

The Influence of IDOLA Media Based on Articulate Storyline 3 on Elementary School Science Learning Outcomes

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Received: 20 May 2023; **Revised:** 12 June 2023;
Accepted: 16 June 2023; **Published:** 30 June 2023

To link to this article: <https://doi.org/10.37134/ajatel.vol13.1.10.2023>

Abstract

This study aims to identify the effect of using IDOLA media on student learning outcomes in science subjects for grade IV. This study uses a research and development (R&D) approach with a focus on validation and development of educational products. The development model used is Borg and Gall, including eight steps: 1) Identifying Potential and Problems, 2) Collecting Data, 3) Designing Products, 4) Validating Designs, 5) Revising Designs, 6) Conducting Initial Trials, 7) Revising Products, and 8) Conducting Trials. Data collection methods include tests, observations, interviews, questionnaires, and documentation. Quantitative data analysis techniques include validation sheet analysis, feasibility questionnaire analysis, teacher and student response questionnaires, and t-test gain analysis. This study involved grade IV students from three elementary schools in the Pringgodani Cluster, Sarang District, Rembang Regency. The results showed that IDOLA media was effective in improving learning outcomes. The pre-test average for the experimental and control classes were 37.25 and 39, respectively. The post-test average increased to 84.75 for the experimental class and 77 for the control class. The t-test results showed a t-value of 3.555 with a significance level of 0.000, which is smaller than $\alpha = 0.05$. This study concluded that the development of IDOLA media, with the help of Articulate Storyline 3, is effective for teaching science subjects in grade four. It is recommended that teachers incorporate IDOLA media in their teaching practices to improve student learning outcomes.

Keywords: *IDOLA Media, Articulate Storyline 3, Science Learning Outcome*

INTRODUCTION

Merdeka Curriculum, introduced by the government as a replacement for the 2013 curriculum, commenced in the 2022/2023 school year for first and fourth-grade levels in elementary schools. This curriculum aims to address the learning loss experienced during the COVID-19 pandemic by emphasizing Learning Achievement (CP) as the ultimate goal of the learning process. According to the Minister of Education and Culture Regulation No. 16 of 2022 Article 3a, learning achievements are the learning objectives of a learning unit (Wahab, 2023). In designing lessons, compiling teaching modules, and developing teaching materials, teachers must adhere to the Learning Outcomes of each phase and lesson content (Ndari & Mahmudah, 2023).

Teachers are expected to cultivate students' knowledge, attitudes, and skills simultaneously. As stated in Law Number 20 of 2003, the goal is to develop the potential of students to become individuals who believe in and are devoted to God Almighty, possess noble character, and are healthy, knowledgeable, capable, creative, and independent, ultimately becoming democratic and responsible citizens. This mission of the Indonesian nation, led by educational pioneers—teachers—aims to produce quality graduates who can compete in the evolving 21st century. Education plays a crucial role in

equipping individuals with skills in technology use, communication, and information media development today (Nurmala et al., 2021). The National Education Association identifies 21st-century skills as "The 4Cs": critical thinking, creativity, communication, and collaboration.

The development of creativity and innovation in learning is particularly applicable to subjects like Natural Sciences. Teachers should go beyond using standard student and teacher books in designing the learning process by being guided by Learning Outcomes (CP) and developing comprehensive teaching materials. The integration of learning media is also essential, considering the digital era students are currently experiencing. Alenezi (2023) highlight that educators in the digital era must be proficient in using both classic and modern learning media. In the context of teaching and learning, media serves as an intermediary to convey information from teachers to students, facilitating effective learning. Media in education often refers to graphic, photographic, or electronic tools used to capture, process, and present visual or verbal information (Buckingham, 2007). Puspitarini and Hanif (2019) emphasizes that learning media can bridge the understanding of learning materials between teachers and students, making the learning process more effective and efficient. Thus, media is crucial in delivering information to enhance the effectiveness and efficiency of learning.

Nurmala et al. (2021), found that Articulate Storyline 3 media products in STEM-based science learning are effective and feasible for developing student creativity. Similarly, Rianto (2020) in his study concluded that an Articulate Storyline 3-based multimedia application, PERI GITA, is highly suitable for interactive learning in the Indonesian Language and Literature Learning Digitization course. Furthermore, Karisma and Hendratno (2022), demonstrated that Articulate Storyline 3 learning media is very effective for improving English vocabulary mastery in various topics. Articulate Storyline, introduced in 2011, is a multimedia authoring tool that enables the creation of interactive learning media incorporating text, images, graphics, sound, animation, and video (Hadza et al., 2020). Outputs from Articulate Storyline can be published on web-based media (HTML5) or as application files compatible with laptops, tablets, smartphones, or mobile phones. Its features are similar to Microsoft PowerPoint but offer more comprehensive and creative presentation capabilities, including timelines, movies, pictures, and character features.

Learning outcomes are the abilities students acquire after learning activities. Prøitz (2010) describes learning outcomes as specific competencies achieved by students, encompassing cognitive, affective, and psychomotor skills. Brooks et al. (2014) elaborates that learning outcomes include all achievements assessed by the curriculum of educational institutions. Therefore, learning outcomes are the cognitive, affective, and psychomotor skills students gain, assessed according to the curriculum standards (Hussey & Smith, 2008). Based on initial research conducted through document analysis at the KKG Gusek Pringgodani in Sarang District, it was found that there is a need for enhanced teaching materials for science subjects. This analysis, which examined the CP curriculum according to Permendikbudristek No. 008/H/KR/2022 in relation to the Teacher's Books and Student's Books, revealed a discrepancy between the material specified in the CP for Science (IPA) and the content provided in the current textbooks. Specifically, CP Phase B for fourth grade includes material on the life cycle of living things, which is not covered in the Student's Book of Natural and Social Sciences for Class IV or the Teacher's Book Natural and Social Sciences Teacher's Guidebook for Class IV.

Further preliminary research, including observations, interviews, and questionnaires with fourth-grade teachers in several elementary schools in Gusek Pringgodani, Sarang District, found that the absence of engaging media in teaching made learning monotonous. Teachers primarily relied on textbooks, resulting in a teacher-centered approach and limited use of school infrastructure, such as ICT tools like Chromebooks. Therefore, there is a need to develop teaching materials that incorporate Chromebooks to enhance the learning experience. Interviews with class teachers indicated that the PAS Semester I Science scores were still low. For example, at SD Negeri 1 Kalipang, only 30% of students met the Learning Objectives Achievement Criteria (KKTP). Similarly, at SD Negeri 2 Kalipang and SD Negeri 1 Karangmangu, only 40% and 24% of students, respectively, met the KKTP. The low student performance was attributed to the insufficient coverage of science material, as teachers relied solely on the Student's Book and Teacher's Book, which provided limited content. Moreover, some topics included in PTS and PAS assessments were not taught due to the lack of developed teaching materials aligned with CP and TP. This research focuses on the development of teaching materials and learning media, specifically the IDOLA media using Articulate Storyline 3, to address these issues. The researchers have named the developed interactive learning media IDOLA, which stands for Interactive,

Digitalization, Online, and Fun. This media aims to enhance student interest, engagement, and learning outcomes, and to facilitate teachers in delivering teaching materials effectively.

METHODS

The research design employed is research and development (R&D), which aims to validate and develop products. This study follows the Borg and Gall development model which comprises 10 stages. However, due to time constraints, the research was limited to 8 stages: 1) Identifying Potential and Problems, 2) Collecting Data, 3) Designing the Product, 4) Validating the Design, 5) Revising the Design, 6) Conducting an Initial Trial, 7) Revising the Product, and 8) Trial Use (Sugiyono, 2015).

The research subjects were fourth-grade elementary school students in the Gugus Pringgodani, Sarang District, Rembang Regency. The sample included 20 students from class IV at SD Negeri 1 Kalipang as the experimental class and 10 students from class IV at SD Negeri 1 Karangmangu as the control class. Additionally, extensive trials were conducted at SDN Temperak with 22 students, SDN 2 Kalipang with 32 students, and SDN 1 Bajorowjo with 28 students.

Quantitative data collection involved administering two tests: a pretest and a posttest. These tests were conducted before (pretest) and after (posttest) the learning sessions. Questionnaires were used to gather student and teacher responses to the learning media. Documentation included photos of activities, students' science test results, theoretical studies, curriculum documents, CP (Competency Standards), ATP (Annual Teaching Program), teacher books, and student books. Interviews were conducted during the preliminary study with fourth-grade teachers at SD Negeri 1 Kalipang, SD Negeri 2 Kalipang, and SD Negeri 1 Karangmangu from April 10-12, 2023. Observations were made in these three elementary schools.

The research instruments included test questions for the pretest and posttest, observation sheets, and questionnaire sheets. Initial data analysis was performed after obtaining pretest data from both the control and experimental groups to determine if the two classes were in similar initial conditions. The analysis involved a normality test, a homogeneity test for two variance similarities, an n-gain test, and a t-test. The normality test was used to determine whether the test results of the two groups were normally distributed. The hypothesis for the normality test was formulated accordingly.

The normality of the test results was assessed using the Shapiro-Wilk test with the assistance of SPSS software. In this test, if the p-value obtained is greater than 0.05, the null hypothesis (Ho) is accepted, indicating that the data are normally distributed. Test the equality of variances using Levene's test with the assistance of SPSS. If the p-value obtained is greater than 0.05, the null hypothesis (Ho) is accepted. The pre-test and post-test data from the control group and the experimental group were analyzed using the Normalized Gain (n-gain) formula, which can be calculated as follows.

$$N - gain < g > = \frac{Posttest\ score - Pretest\ score}{maximum\ score - Pretest\ score} \quad (1)$$

Tabel 1 Average normalized gain value and its classification

Average Gain Normalized	Classification	Level of Effectiveness
$\langle g \rangle \geq 0.70$	High	Effective
$0,30 \leq \langle g \rangle < 0.70$	Average	Effective enough
$\langle g \rangle < 0.30$	Low	Less effective

Source: Lestari (2023)

According to Arifin (2017), data analysis can also be conducted using an independent sample t-test with the assistance of the SPSS program to determine whether there are differences in the learning outcomes between the control group and the experimental group.

Ho: $\mu_1 = \mu_2$ (there is no difference in learning outcomes between the experimental class and the control class).

Ha: $\mu_1 \neq \mu_2$ (there are differences in learning outcomes between the experimental class and the control class).

Differences in learning outcomes between the control and experimental groups are determined by the Sig. (2-tailed) value. If the Sig. (2-tailed) value is greater than $\alpha = 0.05$, the null hypothesis (H₀) is accepted. Conversely, if the Sig. (2-tailed) value is less than $\alpha = 0.05$, the alternative hypothesis (H₁) is accepted. For the pretest data analysis, if the Sig. (2-tailed) value is greater than $\alpha = 0.05$, and for the posttest data analysis, if the Sig. (2-tailed) value is less than $\alpha = 0.05$, it can be concluded that the IDOLA media assisted by Articulate Storyline 3 is effective in improving student learning outcomes in science subjects.

FINDINGS AND DISCUSSION

Product development was based on an analysis of the needs of teachers and students through a comprehensive field study. Researchers identified potential and existing problems by conducting interviews, observations, distributing questionnaires, and gathering documentation from fourth-grade students in three elementary schools in the Sarang Gugus Pringgodani District: SD Negeri 1 Kalipang, SD Negeri 1 Karangmangu, and SD Negeri 2 Kalipang. This process revealed low PAS 1 Science learning outcomes, which were below the Learning Goal Achievement Criteria (KKTP), a lack of alignment between the Student Book and the Competency Standards (CP), and missing content in the Student Book. Questionnaires were distributed to 81 fourth-grade students across the three observed schools. Documentation studies involved collecting data and theoretical support for the development of the learning media. Data collection also included analyzing curriculum documents, Learning Outcomes (CP), Learning Objectives Flow (ATP), teaching modules, teacher books, student books, learning resources, and relevant research (Adikara et al, 2022).

Trials were conducted to determine the effectiveness of the developed learning media. Effectiveness was assessed through a pretest-posttest control group design, comparing conditions before and after the intervention, with an experimental class and a control class. The experimental class was fourth-grade students from SD Negeri 1 Kalipang, and the control class was fourth-grade students from SD Negeri 1 Karangmangu. A limited trial at SD Negeri 1 Kalipang was conducted with 20 students, and at SD Negeri 1 Karangmangu on July 29, 2023, with 10 students. The trial involved using Chromebooks connected to the internet. Students completed pretest questions before the learning process with IDOLA media. The teacher/researcher then conducted lessons using the prepared teaching modules, incorporating IDOLA media. Students accessed the IDOLA Media link and, with teacher assistance, explored the media to study the Life Cycle of Living Creatures and engage in games, quizzes, and evaluations. At the end of the trial, students completed post-test questions and a response questionnaire regarding the IDOLA media. This response questionnaire gauged student opinions on the developed product. Students were informed that they could independently study with IDOLA Media anytime and anywhere using a cellphone/Android device.

Based on the data from the trial conducted on fourth-grade students at SD Negeri 1 Kalipang, which involved 20 respondents, the total percentage result was 90.86%, categorizing the product as "very interesting." A broader usage trial was subsequently conducted with fourth-grade students from three elementary schools in the Dabin II area of Sarang District: Temperak Public Elementary School, Kalipang 2 Public Elementary School, and Bajingjowo 1 Public Elementary School. The trials were carried out as follows: at SD Negeri Temperak with 22 students; at SD Negeri 2 Kalipang with 32 students; and at SD Negeri 1 Bajingjowo on Saturday with 28 students. During the trials, school Chromebooks connected to the internet were set up. Students first completed pretest questions before using the IDOLA media. They were then provided with the IDOLA media link and given time to explore and use the media. Afterward, students completed posttest questions to assess the improvement in learning outcomes resulting from the use of IDOLA media. Table 2 presents the pretest and posttest results for both the control and experimental groups. The average pretest scores for the experimental and control classes were 37.25 and 39, respectively. After the intervention, the average posttest scores were 84.75 for the experimental class and 77 for the control class. This significant improvement in the experimental class demonstrates the effectiveness of the IDOLA media in enhancing student learning outcomes.

Table 2 Description of pretest and posttest values of experimental class and control class

	N	Range	Min	Max	Mean		Std. Deviation
					Statistic	Std. Error	
Experiment Pretest	20	40.00	25.00	65.00	37.2500	2.60250	11.63875
Experiment Posttest	20	40.00	60.00	100.00	84.7500	2.39173	10.69616
Control Pretest	10	30.00	20.00	50.000	39.0000	3.05505	9.66092
Control Posttest	10	50.00	50.00	100.00	77.0000	5.22813	16.53280
Valid N (listwisw)	10						

Figure 1 shows that the average pretest scores in the experimental and control classes were 37.25 and 39, respectively. After implementing learning with IDOLA media, the average posttest scores increased to 84.75 in the experimental class and 77 in the control class.

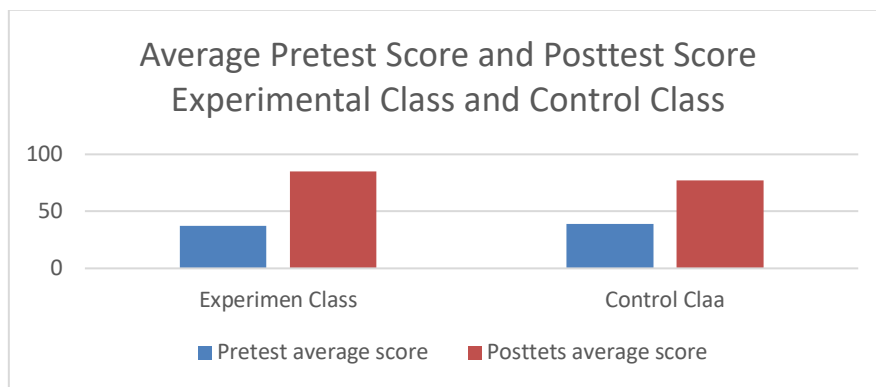


Figure 1 Pretest and posttest average scores of experimental class and control class

Data normality can be assessed through a normality test, which aims to determine whether the sample data come from a normally distributed population. The normality test was conducted using the Shapiro-Wilk test with the assistance of SPSS. Based on Table 3, the significance values for the pretest and posttest in the experimental and control classes were 0.296, 0.106, 0.061, and 0.156, respectively. Since these values are greater than 0.05, we conclude that the null hypothesis (H0) is accepted, indicating that the data are normally distributed. Following the normality test, a homogeneity test was performed. Before conducting the homogeneity test, a paired sample test was carried out.

Table 3 Experimental class and control class normality test results

	Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning outcomes	Experiment Pretest	.115	20	.200*	.945	20	.296
	Experiment Posttest	.195	20	.044	.921	20	.106
	Control Pretest	.241	10	.103	.852	10	.061
	Control Posttest	.272	10	.035	.887	10	.156

*. This is a lowerbound of the true significance

a. lilliefors Significance Correction

According Table 4, it is found that the sig (2-tailed) value for the pretest and posttest of the experimental class is 0.000. Since this value is less than 0.05, it can be concluded that there is a significant difference in the average learning outcomes between the pretest and posttest in the experimental class. Similarly, the sig (2-tailed) value for the pretest and posttest in the control class is also 0.000. As this value is less than 0.05, it can be concluded that there is a significant difference in the average learning outcomes between the pretest and posttest in the control class.

From this table, it is evident that the sig (2-tailed) value for the pretest and posttest of the experimental class is 0.000. Since this value is less than 0.05, it can be concluded that there is a

significant difference in the average learning outcomes between the pretest and posttest in the experimental class. Similarly, the sig (2-tailed) value for the pretest and posttest in the control class is also 0.000. As this value is less than 0.05, it can be concluded that there is a significant difference in the average learning outcomes between the pretest and posttest in the control class.

Table 4 Paired-sample t-test test results (paired samples)

		Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Experiment Pre - Experiment Post	-47.50000	12.51315	2.79803	-53.35633	-41.64367	-16.976	19	.000
Pair 1	Control Pretest	-38.00000	8.88194	2.80872	-44.35376	-13.529	-13.529	9	.000

The criteria for the effectiveness of learning media are if the t-test results for the pretest score have a Sig. value (2-tailed) $> \alpha = 0.05$, and the posttest score criteria have a Sig. value (2-tailed) $< \alpha = 0.05$. After conducting tests over two meetings, a posttest was administered to determine the students' learning outcomes. The t-test results for the posttest scores yielded a calculated t value of 3.555 with a Sig. (2-tailed) value of 0.000, which is less than $\alpha = 0.05$. This indicates a significant difference in posttest learning outcomes between the control and experimental classes, with the experimental class scoring higher than the control class. Therefore, IDOLA media assisted by Articulate Storyline 3 has met the effectiveness criteria, demonstrating that it is effective in improving science learning outcomes in elementary school students (Dayanes et al., 2023). Table 5 shows the T-test results.

Table 5 T-test results

		Levene's Test for Equality of Variances		t	df	Sig. (2-tailed)	t-test for Equality of Means		95% Confidence interval of the Difference	
		F	Sig.				Mean Difference	Std. Error Difference	Lower	Upper
Learning outcomes	Equal variances assumed	1.364	.256	3.555	28	.031	.031	7.75000	4.98233	17.95585
	Equal variances not assumed			3.384	3.348	2.894	.021	7.75000	5.74924	20.18088

CONCLUSION

The conclusion effectively demonstrates the impact of IDOLA media on student learning outcomes. The learning media showed significant improvements in both the experimental and control groups through pretest and posttest evaluations. Furthermore, extensive trials with high average N-Gain scores confirmed the media's effectiveness in enhancing science learning for fourth-grade elementary students. Thus, IDOLA media, supported by Articulate Storyline 3, can be confidently utilized in science education to improve student learning outcomes.

ACKNOWLEDGEMENT

The author would like to thank all the parties involved in this research, especially the families who supported its completion. Special thanks go to the schools: SDN 1 Kalipang, SDN 1 Karangmangu,

SDN Temperak, SDN 2 Kalipang, and SDN 1 Bajingjowo. Additionally, gratitude is extended to all other parties who contributed, though they are not individually mentioned here.

FUNDING

The authors declare that no financial support was received for this research.

DATA AVAILABILITY STATEMENT

Data will be made available on request.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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