



Articulate Storyline as a Modern Solution in Natural Science Learning in Elementary School

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ABSTRACT

Articulate storyline-based learning has become an effective learning alternative in improving student learning outcomes, especially at the elementary school level. As the use of mobile devices increases among children, this approach provides an opportunity to create interactive and engaging learning experiences. This study aims to evaluate the influence of articulate storyline-based learning on the learning outcomes of elementary school students in Natural Sciences subjects. This study uses a quasi-experimental method with a control design involving 60 fourth grade elementary school students. Students were divided into two groups, namely the experimental group that used mobile learning applications and the control group that received conventional learning. Data was collected through pre-test and post-test tests to measure the improvement of learning outcomes and questionnaires to assess students' responses to articulate storyline-based learning. Data analysis was carried out using statistical tests to determine significant differences between the two groups. The results showed that students who learned using mobile applications had a higher increase in learning outcomes compared to the control group. In addition, students in the experimental group also showed an increase in motivation and interest in learning, especially in the material delivered interactively. The conclusion of this study is that articulate storyline-based learning is influential in improving the learning outcomes of elementary school students and has the potential to be applied more widely at the basic education level.

Keywords: *Articulate Storyline-Based Learning, Elementary School, Learning Outcomes*

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INTRODUCTION

The rapid development of the digital era has made the use of technology in education an important need to improve the quality of learning. One of the technologies

that is currently popularly used in education is mobile learning (Andi dkk., 2024). Mobile learning like Articulate Storyline emerged as one of the tools that is considered to be able to increase the effectiveness of learning by providing interactive and engaging content (Aprilya dkk., 2024). However, there is still debate about how much impact it has on student learning outcomes, especially at the elementary school level. Based on the 2018 PISA (Program for International Student Assessment) report, the average score of Indonesian students in the fields of literacy, mathematics, and science is still below international standards (Bilad dkk., 2024). In the field of reading, for example, Indonesian students only recorded an average score of 371, far below the OECD average of 487. Similar conditions are seen in the fields of mathematics and science with scores of 379 and 396, respectively, while the OECD average reaches 489 (Bazilio dkk., 2022). This low learning outcome is caused by several factors, namely limited access to learning facilities, less interactive teaching methods, and lack of technological support in the learning process. From the above phenomenon, it can be seen that education in Indonesia, especially elementary schools, urgently needs more innovative and interactive learning media to help improve student learning outcomes (Auliarachman Diadi dkk., 2023).

This is based on previous research that has been carried out by several researchers, including research by (Romadlon & Farisi, 2024) with the title Development of Interactive Learning Media Using Articulate Storyline. This study shows that the use of Articulate Storyline can increase students' understanding of social studies concepts as evidenced by an increase in students' average scores by 20% after using this media in learning. Other research was also conducted by (Puspita Sari & Kiptiyah, 2024) with the title Mobile Learning Media Based on Articulate Storyline Material on Geographical Conditions of the Indonesian Region Class V. This study found that the use of Articulate Storyline helping students knowing the geographical conditions and natural phenomena that occur faster and being able to maintain interest in learning during the learning process. Meanwhile, the research conducted by (Rivaldi dkk., 2024) with the title of The Effect of Guided Discovery Learning Assisted by Articulate Storyline Media on Students' Critical Thinking Skills in Geography Learning, it was found that the use of Articulate storyline in the learning process can improve student learning outcomes. Some of the studies above show that using interactive media can improve student learning outcomes. However, the above research still focuses on social science subjects and has not studied in depth the factors that contribute to the successful implementation of this media in learning. So that researchers are interested in conducting similar research, but researchers implement it in Natural Sciences subjects and explore the factors that support the success of its implementation.

The purpose of this study is to explain three things, namely the influence of the use of mobile learning based on Articulate Storyline software on student learning outcomes in Natural Sciences subjects, looking at the level of effectiveness of mobile learning based on Articulate Storyline software in improving students' understanding of Natural Sciences subjects and factors that affect the successful implementation of

mobile learning based on Articulate Storyline software in Natural Science learning. This research is based on the media used by teachers in the learning process must be changed so that students can more easily understand the material conveyed and be motivated in the learning process so that the learning outcomes obtained will increase (Anggita, 2023). Therefore, this study bases its beliefs on two main arguments. First, the media used in learning must adjust to the needs of students because learning is now student-centered while teachers are facilitators in learning. Second, the material contained in the Natural Sciences subject is abstract while students are easier to understand the concrete learning material. With this interactive media, it is a solution in improving student learning outcomes in Natural Science subjects. An in-depth explanation is expected to provide a practical contribution in the implementation of articulate storyline to improve student learning outcomes in Natural Sciences subjects in basic education, and theoretically can present a new discourse of the articulate storyline paradigm as an effort to improve the learning outcomes of elementary school students.

RESEARCH METHODOLOGY

This study uses a pseudo-experimental design to measure the effectiveness of articulate storyline in improving the learning outcomes of elementary school students. This design was chosen because it makes it easier for researchers to compare learning outcomes between groups of students who use the articulate storyline application and groups that use conventional methods in learning (Amin dkk., 2020). With this approach, the impact of using the app Mobile on learning outcomes can be comprehensively analyzed without the need for full randomization due to limited student access to devices Mobile at school (Dong dkk., 2021).

The population in this study is grade IV elementary school students in the Tanah Datar area. The research sample consisted of 60 students who were divided into two groups, namely the experimental group using the articulate storyline application and the control group who learned using conventional methods. The selection of this sample took into account the diversity of student characteristics as well as access to relevant mobile devices and applications for this study.

The research instruments used include learning outcome tests and learning motivation questionnaires. The learning outcome test is designed to measure students' understanding of the Natural Sciences subject matter that has been taught through the application articulate storyline (Majid & Sekar Purbarini Kawuryana, 2024). The test consists of multiple-choice questions and descriptions that measure concept comprehension, problem-solving skills, and application of knowledge. The learning motivation questionnaire is used to determine students' perception of articulate storyline, which includes aspects of interest, engagement, and convenience in using learning applications. The validity and reliability of the instrument are tested before the study begins to ensure the instrument can accurately measure learning outcomes and motivation.

The research procedure begins with the division of samples into experimental groups and control groups. The experimental group was given a mobile application containing interactive learning materials in the form of videos, practice questions, and simulations for the subjects studied. Students in the experimental group used the app in structured learning sessions over four weeks, under the guidance of a classroom teacher. The control group received the same learning material, but through conventional teaching methods without using mobile devices (Fardila & Arief, 2021).

After the learning period is over, both groups take a learning outcome test to measure their achievement towards the material studied. In addition, the experimental group was asked to fill out a motivation questionnaire to assess their perception of the learning experience using the mobile application. Data from the learning outcome test and motivation questionnaire were then analyzed using statistical tests to determine significant differences between learning outcomes and student motivation from the two groups.

RESULT AND DISCUSSION

Student learning outcome data was obtained from the final test conducted after a four-week learning period for the experimental group and the control group. Table 1 shows the average score of student learning outcomes from both groups. The experimental group that used the articulate storyline application had an average score of 82.5, while the control group had an average score of 73.2. The standard deviation for the experimental and control groups was 6.8 and 8.3, respectively, suggesting that the scores of the students in the experimental group were more concentrated around the mean.

Table 1. Average Score of Student Learning Outcomes

Group	Average Score	Standard Deviation
Eksperimen	82,5	6,8
Control	73,2	8,3

The distribution of grades shows a significant difference between the learning outcomes of students who use mobile applications and those who learn with conventional methods. The experimental group tended to have higher learning outcomes with slight variation in the value range compared to the control group. This shows that articulate storyline-based learning has a positive impact on student learning outcomes.

The experimental group that used articulate storyline-based learning showed a significant improvement in learning outcomes compared to the control group. Students in this group have access to interactive materials presented in the form of videos, simulations, and practice questions that allow them to understand the material better. The ease of repeating material through this application also contributes to improving understanding of concepts in learning.

This increase in learning outcomes also reflects higher learning motivation among students who use articulate storyline. Interactive and engaging learning apps help students be more actively involved in the learning process, thereby improving their

ability to understand and apply the material (Hoxhaj, 2024). This shows that this application can be an effective tool to improve learning outcomes at the elementary school level.

Further data descriptions show lower variation in scores in the experimental group compared to the control group. The low variation in scores in the experimental group showed a high consistency of learning outcomes among students, which could demonstrate the effectiveness of this mobile application in providing uniform access to learning. Students can learn at their own pace which helps them achieve an optimal understanding of the material.

In the control group, the higher variation in scores showed that not all students had an even understanding of the material. This can be caused by conventional learning methods that are less responsive to individual learning needs (Bawamenewi dkk., 2024). Students with lower levels of understanding may have difficulty following traditional learning methods that can impact their learning outcomes.

The t-test was used to analyze the difference in learning outcomes between the experimental group and the control group. Figure 1 shows the distribution of scores from the two groups, which shows significant differences in learning outcomes. The t-count value of 3.82 with a p-value < 0.05 showed that there was a statistically significant difference between the learning outcomes of students in the experimental group and the control group.

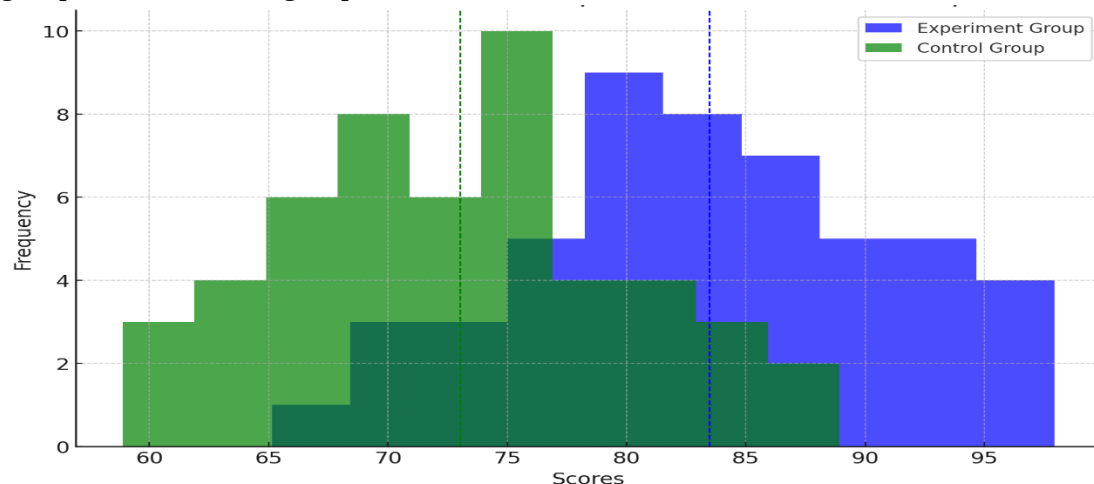


Figure 1. Distribution of Learning Outcomes of Experimental and Control Groups

The results of inferential analysis show that articulate storyline-based learning has a significant positive influence on the learning outcomes of elementary school students. These results show that the use of learning applications can be an effective method to improve students' understanding of the material, especially in subjects that require interaction and understanding of concepts.

The relationship between mobile application use and better learning outcomes shows that technology can function as a powerful learning tool in the primary education environment (Hafizh dkk., 2024). The use of mobile applications that provide learning materials with interactive features strengthens the learning process and increases

students' interest in the material being taught. This higher engagement has a positive impact on improving their learning outcomes (Uzunboylu & Azhar, 2023).

In addition, these results indicate that mobile applications can reduce the understanding gap between students in the classroom. The mobile app allows students to learn independently and at their own pace, providing a greater opportunity for each student to understand the material. This creates a more inclusive and adaptive learning environment to diverse learning needs (Ivan Stevanus & Lusila Parida, 2023).

In a case study at one school, a student who had previously experienced difficulties in understanding the concept of Natural Sciences showed a significant improvement after using the mobile app. The students find it easier to understand the concepts with the help of the interactive simulations provided in the application. This improvement in learning outcomes indicates that articulate storyline-based learning can help students who have visual and kinesthetic learning styles (Barabanova dkk., 2020).

Other students reported that they felt more motivated and interested in learning by using the app compared to conventional learning methods. The mobile app helps them learn independently at home and repeat material that they are difficult to understand at school. This case study reinforces the finding that articulate storyline-based learning can help students in improving their understanding and learning outcomes.

Articulate storyline-based learning provides flexibility for students in managing their study time (Moriska & Hanif, 2024). Data shows that students who use mobile learning apps feel more comfortable repeating difficult to understand material and this has a positive impact on their learning outcomes. Apps designed with engaging and interactive content also help students to stay engaged and enthusiastic about learning (Fardila & Arief, 2021).

This improvement in learning outcomes can also be attributed to the app's ability to provide direct feedback on practice questions and simulations. This feedback allows students to immediately identify mistakes and improve their understanding, which contributes to improved overall learning outcomes. Mobile applications, thus, become an effective means of supporting the adaptive learning process.

The results of the study show that articulate storyline-based learning has a significant impact on improving the learning outcomes of elementary school students. The increased understanding and interest in learning generated by mobile applications shows that technology can be an important element in modern learning. These results reinforce the idea that a responsive and interactive learning approach is needed to meet the learning needs of today's digital generation.

The use of mobile applications as a learning medium also provides opportunities to create a more inclusive and focused learning environment on student needs. These findings support efforts to integrate technology in education as one of the strategies to improve the quality of learning in elementary schools (Ibrahim dkk., 2024).

The results show that articulate storyline-based learning has a significant positive effect in improving the learning outcomes of elementary school students. The

average score of the experimental group that used the articulate storyline-based learning app showed a higher improvement compared to the control group that did not use this method (Wahyuningtias & Bachri, 2024). This improvement reflects that the mobile approach provides easy access to information, flexibility in learning time, and is able to increase student involvement in the learning process.

The study also revealed that the use of mobile devices in learning allows students to learn independently outside of classroom hours. The effectiveness of this method can be seen from the increase in post-test scores in the experimental group compared to the control group. This shows that mobile devices play an effective supporting role in facilitating effective self-learning, especially in basic education.

These results are in line with several previous studies that highlight the role of mobile technology in improving learning outcomes. Other research has also found that articulate storyline-based learning is able to increase student engagement and help them understand the material more deeply than conventional methods (Clark dkk., 2021). However, there are also studies that reveal obstacles in the implementation of mobile learning, especially related to distractions and dependence on technology.

The difference in the results of this study shows that the effectiveness of articulate storyline-based learning may be influenced by several factors, such as the age of the students, the quality of the application content, and the teacher's approach in utilizing the technology. Although most studies support the effectiveness of articulate storyline-based learning, it should be noted that optimal results are only achieved if there is guidance from teachers and control over the time of use (Mita Andira dkk., 2024).

The results of this study are an important indicator that articulate storyline-based learning is not only a trend, but a necessity in the modernization of education. The increase in scores in the experimental group showed that elementary school students were able to adapt and make good use of technology in their learning activities. This indicates that technology has great potential to be integrated in the basic education curriculum at large (Chauhan, 2017).

The effectiveness of this method also indicates the importance of the role of technology in forming adaptive and independent learning methods at an early age (Solihin dkk., 2024). This reflection shows that the incorporation of technology in education can stimulate students' interest in learning and increase students' understanding of subject matter, which ultimately has the potential to create a generation that is better prepared to face the challenges of the times.

The implications of these results include increased use of technology in learning, which can support the achievement of more inclusive and modern education goals. These results can be the foundation for the development of a curriculum that is more responsive to the needs of students in the digital era (Muhammad Fiqri Abdul Thoriq & Taukhid Mubarak, 2024). If widely implemented, articulate storyline-based learning can be a solution to improve the quality of education in various regions, including in remote areas.

The application of this method also has a positive impact on the development of students' character who are independent, adaptive, and creative in solving problems. With articulate storyline-based learning, students are encouraged to take responsibility for their own learning process, thereby creating a sense of independence and discipline. This impact is important for the development of students' skills in the long term, both in the academic environment and outside of school (Nengsih & Haryanti, 2024).

The success of articulate storyline-based learning in this study is due to several main factors, including the availability of devices, application accessibility, and teacher support (Nascimento & Marques, 2024). Students' ability to operate mobile devices easily contributes to the success of this method. In addition, interactive learning apps provide a more engaging learning experience, so students are more motivated to learn the subject matter. The following is a picture related to the success factors in implementing the articulate storyline application.

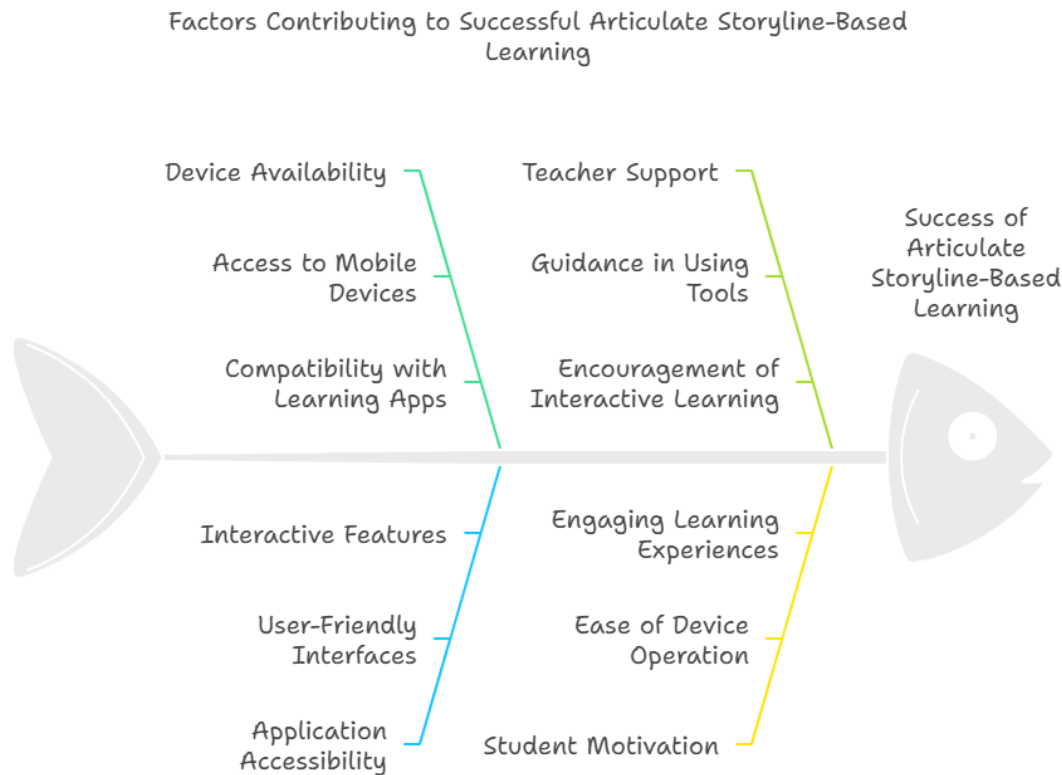


Figure 2. Success Factors of Articulate Storyline in Improving Student Learning Outcomes

The role of teachers in guiding students when using mobile applications is also an important factor. Teachers who accompany students in using the app can ensure students understand the content they are learning and use mobile devices wisely. These factors show that articulate storyline-based learning can be effective if supported by a comprehensive and collaborative education ecosystem (Pradana & Josiah, 2024).

The next step is to gradually expand the implementation of articulate storyline-based learning in various schools, especially at the primary education level. The development of educational content in accordance with the national curriculum and training for teachers in the use of mobile applications will be a priority that needs to be considered (Kurniafin & Okyranida, 2022). Thus, schools can take advantage of mobile technology to improve the quality of learning overall.

Long-term evaluation is also needed to identify the impact of articulate storyline-based learning on students' academic development and social skills. With this step, education policies can be designed to encourage the wise and sustainable adoption of technology in the education system. Further research is expected to enrich insights into the effectiveness of articulate storyline-based learning at various levels of education and socio-economic conditions.

CONCLUSION

This study found that articulate storyline-based learning can significantly improve the learning outcomes of elementary school students compared to conventional learning methods. These findings show that students who use articulate storyline-based learning applications tend to have a deeper understanding of the subject matter, as well as a higher increase in learning motivation than students who use traditional methods. This highlights the role of technology as a learning aid that is able to increase the effectiveness of the learning process at an early age.

This study also shows that articulate storyline-based learning supports the development of student independence in learning. These results highlight the importance of the role of mobile technology in encouraging students to be more active in the learning process, where they can access materials flexibly outside of school hours. Thus, articulate storyline-based learning not only helps students improve their learning outcomes academically but also develops independent learning skills.

The more value of this research lies in the application of articulate storyline-based learning concepts tailored to primary education, where many previous studies have focused more on secondary and higher education levels. This research contributes to introducing articulate storyline-based learning methods that are more adaptive and in accordance with the learning characteristics of elementary school students. These findings open up opportunities for educators to be more creative in designing learning experiences that are connected to technology effectively.

In addition to the advantages, this study also has several limitations, one of which is that the sample coverage is limited to a few schools in certain regions, so the results may not be fully representative of the student population in general. In addition, differences in the availability of technology in various regions also affect the results of the study, because not all students have the same access to adequate mobile devices. For this reason, further research with a wider coverage of the area and a more diverse population is needed to obtain more representative results.

Another aspect that is a limitation is the relatively short duration of the research, so that the long-term impact of articulate storyline-based learning on the academic and social development of students has not been well measured. Going forward, longer-term research will help identify the sustainable effects of articulate storyline-based learning on students' skills. This direction is important to evaluate the extent to which articulate storyline-based learning can provide sustainable benefits to primary education.

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