



DEVELOPMENT OF INTERACTIVE LEARNING MEDIA ARTICULATE STORYLINE 3 ON SOLAR SYSTEM TO IMPROVE LEARNING ACHIEVEMENT OF GRADE VI ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Character formation and the quality of human resources are essential roles of education. Therefore, education must be carried out effectively and efficiently so that students can understand the subject clearly. One solution that can be applied is to develop interactive learning media, attract students' interest, and be based on information technology (IT) that follows the times. Articulate Storyline, published online, can be an effective alternative, allowing teachers to utilize it in the classroom learning process through facilities provided by the school. This study aims to determine the validity of interactive learning media and the effectiveness of using Articulate Storyline 3 in solar system material to improve the learning achievement of grade VI students in elementary schools. The type of research used in this study is research and development (R&D). This study uses a quantitative approach using the 4D development model and is analyzed using SPSS Software. Based on the results of the development of interactive learning media Articulate Storyline 3 with solar system material for science subjects for grade VI at SDN Kandangapi 1, it shows that the use of media is valid and effective in improving student learning achievement.

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INTRODUCTION

The current digital era has had a significant impact on the education sector in Indonesia, where technology has become a key tool in supporting the learning process. Technology, such as the use of learning media, is recognized to help teachers when presenting information with more impact to students (Alviyanti et al., 2025; Dwiqi et al., 2020).

Learning results from interaction between learners and learning resources, which has a goal for learning achievement. According to Nurrita (2018), effective learning can improve students' Higher Order Thinking Skills (HOTS) and creativity. For learning to be more effective, the main component of learning activities is the existence of learning media. Media in learning is not only a source of learning, but also helps teachers enrich students' knowledge. Through various types of learning media, teachers can present material more effectively, facilitate learners' understanding, and contribute to developing their insights. This is in line with what Nurrita (2018) said in her journal article entitled "Learning media development to improve student learning outcomes", that media in enjoyable learning can even stimulate students in learning activities, so using teaching and learning aids is crucial in schools.

Interactive learning media, according to MZ, A. S. A., et al (2022), act as an intermediary for delivering material by teachers to students. This interaction between learners and learning media helps to concretize abstract material, allowing action and reaction between the two (Yanto, 2019).

However, previous research shows that teachers have not fully utilized technology as a systematic and practical learning medium (Halimah & Indriani, 2021; Ningsih et al., 2023). Many still use conventional methods, especially in science subjects, due to the limited learning media available in elementary schools (Diana et al., 2022; Hanikah et al., 2022; Nafitri et al., 2024). This can harm students' interest and learning outcomes, because learning media is still one-way (Azizatunnisa et al., 2022; Putri et al., 2023; Safira et al., 2021). In the long run, this can hinder learners' development and reduce their interest in learning.

Based on interviews conducted with grade VI students at UPT SD Negeri Kandangapi 1, students seem less enthusiastic about learning and have difficulty understanding Solar System material because the learning media used are only in

pictures and videos with one-way delivery. Meanwhile, science learning should emphasize direct experience that involves students. Material about the Solar System is also an abstract and broad learning material. Learners in grade VI are at the concrete operational level; after observation, it was also found that most students in grade VI at UPT SD Negeri Kandangsapi 1 have a visual-kinesthetic learning style. Therefore, learning media is needed to support students to play a more active role so that they have direct experience, which impacts their understanding of the concept or material of the Solar System.

One solution that can be applied is to develop interactive learning media that attract students' interest, based on information technology (IT), following the times. The use of Articulate Storyline published online can be an effective alternative, allowing teachers to utilize it in the learning process contained in the classroom through the facilities provided by the school. Interactive learning media using IT, especially in the context of material about the Solar System in science subjects, can increase learner engagement and create an active and innovative learning atmosphere (Hidayat, 2024; Ningtiyas et al., 2024; Nurhamidah et al., 2022).

Heliawati et al. (2022) in their research on seventh-grade students of a junior high school stated that using Gamification in Articulate Storyline 3-based multimedia effectively fosters critical thinking skills and independent learning. Another case is the research conducted by Lestarani et al. (2023) on X-grade students in 4 schools at the SMA / MA level in East Sumba. His research concluded that the validity of teaching materials using an articulate storyline 3 according to material and media experts, reached 87.95% and 93.3%.

Previous research on the use of Articulate Storyline 3 has shown positive results in improving learning, especially at the junior and senior high school levels (Jainuri et al., 2023; Safira et al., 2021; Sulistri et al., 2020). However, its application at the elementary level is still not widely practiced (K. A. Hidayah & Rachmadyanti, 2023; Nugroho & Arrosyad, 2020; Sari et al., 2024). This is an essential challenge because primary school students' characteristics and learning needs differ from those of higher education.

This study aims to assess the validity and effectiveness of Articulate Storyline 3-based interactive learning media on Solar System material to improve the learning

achievement of grade VI elementary school students. Research initiatives that specifically investigate the effectiveness of this platform on elementary school learners can provide valuable insights into the development of more targeted learning media based on the educational needs at that level. In addition, this study offers novelty by targeting primary school learners as the main population. Thus, the author hopes that this research has the potential to make a new contribution in developing learning tools/media in science subjects as well as being one of the other breakthroughs in the above problem with the title of developing interactive learning media Articulate Storyline 3 on solar system material to improve learning achievement of grade VI students at UPT SD Negeri Kandangapi 1 by using articulate story applications.

METHOD

The type of research used in this study is research and development or Research and Development (R&D) following the development according to Borg and Gall which includes seven stages needed by researchers, namely potential and problems, data collection, product design, design validation, product design revision, product usage trials, and final products. This approach aims to create or improve new products through a systematic and measurable development process (Sukmadinata, 2015). This research was conducted to find facts and interpret the development of Articulate Storyline 3 Interactive Learning Media on Solar System Material to improve the achievement of grade VI students. This research began in April and June 2024. At the same time, the research site will be carried out at UPT SDN Kandangapi 1. This research involved 3 test subjects: validation by media experts, validation by material experts, and field practitioners (students) in product trials. This research adopted the 4D development model that Thiagarajan et al (1974) introduced. This model consists of four main stages: define, design, develop, and disseminate (Sani et al, 2018).

This study uses a quantitative approach by describing the results that will be processed to obtain information from respondents and analyzed using the help of SPSS Statistical Software in validity trials. To determine the effectiveness of the media developed, the researchers used a different test, the t-test (Paired-Sample t-Test). In addition, quantitative data is analyzed from processing the respondent's questionnaire assessment results, by calculating the validator's score and then describing it using qualitative sentences. The data processing will use the following

formula:

$$p = \frac{\sum x}{\sum x_i} \times 100 \%$$

Information:

P = Validation of the results of the trial subject

X = Number of scores by the trial subject

X_i = maximum score for the nth item/criteria

100 = constant

RESULT AND DISCUSSIONS

Results

Define

Problem analysis, needs analysis, and determination are carried out at the defining stage. After analyzing the needs by conducting interviews and filling out questionnaires (questionnaires) on the needs of students and teachers at schools that have been prepared previously, researchers also collect data using the results of participant observation and filling out questionnaires (questionnaires) to experts to obtain data and information on the feasibility of the media developed so that any deficiencies and problems that exist can be answered.

The observation results show that some problems are still faced in the teaching and learning process. Problems in the learning and teaching process have not been able to improve student achievement due to the teaching materials used, which have not been maximized in attracting students' interest in learning to increase the enthusiasm for learning and motivate students. Students look less excited about learning and less understanding in science lessons, especially Solar System material, because the media only uses pictures and videos with one-way delivery, while science learning emphasises direct experience for students.

Material about the Solar System is also learning material that is abstract and broad (Aulia & Mintohari, 2023; Najib et al., 2023; Wahyuni et al., 2022). Students in grade VI are at the concrete operational level; after observation, it was also found that most students in grade VI at UPT SD Negeri Kandangsapi 1 have a visual-kinesthetic learning style. Therefore, learning media is needed to support students to play more actively so that they have direct experience, which impacts their understanding of the

Solar System concept or material.

Furthermore, a needs analysis was conducted by collecting information about the learning needs of students and the characteristics of interactive learning media using Articulate Storyline 3 as one of the learning resources for students. Based on the initial observations and needs analysis results, the learning used in science learning in the classroom is in the form of video media and PPT.

One of the appropriate learning media educators need for the learning process is interactive learning using Articulate Storyline 3. The development of interactive learning media based on Articulate Storyline 3 was developed following the development according to Borg and Gall, which includes seven stages needed by researchers, namely potential and problems, data collection, product design, design validation, product design revision, product usage trials, and final products.

Participant observation is carried out when the learning process is being carried out using previously developed media. So that the results of observations from researchers to students show that students are very enthusiastic in using the media, are more active in the learning process, and get good responses and responses to students to interactive learning media that have been developed.

Design

After collecting data, the next step is to make a product design from the development of interactive learning media, Articulate Storyline 3, with the subject matter of the solar system, grade VI elementary school theme 9. The stages in making and developing this media are carried out in several stages, namely preparing material scripts and making the media. In addition, the developed media can be improved by several experts who have been selected, namely two media experts, two material experts, and two language experts. The stages of making interactive learning media developed in this study are preparing material scripts and designing interactive learning media.

In preparing the material script, researchers collected solar system material for grade VI SD from several sources, such as books for grade VI SD, modules, ebooks and other learning resources. After researchers have collected the material, they will compile it based on the results of the learning syllabus and lesson plans at school. The

material presented in the interactive learning media to be developed is the definition of the solar system, the sun, and the eight planets in the solar system. The results of the design of interactive learning media can be seen in the following figure:



Figure 1: Home/Login Page

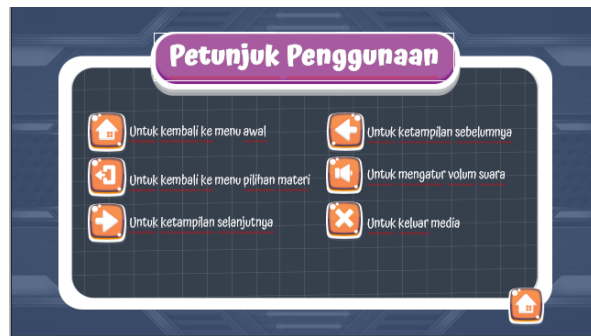


Figure 2: Instructions for Using Learning Media



Figure 3: Main Menu Display



Figure 4: Details of KD and Achievement Indicators



Figure 5: Material Menu



Figure 6: Material Page



Figure 7: Assessment/Quiz Menu

Develop

Data from the validation of learning media was taken starting on June 18, 2024 and ending on June 25, 2024, taking the data through the results of expert validation and field trials. Validation data was obtained from three expert validators: one material expert validator, a media design expert, and a learning expert science teacher at SDN Kandangsapi

1. The results of the material expert validation can be seen in Table 1 below.

No	Statement	x	xi	P(%)	Level of Validity	Description
1	Suitability of KD with Material	5	5	100	Very valid	No revision
2	Explanation of Solar System material is presented accurately	4	5	80	Valid	No revision
3	Identification of the Sun and Planets in the Solar System	4	5	80	Valid	No revision
4	Explanation of the Solar System and the characteristics of its members	5	5	100	Very valid	No revision
5	Explanation of planetary groups in the solar system based on their location and asteroid belts	5	5	100	Very valid	No revision
6	Explanation of other celestial bodies in the Solar System	4	5	80	Valid	No revision
7	Presentation of material is factual	5	5	100	Very valid	No revision
8	Clarity of examples of images, animations, and sounds contained in digital learning media based on the articulate storyline 3 material "Solar System"	4	5	80	Valid	No revision
9	Ease of understanding the material contained in the digital learning media based on the articulate storyline 3 material "Solar System"	4	5	80	Valid	No revision
10	The material presented can encourage students to build their knowledge.	5	5	100	Very valid	No revision
Amount		45	50	90	Very valid	No revision

Table 1: Results of Material Expert Validation of Interactive Learning Media Articulate Storyline 3

Based on the calculation results presented in Table 1, the observations made by the material experts reached 90%. This score is included in the very valid criteria if it matches the eligibility table. Furthermore, the results of media expert validation have been presented in Table 2.

No	Statement	x	xi	P(%)	Tingkat	Keterangan
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					Kevalidan	
1	Attractive display design	4	5	100	Very valid	No revision
2	Text readability (letter color, image, background is solid and does not interfere when read)	4	5	80	Valid	No revision
3	Appropriateness of using letters, sizes, and typeface	4	5	80	Valid	No revision
4	Appropriateness of navigation button layout	5	5	100	Very valid	No revision
5	Overall attractiveness of media content	4	5	100	Very valid	No revision
6	Ease of operation	4	5	80	Valid	No revision
7	Clarity of instructions for use	4	5	100	Very valid	No revision
8	Accuracy of use according to instructions	4	5	80	Valid	No revision
9	The practicality of media can be used	4	5	80	Valid	No revision
10	Ease of understanding the content	5	5	100	Very valid	No revision
Amount		42	50	84	valid	No revision

Table 2: Results of Media Expert Validation of Interactive Learning Media Articulate Storyline 3

Based on the calculation results presented in Table 2 above, the observations made by media experts reached 84%. If matched with the eligibility criteria table, this score is included in the valid criteria. Next, the data from the pilot test is presented in Table 3.

No	Statement	x	xi	P(%)	Tingkat Kevalidan	Keterangan
1	Clarity of writing in the media	4	5	80	Very valid	No revision
2	Clarity of images in the media	5	5	80	Valid	No revision
3	Clarity of video in the media	5	5	80	Valid	No revision
4	Attractiveness of the overall media display	5	5	100	Very valid	No revision
5	Attractiveness of the overall presentation of media content	4	5	100	Very valid	No revision
6	Ease of understanding the material	4	5	80	Valid	No revision
7	Clarity of the sequence of material display	4	5	100	Very valid	No revision
8	The material used is suitable for use in interactive learning media	4	5	80	Valid	No revision
9	Ease of understanding the material	4	5	80	Valid	No revision
10	The role of media in improving students' learning achievement	5	5	100	Very valid	No revision
Amount		44	50	88	valid	Tidak revisi

Table 3: Trial Assessment Data

Based on the calculation results presented in Table 3 above, the overall observation reached 88%. If matched with the eligibility criteria table, this score is included in the valid criteria. Criticisms and suggestions for individual trials in questions through a questionnaire are accepted and considered to improve the learning media.

Disseminate

The results of the data description analysis of the pre-test and post-test results are presented in Table 4.

Indicator	Score	
	Pre-test	Post-test
Average	55	76.7
Minimum Score	30	60
Maximum Score	80	90

Table 4: Descriptive Analysis Results of Pre-test and Post-test Test Results Data

Based on the table above, the minimum score obtained by the pre-test is 30, and the maximum score is 80, with an average score of 55. The post-test results have a minimum score of 60 and a maximum of 90, with an average score of 76.7. This result shows that the value of students has increased after the development of an articulate storyline, 3 interactive learning media, especially in solar system material.

Furthermore, the normality test is carried out to show that the data to be processed can proceed to the next stage The results of the data normality test are shown in Table 5.

		Unstandardized Residual
N		133
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	,00404940
Most Extreme Differences	Absolute	,051
	Positive	,051
	Negative	-,049
Kolmogorov-Smirnov Z		,585
Asymp. Sig. (2-tailed)		,884

a. Test distribution is Normal.

b. Calculated from data.

Table 5: Normality Test Results

The analysis results show that the Kolmogorov-Smirnov Z value is 0.585 and the significance is 0.884 ($0.884 > 0.05$), which means that the residual data is normally distributed, so it is suitable for use.

The Mann-Whitney test is used to determine whether or not there is a difference in the average of two unpaired samples. This test does not require homogeneous and normally distributed data. The following is the research data from the pre-test results and post-test results. Where the results of the Mann-Whitney test are Asymp.sig. (2-tailed) $0.002 < 0.05$, which means the hypothesis is accepted. The results of the Mann-Whitney test can be seen in Table 6.

Test Statistics ^b	
	Children's learning achievement
Mann-Whitney U	10.000
Wilcoxon W	65.000
Z	-3.044
Asymp. Sig. (2-tailed)	.002
Exact Sig. [2*(1-tailed Sig.)]	.002 ^a

Table 6: Test Results Mann-Whitney

Hypothesis Testing

A summary of the pre-test and post-test of the experimental class is shown in Table 7 below.

Class	T count	T table	P-Value
Pre-test Post-test	1.887	1.851	0.000

Table 7: T-test Results

Based on the table above, $t \text{ count} > t \text{ table}$ at the 5% significance level ($1.887 > 1.851$) and has a p value < 0.05 , which means it can be concluded that there is a significant increase in the score of student learning outcomes.

A summary of the experimental class pre-test and post-test paired t-test is shown in Table 8 below.

Class	Mean	T count	T table	P-Value
Pre-test	55	7.681	1.697	0.000
Post-test	76,76			

Table 8: Pairwise T Test Results of Pre-Test with Post-Test

Based on the table above, the average pre-test score is 55, and the average post-test score is 76.76, so it has increased by 2.1. Which means that Articulate Storyline 3 Interactive

Learning Media improves student learning outcomes. In addition, it is also obtained that $t_{count} > t_{table}$ at the 5% significance level ($7.681 > 1.697$) and has a p value < 0.05 , which means it can be concluded that there is a significant effect on the student learning outcomes score.

Testing Results	Correlation	Sig.
Pre-test	0.543	0.452
Post-test		

Table 9: Pairwise T Test Results of Pre-Test with Post-Test

Table 9 shows that the results of the correlation or relationship between the two data sets, or the relationship of the pre-test and post-test scores, have a correlation value of 0.543 with a significance value of 0.452. because of the sig value. $0.452 > 0.05$, it can be said that there is no relationship between pre-test scores and post-test scores.

Based on the results, each test's average value shows that the pre-test's average value is 68.83, while the average value for the post-test is 87.3. This shows that the average value of the post-test is higher than the pre-test. So, there is a significant difference in the use of interactive multimedia-based learning media for science on the solar system in grade VI that has been developed.

The average post-test score obtained by students is greater than the pre-test score, with a difference of 18.47. This shows that students experience an increase in learning outcomes after using learning media, Articulate Storyline 3, so that it can be said that the interactive multimedia-based science learning media Articulate Storyline 3 that has been developed can effectively improve understanding and learning outcomes in science lessons on solar system material for grade VI students.

CONCLUSIONS

The development of interactive learning media using Articulate Storyline 3 is proven to have a high level of validity and attractiveness. Based on the assessment results, this media obtained a validity score of 90% from material experts, 84% from media experts, and 88% from grade VI students of SDN Kandangsapi 1. This shows that users can receive this learning media regarding the material and media display. The field trial results showed a significant increase in student learning outcomes after using this media. The average student pre-test score of 68.83 increased to 87.3 in the post-test, with an increase of 18.47. In addition, the t-test results show that the t-count value is greater than the t-table, and the N-Gain Score value of 0.765 is in

the moderately effective category. Thus, this learning medium significantly improves students' understanding of solar system material.

Suggestions made regarding the development of interactive multimedia-based learning media on the subject of the solar system for grade VI science subjects include that interactive multimedia-based learning media on the subject of the solar system for grade VI science subjects can be utilized as an alternative learning medium and used as support in delivering solar system material. In addition, the learning media that have been developed can be used as a reference by teachers or further developers according to the needs and characteristics of students.

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