

Development of interactive multimedia articulate storyline to improve elementary school students' learning outcomes regarding the history of the formulation of Pancasila

Siti Nur Hidayatur Rofi'ah ^{a,1,*}, Susilo Tri Widodo ^{a,2}

^a Department of Elementary School Teacher Education, Faculty of Education and Psychology, Universitas Negeri Semarang, Jl. Raya Beringin No.15, Wonosari, Semarang, Central Java 50244, Indonesia

¹ sinuhiro@students.unnes.ac.id; ² susilotriwidodo@mail.unnes.ac.id

* Corresponding author

Abstract: The low student learning outcomes on the history of the formulation of Pancasila and the learning media used by teachers are less creative and innovative, causing students to feel bored and less active in learning, this is the background of researchers in conducting research. The purpose of this study was to develop, test the feasibility, and test the effectiveness of Articulate Storyline interactive multimedia in improving the learning outcomes of Pancasila formulation history material for fourth-grade students of SDN Gondoriyo Semarang City. Researchers use development research or Research and Development (R&D) with the Borg and Gall development model. Researchers used observation, interviews, documentation, questionnaires, and tests as data collection techniques. Researchers used data analysis techniques of normality test, t-test, and N-Gain test. The results of the material expert feasibility assessment obtained a score of 85.8%, and the media expert assessment obtained a score of 86.25%. The validation results of material experts and media experts show that the interactive multimedia articulate storyline is "very feasible" to be used in the learning process. Teachers and students stated that Articulate Storyline interactive multimedia is "very practical" to use in the learning process. The effectiveness of interactive multimedia articulate storyline on the material of the history of the formulation of Pancasila is proven by the t-test, with the results of small-scale product trials obtained sig. (2-tailed) $0.000 < 0.05$, while in the large-scale product trial obtained sig. (2-tailed) $0.000 < 0.05$, it can be stated that there is a comparison of the average student learning outcomes before and after the product trial, so it can be concluded that Articulate Storyline interactive multimedia can improve learning outcomes in the material of the history of the formulation of Pancasila for grade IV elementary school students. The results of this discovery can be used as a basis for expanding the distribution of media on a wider scale.

Keywords: articulate storyline; interactive multimedia; learning outcomes

Citation: Rofi'ah, S. N. H., & Widodo, S. T. (2024). Development of interactive multimedia articulate storyline to improve elementary school students learning outcomes regarding the history of the formulation of Pancasila. *Research and Development in Education (RaDEn)*, 4(1), 516-532.
<https://doi.org/10.22219/raden.v4i1.32609>

Received: 5 March 2024

Revised: 9 March 2024

Accepted: 21 April 2024

Published: 29 May 2024



Copyright © 2024, Rofi'ah et al.

This is an open access article under the CC-BY-SA license

1. Introduction

Education is a determining factor in shaping the next generation of the nation. Therefore, children need to receive education to develop their potential to gain knowledge, skills, and positive attitudes as a prerequisite for further development of the nation and state in the future. According to Law Number 20 of 2003 concerning the National Education System, education is a conscious and planned effort to realize the learning process in such a way that students can develop their potential to gain religious spiritual strength, self-control, character, intelligence, noble morals, and skills that are useful for themselves, society, nation, and state.

To create a learning atmosphere and learning process that fosters student potential, modernization requires teachers to be able to develop and adapt to progress (Abuhassna et al., 2020; Coman et al., 2020; Hermita et al., 2021; Kim et al., 2019). This is by 21st-century learning, where 21st-century teachers need to design learning by utilizing technology as an innovation in learning. For this reason, teachers must be able to improve the quality of learning and create an attractive learning environment by utilizing sophisticated and innovative technology (Bahri, 2020; Elisa et al., 2022; Saadah & Hasanah, 2023).

According to experts in the field, learning activities are activities that involve teachers and students to support the teaching-learning process (Calleja & Camilleri, 2021; Shaaruddin & Mohammad, 2017; Sulasmi, 2022). The level of student participation is reflected in their involvement in various activities such as asking questions, responding, collaborating in teams, listening carefully, conducting experiments, and thinking actively

in solving problems (Engeness, 2020). The ideal learning outcome is that students can understand the learning process which includes 3 domains, namely cognitive, affective, and psychomotor (Hoque, 2016). Good learning outcomes can be seen from students' increased understanding of the learning material, this can be seen from evaluation scores that are above the minimum standard of completeness (Nurwulan et al., 2020).

The results of preliminary studies conducted by researchers at SDN Gondoriyo Semarang City indicate that the use of learning media is less creative and innovative, and technology in the learning process is still limited. Initial observations show that teachers rarely use projector media with PowerPoint, and have not introduced Android-based media in learning. The potential impact of this condition is the decline in student interest in learning and the lack of student involvement in exploring learning concepts, which in turn can result in a lack of student activity and participation in the teaching and learning process. Furthermore, the research found that students' learning outcomes, especially in the material on the history of the formulation of Pancasila in Pancasila Education learning, showed a low level. Data from pre-research activities in class IV of SDN Gondoriyo Semarang City showed that only 42.8% of students could reach or exceed the KKM score in the midterm assessment activities for Pancasila Education subjects. In addition, the decline in student learning outcomes was also caused by students' lack of focus in following the learning process.

So, to overcome these problems, it is necessary to use learning media that can increase student learning activities in line with the times. According to research by Anjarwati et al. (2016), the use of learning media as a communication tool in the learning process is considered important to achieve optimal learning outcomes. The selection of learning media must be tailored to the needs, not only in terms of media characteristics but also student characteristics (Yanto et al., 2023). Based on the analysis and interviews with students, the results show that students can implement IT-based learning so that it can support development. The use of technology in learning has great benefits because it can increase student learning motivation and make the learning process more interesting (Bahri et al., 2020). With high learning motivation, it can have a positive impact on student learning outcomes (Ramadhanti et al., 2024).

In the use of IT-based learning media, there are many software that can be used to create interactive media, one of which is Articulate Storyline. Based on the results of interviews and observations, it turns out that educators have never made or developed interactive multimedia Articulate Story-line. Articulate Storyline is software that can create interactive learning multimedia (Husna et al., 2022). The advantage of Articulate Storyline is that it can create creative and comprehensive presentations (Nissa et al., 2021). The various features provided by Articulate Storyline include videos, characters, and images and can be accessed online or offline by students (Firdaus et al., 2022). The Articulate Storyline software is expected to make it easier for students to understand the learning material delivered by the teacher and improve students' critical thinking skills (Heliawati et al., 2022; Rahayu & Ulumiyah, 2021; Wijayanti et al., 2022).

The utilization of Articulate Storyline interactive multimedia in the learning process has been the focus of attention in several previous studies. Findings from previous studies can be an impetus for further development of Articulate Storyline interactive multimedia for use in primary schools. The results showed that the use of this Articulate Storyline-based learning material was effective and useful in the learning context, successfully improving students' learning achievement (Sindu et al., 2020; Wahyuni et al., 2023).

The study became a reference for researchers in developing Articulate Storyline interactive multimedia on the history of the formulation of Pancasila to facilitate student understanding by providing interesting and fun learning media. The purpose of this research is to develop, test the feasibility, and test the effectiveness of Articulate Storyline interactive multimedia in improving the learning outcomes of Pancasila formulation history material for grade IV students of SDN Gondoriyo Semarang City.

2. Materials and Methods

The type of research used in this study is research and development. Development research is a process for improving existing products or creating new products (Strijker, 2020; Trisna, 2022). In this study, researchers adopted the modified Borg and Gall model from the work of Sugiyono (2021). The Borg and Gall development model consists of 10 stages, namely 1) Identification of potential and problems, 2) Data collection, 3) Product design, 4) Design validation, 5) Product revision, 6) Product trial, 7) Product revision, 8) Trial of use, 9) Product revision, and 10) Mass production. Due to limited time and resources, researchers were only able to reach the ninth stage. The selection of the Borg and Gall development model was based on the systematic stages of development and ease of understanding.

The initial process of the development research began with an analysis of the problems and needs that existed at SDN Gondoriyo. At this stage, researchers conducted observations to identify the potential problems that arise in class IV SDN Gondoriyo. Researchers also conducted interviews and observations to explore the problem of students' understanding of the material on the history of the formulation of Pancasila. Next, researchers conducted a needs analysis using a questionnaire, where teachers and students were asked to fill out a needs questionnaire. The data obtained from this needs questionnaire became the basis for developing Articulate Storyline interactive multimedia.

In the second step, researchers collected data. The problems identified during the pre-research stage were considered as potential which then allowed researchers to collect various information related to learning media that could support. Through references such as books, journals, and online sources, the researcher obtained the information needed to support the development of the media as well as understanding how to use it. From the information collected, researchers found a new learning media, namely Articulate Storyline.

In the third stage, the product design process, researchers designed the initial design by assembling the existing components carefully and completely. However, the product design that has been prepared can still undergo changes, additions, or subtractions according to the results of validation by experts and field trials.

The next step, in the fourth stage, researchers conducted design validation. This validation process aims to evaluate the effectiveness of the product design. Researchers involved two experts, namely material experts and media experts, to provide input and suggestions for the Articulate Storyline interactive multimedia design. This was done so that the product developed was to the needs and characteristics of students.

In the fifth stage, namely product revision. Development products that have received assessments from experts and students through questionnaires, the next step is for researchers to make revisions according to the assessments obtained. This aims to produce a better Articulate Storyline interactive multimedia.

In the sixth stage, researchers conducted product trials. Product trials have the aim of collecting data as a basis for determining whether or not the product is feasible in terms of suitability and use in completing the learning period. Product trials were conducted with small-scale trials and large-scale trials.

In the seventh stage, namely product revision. Articulate Storyline interactive multimedia that has been tested by experts and received responses from students will be revised if it is not as expected until it becomes a product that is suitable for use in learning.

In the eighth stage, researchers conducted a trial of use. Researchers retested the product to be developed to determine the feasibility of the product. The large-scale test can be done with the same teacher as the second trial. Researchers used Articulate Storyline interactive multimedia directly in the classroom in learning. That way researchers can find out the effectiveness of the product.

The ninth stage is product revision. At this stage, the researcher makes improvements to the product developed if they must be corrected. This is done to get the results of development products that are truly feasible and can be used in the field to help students

achieve the expected learning objectives. In this research and development process, the results of product revision can be said to be the final product.

This research was conducted at SDN Gondoriyo, Ngaliyan District, Semarang City, Central Java. The research subjects consisted of fourth-grade students at SDN Gondoriyo Ko-ta Semarang, with a total of 8 students for small-scale product trials and 20 students for large-scale product trials. This research method uses a simple paradigm with one dependent variable and one independent variable. The independent variable in this study is Articulate Storyline interactive multimedia applied to grade IV materials at SDN Gondoriyo Semarang City. Meanwhile, the dependent variable measured in this study is student learning outcomes in the material of the history of the formulation of Pancasila at SDN Gondoriyo Semarang City.

The data collection techniques used in this study are: 1) Observation, observation is carried out at the pre-research stage to observe and study the problems that occur at school. Observations carried out in this study aim to observe and learn about the means of supporting the learning process used by teachers during learning, subjects, learning methods used by teachers, and student attitudes in the learning process. 2) Interview, is a method of seeking information by dialoguing with informants. Interviews are conducted orally to find information needed in research. This research uses interviews conducted face-to-face and semi-structured based on previously compiled interview guidelines. Interview activities were carried out with homeroom teachers to obtain information related to problems experienced by students in learning. 3) Questionnaires are data collection tools that utilize written questions. Four types of questionnaires will be used, namely questionnaires for material experts, media experts, students, and teachers. A Likert scale with a range of 1 to 4 will be used in this questionnaire to assess respondents' responses. 4) Tests, in this study, using pretest and posttest tests to evaluate the impact of using Articulate Storyline interactive multimedia on student learning outcomes on the material of the history of the formulation of Pancasila. This test has been tested for validity, reliability, difficulty level, and differentiating power. The test was conducted at SDN Gondoriyo Semarang City. 5) Documentation, and data collection techniques through documentation are done by investigating written objects such as books and documents. The documentation used in this study is in the form of student learning outcomes data and also documentation of the implementation of the research.

This research uses descriptive analysis techniques by intervening in the opinions and answers obtained from filling out the questionnaire is qualitative data which is converted into quantitative data through a Likert scale. The data is then analyzed by converting the scores obtained by referring to the decision-making table to determine the eligibility criteria and effectiveness of the developed Articulate Storyline interactive multimedia. The scores obtained from respondents using Likert scale rules will be converted using a decision-making qualification table by comparing the number of answers of all respondents with the maximum score of each questionnaire. The decision-making conversion table refers to [Sugiyono \(2021\)](#), which can be seen in [Table 1](#).

Table 1. Decision-making Conversion

Achievement Level	Qualification
80-100	Very good
60-79,99	Good
40-59,99	Simply
20-39,99	Less
0-19,99	Very Less

In this study, initial data analysis was carried out by testing the normality of pretest and posttest results using the Shapiro-Wilk method. The normality test was conducted to assess whether the data distribution was normal or not. The criteria used in the normality test is if the Sig value > 0.05 , then the data is considered normally distributed, while if the Sig value < 0.05 , then the data is considered not normally distributed.

The final data analysis was conducted with a t-test and N-Gain test. The t-test was conducted to analyze the effectiveness of Articulate Storyline interactive multimedia in overcoming students' difficulties in learning the history of Pancasila formulation. It was done by testing student learning outcomes. The N-Gain test was conducted to test the average increase in learning outcomes before and after using Articulate Story-line interactive multimedia. N-Gain criteria and N-Gain interpretation categories refer to Sugiyono (2021), which can be seen in Table 2 and Table 3.

Table 2. N-Gain Criteria

N-Gain Value	Criteria
$N-Gain \geq 0.70$	High
$0.30 < N-Gain < 0.70$	Medium
$N-Gain \leq 0.30$	Low

Table 3. N-Gain Interpretation Categories (%)

Percentage%	Interpretation
<40	Ineffective
40-55	Less effective
56-75	Enough effective
>76	Effective

3. Results

3.1. Results of Articulate Storyline Interactive Multimedia Development

The final product of Articulate Storyline interactive multimedia is an app that can be accessed through Android devices and the web, allowing its use through mobile phones or laptops/computers. Articulate Storyline interactive multimedia features attractive animations and easy-to-understand buttons. Here are the details of the Articulate Storyline interactive multimedia.

3.1.1. Articulate Storyline interactive multimedia design

The design of the media is organized as well as possible to attract students' participation in the learning process. The first display of the Articulate Storyline interactive multimedia, shown in Figure 1, has a background designed using a combination of bright colors, equipped with animations and attractive images. The first page in Figure 1 contains the title of the material contained in the Articulate Storyline interactive multimedia as well as an arrow button to start the application. The next page has a login menu which can be seen in Figure 2, on the login menu display there is a form for students to fill in their identity in the form of full name and school origin. Articulate Storyline interactive multimedia can only be accessed after students fill in their identity completely. After the login menu, the next page is the main menu display of Articulate Storyline interactive multimedia which can be seen in Figure 3, on this page there are various menus, namely instructions for use, learning objectives, materials, quizzes, bibliography, and profiles of authors and supervisors. The menu display is also equipped with musical instruments that are attractive to students.



Figure 1. Articulate Storyline Interactive Multimedia Cover



Figure 2. Articulate Storyline Interactive Multimedia Login Menu



Figure 3. Main Menu of Articulate Storyline Interactive Multimedia

3.1.2. Material Content

Articulate Storyline interactive multimedia contains material on the history of the formulation of Pancasila which includes the period of Pancasila proposal, the period of Pancasila formulation, and the period of Pancasila ratification. The presentation of Articulate Storyline interactive multimedia gives students an understanding of the meaning and flow of the Pancasila formulation process. Figure 4 shows the content of the Articulate Storyline interactive multimedia material.



Figure 4. Content of Articulate Storyline Interactive Multimedia Material

3.1.3. Quiz

The quiz presented aims to test students' abilities after the use of Articulate Storyline interactive multimedia. The quiz consists of 10 questions and is presented in the form of multiple choice. After students take the quiz, students can see the score of the results obtained. Figure 5 shows the Articulate Storyline interactive multimedia quiz.

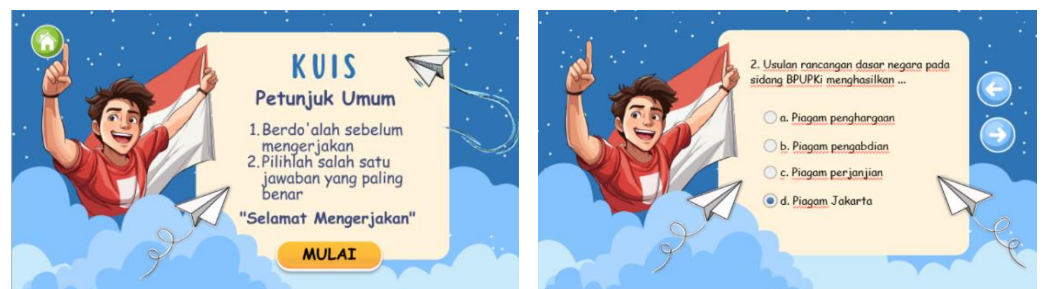


Figure 5. Articulate Storyline Interactive Multimedia Quiz

3.2. Feasibility of Articulate Storyline Interactive Multimedia

The feasibility of Articulate Storyline interactive multimedia is obtained from the assessment results of material expert validators, media experts, teacher responses, and student responses. Aspects of feasibility assessment by material experts and media experts are adopted from Arsyad (2019) which has been modified, as in Table 4.

Table 4. Material Expert Assessment Results

No.	Assessment Aspect	Score Earned	Maximum Score	Feasibility (%)	Validity Level
1.	Content Feasibility	19	20	95	Valid
2.	Language Feasibility	12	16	75	Valid
3.	Technical Quality	21	24	87,8	valid
Average Percentage				85,8	Valid

Based on all aspects of the material expert assessment results in [Table 4](#), the percentage of content feasibility is 95%, language feasibility is 75%, technical quality is 87.8% and the average percentage of feasibility is 85.8%. It can be concluded that the Articulate Storyline interactive multimedia has a valid level of content quality and technical quality and is suitable for use with revision.

Based on all aspects of the media expert assessment results in [Table 5](#), the percentage of learning media functions is 83.3%; and technical quality, design, and appearance is 89.2%. The average percentage of feasibility is 86.25% and declared valid. It can be concluded that the Articulate Storyline interactive multimedia is declared feasible to use with revisions.

Table 5. Media Expert Assessment Results

No.	Assessment Aspect	Score Earned	Maximum Score	Feasibility (%)	Validity Level
1.	Learning Media Function	10	12	83,3	Valid
2.	Technical Quality, Design, and Appearance	25	28	89,2	Valid
Average Percentage				86,25	Valid

The media is declared feasible for testing after receiving a feasibility assessment from expert validators. Before the large-scale test, the product was tested on a small scale first to find out the reactions and comments of Articulate Storyline interactive multimedia in learning the history of the formulation of Pancasila in class IV SDN Gondoriyo Semarang City. According to [Arikunto \(2019\)](#), small-group trials can be conducted with 4-20 respondents. The researcher used 8 fourth-grade students of SDN Gondoriyo as the small-scale trial sample using purposive sampling by selecting high, medium, and low-ability students. Researchers also distributed questionnaires of teacher and student responses regarding the development of Articulate Storyline interactive multimedia in learning the history of the formulation of Pancasila.

The implementation of small-scale product trials begins with students working on pretest questions to measure students' initial ability or knowledge of the history of Pancasila formulation before using Articulate Storyline interactive multimedia. Furthermore, students open the Articulate Storyline interactive multimedia application, then read the instructions, and follow the learning material on the history of the formulation of Pancasila. After using Articulate Storyline interactive multimedia, students work on posttest questions to measure student learning outcomes.

The results of student responses consist of four criteria, namely 82%-100% very feasible criteria, 63%-81% feasible criteria, 44%-62% sufficient criteria, and 25%-43% inappropriate criteria. The aspects of assessment in the questionnaire given to students include aspects of design, appearance, and usability of Articulate Storyline interactive multimedia. Articulate Storyline interactive multimedia on the historical material of the formulation of Pancasila obtained a percentage of eligibility from 8 students 100% with very feasible criteria. The teacher's response to the small group trial of Articulate Storyline interactive multimedia on the history of the formulation of Pancasila class IV obtained a percentage of 100% with very feasible criteria. It can be concluded that the interactive multimedia Articulate Storyline on the history of the formulation of Pancasila does not need to be revised and can continue to the next stage of research.

Furthermore, the large-scale product trial was conducted on 20 fourth-grade students of SDN Gondoriyo Semarang City. The number of large group test subjects according to [Arikunto \(2019\)](#) is 15-50. The number of samples used was determined using the

proportional cluster random sampling technique. Proportional cluster random sampling is a sampling technique for examining large data sources (Sugiyono, 2021). The stages of implementing large-scale product trials are the same as when conducting small-scale product trials. Students worked on pretest questions first, then continued learning with Articulate Storyline interactive multimedia. After that, students work on post-test questions. In the last stage, teachers and students were given a response questionnaire to the use of Articulate Storyline interactive multimedia on the history of the formulation of Pancasila.

The results of student responses to the use of Articulate Storyline interactive multimedia on the material of the history of the formulation of Pancasila obtained a percentage of feasibility from 20 students of 97.5% so it was in the very feasible category. Students are greatly helped by the existence of interactive multimedia Articulate Storyline to make it easier to understand the material of the history of the formulation of Pancasila. The design and appearance presented are very attractive to students. The recapitulation of the teacher's response to the articulate storyline interactive multimedia obtained a percentage of 100% so it was very feasible. Homeroom teachers argue that Articulate Storyline interactive multimedia can be further developed in other subjects or materials because Articulate Storyline interactive multimedia is very good for use in learning.

The percentage results of assessments from material experts, media experts, and user responses show that the developed Articulate Storyline interactive multimedia has met the criteria for selecting learning media. The developed Articulate Storyline interactive multimedia can last a long time and is practical because it can be accessed easily using electronic devices. Articulate Storyline interactive multimedia can be used by students easily because students today are very close to the digital world so Articulate Storyline interactive multimedia is very suitable for the current state of students. It can be concluded that Articulate Storyline interactive multimedia is very feasible to use in learning.

3.3. Effectiveness of Articulate Storyline Interactive Multimedia

The effectiveness of Articulate Storyline interactive multimedia is obtained from analyzing student learning outcomes before and after using Articulate Storyline interactive multimedia. Learning outcomes are changes that occur in students which include cognitive, affective, and psychomotor aspects. In the small-scale product trial, there were differences in learning outcomes before and after using Articulate Storyline interactive multimedia. The average pretest score was 56.25 while the average posttest score was 83.75. Then student completeness also has a difference. At the time of the pretest, the number of students who were complete was 0%. At the time of the posttest the number of students who completed 100%. A recapitulation of learning outcomes in the small-scale product trial can be seen in Table 6.

Table 6. Recapitulation of Learning Outcomes on the Small-Scale Product Trial

Action	Lowest Score	Highest Score	Average	Number of Learners Completed	Learner Completeness
Pretest	50	65	56,25	0	0%
Posttest	75	90	83,75	8	100%

In the large group trial, there were differences in student learning outcomes before and after the use of Articulate Storyline interactive multimedia. During the pretest, the average student learning outcomes were 51.25 and 0% completeness. Meanwhile, during the posttest, the average student learning outcomes were 85 with 100% completeness. The recapitulation of learning outcomes in the large-scale product trial can be seen in Table 7.

Table 7. Recapitulation of Learning Outcomes in the Large-Scale Product Trial

Action	Lowest Score	Highest Score	Average	Number of Learners Completed	Learner Completeness
Pretest	40	65	51,25	0	0%
Posttest	75	100	85	20	100%

Furthermore, the data from the pretest and posttest results were tested for normality first to determine whether the data was normally distributed or not. The normality test was carried out using the Shapiro-Wilk formula. The normality test was carried out using the help of SPSS version 25.

According to Table 8, the pretest and posttest results from the small-scale and large-scale trials showed normal distribution as they had significance values greater than 0.05. The significance value recorded in the small-scale trial pretest was 0.114, in the small-scale trial posttest was 0.408, while in the large-scale trial pretest was 0.114, and in the large-scale trial posttest was 0.167.

Table 8. Normality Test Results

		Test of Normality			
	Class	Statistic	Shapiro-Wilk Statistic	df	Sig.
Learning outcomes	Small group pretest	.240	.858	8	.114
	Small group posttest	.220	.917	8	.408
	Large group pretest	.161	.923	20	.114
	Large group posttest	.180	.932	20	.167

After conducting the normality test, the researcher then checked the difference in student learning outcomes using the t-test. The t-test analysis was conducted to assess whether the research hypothesis was acceptable or not. The t-test was conducted to evaluate the effectiveness of Articulate Storyline interactive multimedia on student learning outcomes on the material of the history of the formulation of Pancasila. Researchers used the t-test based on the pretest and post-test data obtained. The t-test was carried out with the help of statistical software SPSS version 25. The hypothesis proposed is as follows: H0 = There is no significant difference between pretest and posttest learning outcomes using Articulate Storyline interactive multimedia. Ha = There is a significant difference between the pretest and posttest learning outcomes using Articulate Storyline interactive multimedia.

Based on Table 9, it can be seen that the results of the t-test on the small-scale product trial show a sig value. (2-tailed) of 0.000. In the large-scale product trial in Table 9, the sig value is obtained. (2-tailed) of 0.000. After being compared, sig. (2-tailed) 0.000 <0.05, therefore it can be decided that the small-scale and large-scale t-tests Ha is accepted and H0 is rejected. So, it can be seen that there is a significant difference in pretest and posttest learning outcomes after using Articulate Storyline interactive multimedia. Articulate Storyline interactive multimedia is proven to be able to help students in improving understanding of the historical material of the formulation of Pancasila. Furthermore, researchers conducted the N-Gain test to determine the average increase in student learning outcomes on the pretest and posttest of large and small-scale product trials.

Table 9. Product Test Pretest and Posttest T-Test Results

	Paired Samples Test							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Small scale	-27.50000	4.62910	1.63663	-31.37002	-23.62998	-16.803	7	.000
Large Scale	-33.75000	9.30124	2.07982	-38.10312	-29.39688	-16.227	19	.000

Based on Table 10, the small-scale N-Gain trial shows that students experienced an average increase of 0.8259 with high criteria, while in Table 10 the large-scale N-Gain trial shows that students experienced an average increase of 0.6907 with moderate criteria. Because the N-Gain value in the small-scale and large-scale product trials can be said to increase student learning outcomes after using Articulate Storyline interactive multimedia is high and moderate, the effectiveness of using articulate storyline interactive multimedia on the historical material of the formulation of Pancasila in improving student learning outcomes is said to be effective. Based on the test results, it can be concluded that the interactive multimedia Articulate Storyline developed by researchers in class IV SDN Gondoriyo Semarang City is declared feasible and effective as a learning medium to improve learning outcomes of Pancasila Education class IV SDN Gondoriyo Semarang City.

Table 10. Recapitulation of N-Gain Test Pretest and Posttest of Product Trial

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Small Scale NGain	8	.63	1.00	.8259	.13915
Large Scale Ngain	20	.50	1.00	.6907	.13653

4. Discussion

This research was conducted at SDN Gondoriyo, Semarang City, involving 28 fourth-grade students of SDN Gondoriyo. Based on the results of pre-research observations, problems were found in the use of learning media that were less creative and innovative, which caused students to feel bored and less active in learning. The weakness of the learning media can hinder student progress, result in ineffective learning, and cause boredom (Kristanto et al., 2017; Roemintoyo & Budiarto, 2021). Another problem identified is that several students show unsatisfactory learning outcomes in Pancasila Education subjects, especially in understanding the material on the history of the formulation of Pancasila. This condition occurs because the material on the history of the formulation of Pancasila tends to contain a lot of memorizations and reading that is difficult for students to understand (Yani, 2023). In the context of learning, the use of learning media has a significant role in facilitating and improving the achievement of student learning outcomes (Rahmatiar & Sukardi, 2023; Sumarwati et al., 2020). Therefore, researchers decided to develop Articulate Storyline interactive multimedia as a solution to the problems faced in class IV of SDN Gondoriyo. The process of developing Articulate Storyline interactive multimedia begins with designing designs and concepts that are realized in the form of prototypes.

The results of the Articulate Storyline interactive multimedia development were then tested by media experts and material experts. The feasibility test conducted by the two groups of experts aims to evaluate the suitability of the tested media and to identify weaknesses that may exist so that they can be improved. Articulate Storyline interactive multimedia that has been tested by experts is assessed as feasible through validation instrument sheets from media and material experts. The feasibility test by media experts received a percentage of 86.25% with very feasible criteria, while the feasibility test by material

experts received a percentage of 85.8% with very feasible criteria. In addition, the feasibility of Articulate Storyline interactive multimedia is also supported by the results of student response questionnaires on small-scale trials which get a percentage of 100% with very feasible criteria, and the results of teacher response questionnaires on small-scale trials get a percentage of 100% with very feasible criteria. In the large-scale trial, student responses obtained a percentage of 97.5% with very feasible criteria, while teacher responses obtained a percentage of 100% with very feasible criteria. Based on the results of the feasibility test involving media experts, material experts, as well as teacher and student responses, it can be concluded that Articulate Storyline interactive multimedia is very feasible to use in learning Pancasila education, especially in the material of the history of the formulation of Pancasila.

The effectiveness of Articulate Storyline interactive multimedia development can be known through the results of the analysis of the pretest and posttest score data from the large-scale trial (Rahmawati & Rukiyati, 2018; Dika & Bektiningsih, 2023). To analyze whether the pretest and posttest score data are normally distributed or not, a normality test is carried out. Based on the results of the Shapiro-Wilk normality test, it is known that the Sig. value for the pretest is $0.114 \geq 0.05$ and the Sig. for the posttest is $0.167 \geq 0.05$. Because Sig. for both ≥ 0.05 , it can be concluded that the pretest and posttest data before and after being treated using Articulate Storyline interactive multimedia are normally distributed. Based on the results of the t-test, it is known that the Sig. (2-tailed) value is $0.00 < 0.05$, so H_0 is rejected and H_a is accepted. So, it can be concluded that there is an average difference between the pretest and post-test learning outcomes, which means that there is an effect of using Articulate Storyline interactive multimedia in improving student learning outcomes in Pancasila education subjects in class IV SDN Gondoriyo. To determine the average increase in pretest and posttest scores, the N-Gain test was conducted. Based on the results of the N-Gain test, the N-Gain value is 0.6907, which means it is in the category $0.3 \leq \text{N-Gain} \leq 0.7$. So, it can be concluded that there is an increase in the average pretest and posttest scores of student learning outcomes in the moderate category. Based on the analysis results of the normality test, t-test, and N-Gain test, it can be concluded that Articulate Storyline interactive multimedia is effective for improving student learning outcomes in Pancasila education subjects.

The results of data analysis show that Articulate Storyline interactive multimedia is suitable for use in learning. This is due to several factors. The first factor, interactive multimedia Articulate Storyline is worth using because it can improve student learning outcomes. Learning media is the most important thing in learning activities (Siregar & Kurniati, 2022). The existence of Articulate Storyline interactive multimedia has a good impact on the learning process. Where it can overcome the obstacles in learning that often use conventional methods. This is also revealed in previous research which states that learning media is a means of delivering messages to students in a planned manner so that learning activities can take place effectively and improve student learning outcomes (Dewi, 2022). Previous findings also confirm that the function of the media is as a learning resource and clarifies the material provided and provides an overview of the material (Dewi & Sujana, 2021; Oktarina et al., 2021). This is what causes the media to facilitate students in learning, and facilitate teachers in teaching so that learning objectives are maximally achieved. With the interactive multimedia, Articulate Storyline can provide students creativity in thinking critically about the history of the formulation of Pancasila and can facilitate students in understanding the material better.

Secondly, Articulate Storyline interactive multimedia is worth using because it can increase students' learning motivation. In the learning process, the use of Articulate Storyline interactive multimedia gives attention to students to continue learning actively and with fun. The use of learning media can provide students with a deeper understanding of the material presented well (Ilmi et al., 2021). This causes students to be more motivated in learning. Interesting learning media can significantly increase student learning motivation (Wardana & Sagoro, 2019). Other findings also state that interesting media can significantly increase students' enthusiasm for learning, so that students become very happy

when studying (Zaharah & Susilowati, 2020). This is certainly very important in learning activities, so media is one of the important tools that every teacher must pay attention to.

One of the advantages of Articulate Storyline interactive multimedia is that it can be accessed by students and teachers online or offline. This is because Articulate Storyline interactive multimedia is published into Android and web applications, making it easier for students in learning activities. This learning media can be accessed via computer, laptop, or smartphone. The use of learning media based on Android and web applications can create learning activities that are more interactive, effective, interesting, and able to increase students' learning motivation. With the Articulate Storyline media published on the web and Android applications, learning the history of the formulation of Pancasila can be carried out anywhere actively, independently, and flexibly. Another advantage is that this Articulate Storyline interactive multimedia is equipped with a quiz that contains questions to assess student understanding. Teachers can implement Articulate Storyline interactive multimedia in learning independently or in groups.

5. Conclusions

The developed Articulate Storyline interactive multimedia received a feasibility assessment from media experts with an average percentage of 86.25%, while material experts obtained an average percentage of 85.8%. Responses from teachers during large-scale and small-scale product trials reached a feasibility percentage of 100%. Meanwhile, student responses to product trials on a small scale reached a feasibility percentage of 100%, and in large group trials, the average feasibility percentage reached 97.5%. Thus, the Articulate Storyline interactive multimedia developed can be concluded to be very feasible to use in learning. The use of Articulate Storyline interactive multimedia in learning Pancasila Education is proven effective as a learning media that support student understanding. Based on the t-test results, there is a significant difference in learning outcomes before and after the use of Articulate Storyline interactive multimedia. The results of the N-Gain test in the small-scale product trial obtained an N-Gain of 0.8259 so it is included in the high category. While in the large-scale product trial, the N-Gain obtained was 0.6907 and included the medium category. The results of the research on the development of Articulate Storyline interactive multimedia on the material of the history of the formulation of Pancasila show a positive impact and provide interesting learning media for students. This multimedia also supports student learning independence because it can be used both individually and in groups. Students learning outcomes on the history of Pancasila formulation also increased, which shows the effectiveness of Articulate Storyline interactive multimedia in supporting students' understanding. This multimedia also helps teachers and students to better understand the use of technology in learning. Therefore, Articulate Storyline interactive multimedia can be a solution in providing learning media that is interesting, interactive, and supports student understanding. With interesting and interactive media, students become more enthusiastic about learning, more focused, and pay attention to the material being taught, so that students' understanding of the material increases, which in turn will improve overall student learning outcomes.

Author Contributions: Rofi'ah, S. N. H.: Methodology, validation, original draft writer. Widodo, S. T.: edit and review.

Acknowledgments: The authors would like to thank all those who have helped with the publication of this article.

Conflicts of Interest: There are no conflicts of interest between the authors.

6. References

- Abuhassna, H., Al-Rahmi, W. M., Yahya, N., Zakaria, M. A. Z. M., Kosnin, A. B. M., & Darwish, M. (2020). Development of a new model on utilizing online learning platforms to improve students' academic achievements and satisfaction.

- International Journal of Educational Technology in Higher Education*, 17(38), 1–23.
<https://doi.org/10.1186/s41239-020-00216-z>
- Anjarwati, D., Winarno, A., & Churiyah, M. (2016). Improving learning outcomes by developing instructional media-based Adobe Flah Professional CS 5.5 on principles of business subject. *IOSR Journal of Research & Method in Education*, 6(5), 1–6. <https://doi.org/10.9790/7388-0605010106>
- Arikunto, S. (2019). *Prosedur penelitian*. Rineka Cipta.
- Arsyad, A. (2017). *Media pembelajaran*. PT. Raja Grafindo Persada.
- Bahri, A., Idris, I. S., Muis, H., Arifuddin, M., & Fikri, M. J. N. (2020). Blended learning integrated with innovative learning strategy to improve self-regulated learning. *International Journal of Instruction*, 14(1), 779–794.
<https://doi.org/10.29333/IJI.2021.14147A>
- Calleja, J., & Camilleri, P. (2021). Teachers' learning in extraordinary times: shifting to a digitally facilitated approach to lesson study. *International Journal for Lesson & Learning Studies*, 10(2), 118-137. <https://doi.org/10.1108/IJLLS-09-2020-0058>
- Coman, C., Țîru, L. G., Meseșan-Schmitz, L., Stanciu, C., & Bularca, M. C. (2020). Online teaching and learning in higher education during the coronavirus pandemic: Students' perspective. *Sustainability*, 12(24), 10367.
<https://doi.org/10.3390/su122410367>
- Dewi, N. L. P. J., & Sujana, I. W. (2021). Learning multimedia based on RPG Maker MV material for circumference and area of flat shapes for elementary school students. *Journal of Education Technology*, 5(3), 365-374. <https://doi.org/10.23887/jet.v5i2.34462>
- Dewi, U., Sumarno, A., Pradana, H. D., & Kristanto, A. (2022). Student responsibilities towards online learning in interactive multimedia courses. *Journal of Education Technology*, 6(1), 38–44. <https://doi.org/10.23887/jet.v6i1.41522>
- Dika, N. S., & Bektiningsih, K. (2023). E-comic improves understanding of indonesian language learning results. *Mimbar PGSD Undiksha*, 11(3), 403–409.
<https://doi.org/10.23887/jjpsgd.v11i3.66865>
- Elisa, E., Prabandari, A. M., Istighfarini, E. T., Alivia, H., Inayati H, L. W., & Nuraini, L. (2022). Digital module innovation based on exploration of physics concepts containing local wisdom “Making traditional snacks” to support the formation of pancasila students. *Jurnal Penelitian Pendidikan IPA*, 8(6), 2923–2932.
<https://doi.org/10.29303/jppipa.v8i6.2171>
- Engeness, I. (2020). Developing teachers' digital identity: towards the pedagogic design principles of digital environments to enhance students' learning in the 21st century. *European Journal of Teacher Education*, 00(00), 1–19.
<https://doi.org/10.1080/02619768.2020.1849129>
- Firdaus, F. M., Azizah, I. N., Pritin, S., Damayanti, O., & Annisa, F. C. (2022). The development of articulate storyline-based learning media to improve 5th grade students' mathematical representation ability. *Al Ibtida: Jurnal Pendidikan Guru MI*, 9(1), 55-73. <https://doi.org/10.24235/al.ibtida.snj.v9i1.9827>
- Heliawati, L., Lidiawati, L., & Pursitasari, I. D. (2022). Articulate storyline 3 multimedia based on gamification to improve critical thinking skills and self-regulated

- learning. *International Journal of Evaluation and Research in Education*, 11(3), 1435-1444. <https://doi.org/10.11591/ijere.v11i3.22168>
- Hermita, N., Putra, Z. H., Alim, J. A., Wijaya, T. T., Anggoro, S., & Diniya, D. (2021). Elementary teachers' perceptions on genially learning media using item response theory (IRT). *Indonesian Journal on Learning and Advanced Education (IJOLAE)*, 4(1), 1-20. <https://doi.org/10.23917/ijolae.v4i1.14757>
- Hoque, M. E. (2016). Three domains of learning: Cognitive, affective and psychomotor. *The Journal of EFL Education and Research*, 2(2), 45-52. https://www.researchgate.net/publication/330811334_Three_Domains_of_Learning_Cognitive_Affective_and_Psychomotor
- Husna, A., & Fajar. D. M. (2022). Development of interactive learning media based on articulate storyline 3 on newton's law material with a contextual approach at the junior high school level. *IJIS Edu: Indonesia Journal of Integrated Science Education*, 4(1), 17-26. <https://doi.org/10.29300/ijisedu.v4i1.5857>
- Ilimi, R., Arnawa, I. M., Yerizon, & Bakar, N. N. (2021). Development of an Android-based for math emodule by using Adobe Flash Professional CS6 for grade X students of senior high school. *Journal of Physics: Conference Series*, 1742(1). <https://doi.org/10.1088/1742-6596/1742/1/012026>
- Kim, S., Raza, M., & Seidman, E. (2019). Improving 21st-century teaching skills: The key to effective 21st-century learners. *Research in Comparative and International Education*, 14(1), 99-117. <https://doi.org/10.1177/1745499919829214>
- Kristanto, A., & Mariono, A. (2017). The development of instructional materials e-learning based on blended learning. *International Education Studies*, 10(17), 10-17. <https://doi.org/10.5539/ies.v10n7p10>
- Nissa, A. D. A., Toyib, M., Sutarni, S., Akip, E., Kadir, S., Ahmad, & Solikin, A. (2021). Development of learning media using android-based articulate storyline software for teaching algebra in junior high school. *Journal of Physics: Conference Series*, 1720(1), 0-7. <https://doi.org/10.1088/1742-6596/1720/1/012011>
- Nurwulan, N., Nugraha, M. F., & Hendrawan, B. (2020). Improving learning outcomes of 2nd grade students through video-based learning media. *International Journal of Elementary Education*, 4(3), 406-413. <https://doi.org/10.23887/ijee.v4i3.28686>
- Oktarina, R., Ambiyar, A., Fadhilah, F., Muskhir, M., & Effendi, H. (2021). The effect of the use of multimedia flip book with the flipped classroom approach in vocational school. *Journal of Education Technology*, 5(1), 159-166. <https://doi.org/10.23887/jet.v5i1.31435>
- Rahayu, W. P., & Ulumiyah, A. (2021). Development of mobile learning media based on articulate storyline 3 to support independence learning of vocational high school students in the new normal era. In *Seventh Padang International Conference On Economics Education, Economics, Business and Management, Accounting and Entrepreneurship (PICEEBA)*, 206-218. <https://doi.org/10.2991/aebmr.k.211117.059>
- Rahmatiar, T. D. , & Sukardi. (2023). Audio visual-based DOMAR media to improve second-grade elementary school students' listening skills. *Jurnal Pendidikan Dan Pengajaran*, 56(3), 614-621. <https://doi.org/10.23887/jpp.v56i3.65814>

- Rahmawati, D. I., & Rukiyati, R. (2018). Developing pop-up book learning media to improve cognitive ability of children aged 4-5 years. *Semarang Early Childhood Research and Educational Conference on Early Childhood Education*, 60–69. <https://doi.org/10.2991/secret-18.2018.10>
- Ramadhanti, S., Kusmaharti, D., & Yustitia, T. (2024). Articulate storyline learning media on speed and discharge concepts for elementary school. *Edunesia: Jurnal Ilmiah Pendidikan*, 5(1), 533–549. <https://doi.org/10.51276/edu.v5i1.728>
- Roemintoyo, R., & Budiarto, M. K. (2021). Flipbook as innovation of digital learning media: Preparing education for facing and facilitating 21st Century learning. *Journal of Education Technology*, 5(1), 8–13. <https://doi.org/10.23887/jet.v5i1.32362>
- Saadah, F. N. L., & Hasanah, F. N. (2023). Development of science learning media klanimal android-based for elementary school students. *Edunesia: Jurnal Ilmiah Pendidikan*, 4(3), 1222–1240. <https://doi.org/10.51276/edu.v4i3.534>
- Shaaruddin, J., & Mohamad, M. (2017). Identifying the effectiveness of active learning strategies and benefits in curriculum and pedagogy course for undergraduate TESL students. *Creative Education*, 8(14), 2312–2324. <https://doi.org/10.4236/ce.2017.814158>
- Sindu, I. G. P., Santyadiputra, G. S., & Permana, A. A. J. (2020). The effectiveness of the application of Articulate Storyline 3 learning object on student cognitive on Basic Computer System courses. *Jurnal Pendidikan Vokasi*, 10(3), 290-299. <https://doi.org/10.21831/jpv.v10i3.36094>
- Siregar, E. S., & Kurniati, R. (2022). Multimedia as a learning tool in training reading skill of elementary schools students. *Journal of Educational Technology*, 6(2), 299–307. <https://doi.org/10.23887/jet.v6i2.44601>
- Strijker, D., Bosworth, G., & Bouter, G. (2020). Research methods in rural studies: Qualitative, quantitative and mixed methods. *Journal of Rural Studies*, 78(6), 262–270. <https://doi.org/10.1016/j.jrurstud.2020.06.007>
- Sugiyono, S. (2021). *Metode Penelitian Pendidikan*. Alfabeta.
- Sulasmi, E. (2022). Primary school teachers' digital literacy: An analysis on teachers' skills in using technological devices. *Journal of Innovation in Educational and Cultural Research*, 3(2), 140–145. <https://doi.org/10.46843/jiecr.v3i2.81>
- Sumarwati, S., Fitriyani, H., Setiaji, F. M. A., Amiruddin, M. H., & Jalil, S. A. (2020). Developing mathematics learning media based on learning using moodle on geometry subject to improve students' higher order thinking skills. *International Journal of Interactive Mobile Technologies*, 14(4), 182–191. <https://doi.org/10.3991/IJIM.V14I04.12731>
- Trisna, S. (2022). Interactive multimedia based on articulate storyline s in the topic of plant anatomy and physiology. *International Journal of Elementary Education*, 6(2), 182–194. <https://doi.org/10.23887/ijee.v6i2.46837>
- Wahyuni, I., Megalina, Y., Tanjung, R., Amdani, K., & Lubis, R. H. (2023). Development of interactive multimedia based on case method assisted by articulate storyline 2 in general phtysics. *Jurnal Penelitian Pendidikan IPA*, 9(11), 9652–9659. <https://doi.org/10.29303/jppipa.v9i11.5685>

- Wardana, S., & Sagoro, E. M. (2019). Implementasi gamifikasi berbantu media kahoot untuk meningkatkan aktivitas belajar. motivasi belajar. dan hasil belajar jurnal penyesuaian siswa kelas X Akuntansi 3 di SMK Koperasi Yogyakarta Tahun Ajaran 2018/2019. *Jurnal Pendidikan Akuntansi Indonesia*, 17(2), 46–57. <https://doi.org/10.21831/jpai.v17i2.28693>
- Wijayanti, I.-J. O. S. S. A. H., Utami, F. A., & Sumaji, S. (2022). Development of articulate storyline interactive learning media based on realistic mathematical education (RME) to improve critical thinking ability of elementary school students. *ICCCM Journal of Social Sciences and Humanities*, 1(5), 13–22. <https://doi.org/10.53797/icccmjssh.v1i5.3.2022>
- Yani, K. E. M., Parji, & Dewi, C. (2023). Educational game media based on CAI in PPKn for fourth grade elementary school. *JPI (Jurnal Pendidikan Indonesia)*, 12(4), 690–704. <https://doi.org/10.23887/jpiundiksha.v12i4.65037>
- Yanto, N., Muliana, G. H., & Zubair, S. (2023). The effect of pop up book media in science learning: A literatur review. *Journal of Education and Learning Innovation*, 3(2), 2775–6173. <https://doi.org/10.35877/454RI.eduline1772>
- Zaharah, Z., & Susilowati, A. (2020). Meningkatkan motivasi belajar peserta didik dengan menggunakan media modul elektronik di era revolusi industri 4.0 . *Biodik: Jurnal Ilmiah Pendidikan Biologi.*, 6(2), 145–158. <https://doi.org/10.22437/bio.v6i2.8950>