gain a more concrete and visual learning experience. This is relevant to the use of the Solar System Scope, which provides an interactive visualization of the solar system, thereby facilitating the understanding of abstract concepts.

Improvements in student learning outcomes are influenced not only by the use of the Solar System Scope but also by the implementation of a guided inquiry learning model that encourages students to actively engage throughout the learning process. In the learning process, the inquiry model was implemented according to its stages: Open, Immerse, Explore, Identify, Gather, Create, Share, and Evaluate. The evaluation results showed an increase in posttest scores compared to pretest scores in the experimental class. This indicates that the use of the Solar System Scope, combined with the guided inquiry model, is effective in improving student learning outcomes.

Thus, the implementation of the Solar System Scope media alongside the guided inquiry learning model is capable of creating a more active, interactive, and meaningful learning experience. Each stage of learning helps students understand solar system concepts through observation, exploration, analysis, and the presentation of learning outcomes, thereby making science learning on the solar system material more effective. This aligns with research conducted by Ardiyah & Noly (2023), which explains that app-based media combined with innovative learning models can enhance students' cognitive abilities. The integration of technology in learning provides students with the opportunity to explore the material actively and independently. This reinforces research findings showing an increase in scores in classes using interactive media compared to conventional learning. Research by Ningsih et al. (2025) indicates that the guided inquiry learning model significantly influences the improvement of students' critical thinking skills, thereby enhancing their learning outcomes.

This is further supported by research by Mutiara et al. (2025), which reveals that the use of the Solar System Scope media in inquiry-based learning can enhance students' science process skills and conceptual understanding. Media combined with an active approach encourages students to participate directly in

the learning process. These findings confirm that the differences in learning outcomes observed in this study are influenced by the use of more interactive and participatory learning media.

2. Student Learning Outcomes in the Control Class

Research results in control classes show that the use of package books as a primary learning source also improves student learning outcomes. This is seen from the average pretest value of 50.63 and then increased to 71.72 in posttest. The improvement suggests that the applied learning methods remain influential on students' understanding of the material of the solar system, even without using technology-based learning media such as Solar System Scope. Improved learning outcomes in control classes occur because students during learning continue to get explanations from teachers and read the materials in the package book. The package book presents information on fundamental concepts in the solar system, so students can still understand the material taught. However, learning that depends only on package books tends to make students receive more information in writing, so that understanding of abstract concepts becomes more difficult to understand in depth.

Research results in control classes show that learning using package books is still able to improve student learning outcomes. However, such improvements tend to be more limited because students only get information through text and teacher explanations without visualization or simulation that can help them understand the concept in a more concrete way. The use of more interactive and visual learning media can be a more effective alternative to helping students understand the material of the solar system in depth. Research conducted by Ritonga et al. (2020) shows that before the use of additional learning media, the average student's learning outcomes on IPA materials are still relatively low because the learning process is still centered on textbooks and teacher explanations. After the use of more variable learning media, the learning outcomes of students experience a significant increase. The results of the study showed that learning that rely only on conventional methods such as the use of package books and teacher explanations can still improve students' learning outcomes, but the improvement tends to not be too big. This is in line with Arianti et al. (2023) research that states that less learning media use tends to be less able to improve students' motivation and understanding optimally because the learning process is still one-way. This was also seen in the results of this study, where the average student grade in control class increased from 50.63 in pretest to 71.72 in posttest. The increase occurs because students continue to get explanations from teachers and read the materials contained in the package book so that the basic understanding of the material of the solar system continues to develop.

Learning in control classes also applies guided inquiry models. By applying guided inquiry steps, students remain actively participating in the learning process even though the media used is still a package book. However, the limited visual and interactive media makes the process of exploring complex concepts not going well, so students' understanding still tends to be theoretical. Learning that only use package books has some limitations. The material of the solar system is a material that contains many abstract concepts such as planetary distance, planetary size, and the movement of planetary revolution. When learning only uses textbooks, students tend to understand theoretically without being able to see the real picture

of the concepts learned. This causes some students to have difficulty understanding the relationship between concepts in a more depth way. This is in line with the research of Suhirman et al. (2024) which mentions that the material of the solar system in IPA learning is still quite difficult to understand by students due to the lack of appropriate support media. Research by Tolingguhu et al. (2024) says that the use of textbooks also has some disadvantages. Some textbooks may no longer fit the latest developments in their field, so that they can leave students behind information or not get the necessary information and not get adequate understanding. Therefore, it is important for teachers and students to use textbooks as one source for learning but also remain open to other sources of information and use various learning ways that match each student's needs and learning styles.

Research results in control classes show that learning using package books is still capable of improving students' learning outcomes, but the increase is not as large as classes using technology-based learning media such as Solar System Scope. This shows the difference in the quality of learning experiences that students receive in both classes. Based on the results of the study, it can be concluded that the limitations of visual and interactive media are one of the main factors that lead to low understanding of concepts and learning outcomes of students.

3. Conclusion

Student learning results on Solar Systems materials taught with Solar System Scope based inquiry-based models the average posttest score of students taught using Solar System Scope within guided inquiry learning reached 79, which signifies that the use of interactive media along with guided inquiries is effective in helping students understand concepts more clearly and in depth. Student's results on the Solar System material in the classroom taught with IPA textbooks showed an increase of 72. However, the end result of the control class is still lower than the experimental classes that show that visual and interactive media limitations are one of the main factors that lead to a low understanding of the concepts and learning outcomes of students. There is a significant influence on the use of the inquiry-based Solar System Scope media that is guided by students' learning outcomes. This evidence is seen from the significance value of 0.002 < 0.05 and the average difference of 7,656, which suggests that the media contributes positively to the improvement of student learning outcomes in the Solar System material

The researchers further advised to expand the measurement of affective and psychomotor aspects to obtain a more thorough picture of the influence of the Solar System Scope media. Subsequent research is expected to examine other factors that influence student learning outcomes, such as learning motivation, learning interest, and science process skills. For researchers it is advisable to compare the use of Solar System Scope media with other digital learning media. In addition, future implementation of Solar System Scope media should consider several technical aspects to ensure optimal learning. Schools and teachers are advised to ensure the availability of adequate devices and a stable internet connection before conducting learning activities. Sufficient time should be allocated for students to explore the application and complete learning tasks effectively. Furthermore, teachers should provide clear guidelines and brief training on the use of the Solar

System Scope application prior to instruction to minimize technical difficulties and maximize student engagement throughout the learning process.

References

Abdurrahman, A. (2019). Meningkatkan Hasil Belajar IPA Materi Tata Surya dengan Media Planetarium pada Siswa Kelas VI SDN Semundal Tahun Pelajaran 2018/2019. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *3*(2).

Amelia, D. T., & Wulandari, F. E. (2024). Pengaruh Model Inkuiri Terbimbing Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPA di Sekolah Dasar. *Jurnal Pendidikan Guru Sekolah Dasar*, *1*(4), 1–10.

Ardiyah, L. I., & Noly, S. (2023). Pengaruh Model Pembelajaran Siklus 5E Berbantuan Aplikasi Solar System Scope terhadap Kemampuan Berpikir Kritis Siswa. *Eduproxima: Jurnal Ilmiah Pendidikan IPA*, *5*(1).

Arianti., Hariani, N. M. M., & Putrayasa, W. B. (2023). Pemanfaatan Media Pembelajaran Pada Materi IPA di Kelas Tinggi Sekolah Dasar Se-Kecamatan Balinggi. *Journal Education and Learning of Elementary School (JATMIKA), 1*(2).

Erina, R., & Heru, K. (2015). Pengaruh Model Pembelajaran InSTAD terhadap Keterampilan Proses Sains dan Hasil Belajar Kognitif Fisika di SMA. *Jurnal Inovasi Pendidikan IPA*, *1*(2), 202–211.

Fadhilah, N., & Mukhlis, A. M. A. (2023). Pengaruh Disiplin Belajar dan Interaksi Teman Sebaya terhadap Hasil Belajar Siswa. *Jurnal Ilmu Pendidikan*, *5*(1), 473–481.

Fauzi, A. A., Hari, A. C. W., & Faiz, H. (2023). Efektivitas Model Pembelajaran Inkuiri Terbimbing Berbantuan Software Solar System Scope untuk Meningkatkan Hasil Belajar Peserta Didik SMP. *Jurnal Phi: Jurnal Pendidika Fisika dan Fisika Terapan, 4*(2), 46-52.

Hidayatullah, A. (2021). Pengaruh Motivasi Belajar dan Manajemen Kelas terhadap Hasil Belajar Siswa. *Jurnal Ilmu Pendidikan*, *5*(4), 1451–1459.

Khatimah, I. A. K., Fatkhomi, F., Atika, N., & Taowatto, S. (2023). Efektiftas Media Solar System Scope dalam Meningkatkan Pemahaman Siswa Terhadap Materi Tata Surya. *SCHOOL EDUCATION JOURNAL PGSD FIP UNIMED*, *13*(1), 73.

Kuhlthau, C. C., Leslie, K. M., & Ann, K. C. (2007). *Guided Inquiry Learning in the 21th Century*. United States of America: Greenwood Publishing Group.

Kuhlthau, C. C., Maniotes, L. K., & Caspari, A. K. (2015). *Guided inquiry: Learning in the 21st century.* United States of America: Bloomsbury Publishing.

Mutiara, E. A., Suwangsih, E., Alindra, A. L. (2025). Peningkatan Keterampilan Proses Sains Peserta Didik dengan Model Inquiry Based Learning Berbantuan Media Solar System Scope. *Jurnal Pendidikan Tambusai, 9*(1), 467-473.

Ningsih, W., Widya, A., Aristo, H., Suci, R., & Edi, P. (2024). *Buku Ajar Media Pembelajaran*. Purbalingga: Eureka Media Aksara.

Ningsih, W., Yanti, D., Sipayung, C., & Simatupang, H. (2025). The Effect of Guided Inquiry with Differentiated Learning to Enhance Students' Critical Thinking Skills. *Jurnal Biolokus: Jurnal Penelitian Pendidikan Biologi Dan Biologi*, *8*(1).

Nugroho, R., & Warmi, A. (2022). Pengaruh Motivasi Belajar terhadap Hasil Belajar Matematika Siswa di SMPN 2 Tirtamulya. *Jurnal Pendidikan, Matematika Dan Sains*, *6*(2), 407–418.

OECD. (2023). *Programme for International Student Assessment (PISA)*.

Putri, P. I. A., Zahrotin, A., & Putra, A. A. I. A. (2025). Pengaruh Media Pembelajaran *Solar System Scope* untuk Melatihkan Literasi Sains pada Materi Struktur Bumi Kelas VIII SMP Negeri 11 Kota Madiun. *Jurnal Media Akademik (JMA)*, *3*(1), 3031–5220.

Ritonga, N., Halimah, S. G., & Rahmi, N. (2020). Peningkatan Hasil Belajar IPA Melalui Pendekatan Keterampilan Proses. *Jurnal Biolokus, 3*(1).

Sahin, D. & Yilmaz, R. M. (2020). *The effect of Augmented Reality Technology on Middle School Students' Achievements and Attitudes Towards Science Education*. *144*, 103710.

Silfiani, Faisal, & Biyatmiati. (2024). Penerapan Media Pembelajaran *Solar System Scope* untuk Meningkatkan Hasil Belajar IPA Materi Tata Surya pada Peserta Didik Kelas VII SMP Negeri 33 Makassar. *Global Journal Education and Learning*, *1*(3).

Simamora, N. N., Derek, F. J. K., Rizki, C. D. M., & Nani, S. (2024). The Influence of a Guided Inquiry Learning Model on Student Motivation and Learning Outcomes on Solar System Material. *EduFisika: Jurnal Pendidikan Fisika*, *9*(1), 93–103.

Tolingguhu, K., Meyko, P., Agil, B., Melizubaida, M., & Yulianti, T. (2024). Pengaruh Penggunaan Sumber Belajar Berbasis Buku Teks Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPS Terpadu. *Dahmil Education Journal, 4*(2).

Wardanis, D., Sauqina., & Sari, M. M. (2023). The Effect of Using Solar System Scope Application on Participation of Students in the Solar the Effect of Using Solar System Scope Application on Participation of Students in the Solar System Sub-Matter of SMPN 24 Banjarmasin. *Indonesian Journal of Science Education and Applied Science, 3*(2).

Wulandari, A. P., Salsabila, A. A., Cahyani, K., Nurazizah, T. S., & Ulfiah, Z. (2023). Pentingnya Media Pembelajaran dalam Proses Belajar Mengajar. *Journal on Education*, *05*(02), 3928–3936.

Zahra, A., Feranie, S., Winarno, N., & Siswantoro, N. (2020). Discovery Learning with the Solar System Scope Application to Enhance Learning in Middle School Students. *Journal Of Science Learning*, *3*(3), 174-184.