



Development of interactive multimedia based on an articulate storyline to improve the independent dimension and learning outcomes of Pancasila education

Putri Rifkiyani ^{1*}, Kurotul Aeni ¹

¹ Universitas Negeri Semarang, Semarang, Indonesia, 50244

Article info	Abstract
Keywords articulate storyline, independent dimension, interactive multimedia, learning outcomes	The use of lecture methods or textbooks often causes boredom and harms students' academic achievement in Pancasila Education. To overcome this, researchers developed interactive multimedia learning media through the Articulate Storyline platform. This research aims to design, evaluate the feasibility, and determine the effectiveness of interactive multimedia learning media, utilising Articulate Storyline, to enhance the independence dimension and learning outcomes in Pancasila Education among fifth-grade students. This developmental research utilises the Borg and Gall model, which consists of eight systematic steps: needs and issue analysis, information gathering, product planning, design evaluation, design improvement, initial testing, product refinement, and implementation trial. The research participants are fifth-grade students at SDN Ngaliyan 05 Semarang. The media expert validation score was 91.67%, and the material expert's score was 98.21%, which was deemed very feasible. There was a significant increase in the independent dimension and learning outcomes of fifth-grade students of SDN Ngaliyan 05 Semarang. The N-Gain calculation showed an average increase in learning outcomes of 0,73. This research concludes that Articulate Storyline-based interactive multimedia is a successful, feasible, and practical approach for teaching Pancasila education to fifth-grade students. This research contributes to the provision of digital media innovation in Pancasila education.

* Corresponding Author.

E-mail address: putririfkiyani@students.unnes.ac.id (Putri Rifkiyani)

DOI: <http://dx.doi.org/10.33578/jpfkip.v14i3.p301-315>

Received 19 April 2025; Received in revised form 20 May 2025; Accepted 03 June 2025

Available online 29 June 2025

e-ISSN 2598-5949 | p-ISSN 2303-1514 © The Authors.

1. Introduction

Education is a deliberate and structured process designed to create an environment and learning experiences that encourage students to actively develop their potential (Rahman et al., 2022). In this context, Pancasila Education plays a crucial role as a fundamental foundation for all citizens in shaping their identity, living as members of the nation, and serving as a guide to realising the ideals of Pancasila (Sulianti et al., 2020). Pancasila Education serves not only as a medium for instilling national values but also as an essential tool for character building, enabling the younger generation to adapt to the social changes and global challenges of the modern era. As Firdaus & Dkk (2024) emphasise, today, Pancasila Education is vital for shaping a generation that is not only intellectually capable but also well-informed about national values. However, its implementation still faces challenges, particularly in the use of conventional and theoretical teaching methods such as lectures. These approaches often lead to student disengagement and boredom, resulting in less constructive learning experiences and poor academic outcomes. Therefore, there is a pressing need for more innovative, interactive, and contextual teaching methods in Pancasila Education to ensure that students effectively internalise the nation's noble values.

Information and Communication Technology (ICT) has experienced rapid development in recent years, making it an integral part of students' daily lives. As a result, technology has become a vital element in modern education, playing a key role in supporting the teaching and learning process (Altun & Ahmad, 2021). The integration of learning media, as noted by Sudjana & Rivai, is expected to enhance students' understanding and progress in various subject matters. The advantages of using educational media include making lessons more engaging, clarifying complex concepts, and fostering students' motivation to learn (Pagarra H & Syawaludin, 2022). In this context, teachers are increasingly required to innovate in their teaching practices to remain relevant and responsive to the demands of the digital era (Gresinta & Tukiran, 2024). Therefore, the effective use of ICT in education is not merely an option but a necessity for improving the quality and relevance of learning in the 21st Century.

The Merdeka Curriculum is an educational approach that emphasises character and competency development through the six dimensions of the Pancasila Student Profile, one of which is independence. This dimension includes the ability of students to recognise their potential, manage emotions, and take responsibility for their learning processes and outcomes, thereby shaping individuals who are not only capable of learning independently but also aware of their roles and responsibilities in society (Kemendikbudristek, 2022). The implementation of the Merdeka Curriculum in enhancing student independence has shown positive results. For example, a study by Utia et al. (2024) found that flexible, student-centred learning significantly improves students' independent learning abilities. Furthermore, Cahyani & Abdul Aziz (2023) highlighted the importance of a constructivist approach, where students actively build their knowledge through meaningful learning experiences that foster independence. In addition, research by (2023) emphasised that the successful implementation of this curriculum depends on effective stages of planning, execution, and evaluation to instil the Therefore, the Merdeka Curriculum, through its focus on the independence dimension, provides a strong framework for shaping students who are independent, responsible, and well-prepared to face future challenges, supported by educators capable of designing learning activities that encourage exploration, reflection, and active decision-making by the learners.

This research originates from a real problem identified at SDN Ngaliyan 05, Semarang City, through field observations and interviews with fifth-grade teachers, revealing that the learning outcomes of Civic Education in the odd semester of the 2024/2025 academic year remain low,

with only 41% of students achieving the KKTP of 75, while 59% have yet to reach this standard. This condition indicates that student achievement is not yet optimal, particularly in Civic Education, which is also caused by the limited use of creative and innovative technology-based interactive learning media. This results in students often feeling bored and unfocused, as well as lacking in the development of independent learning dimensions. A proposed solution is the creation of interactive multimedia learning materials using Articulate Storyline, which integrates various media elements, including animation, audio, graphics, video, and text, to effectively boost students' learning motivation (Saputri et al., 2018).

The benefits of multimedia have been widely reported in research, showing that multimedia in learning can empirically optimise learning motivation (Rajendra & Sudana, 2018), facilitate students' better understanding of the material (Gunawardhana & Palaniappan, 2016), and improve the quality of learning (Wu & Tai, 2016). The advantages of Articulate Storyline lie in its flexibility for content development, interactive design, and its ability to present simulations and exercises that optimise the learning experience and enhance students' critical thinking skills and independence (Zahara et al., 2024).

Research studies conducted by Sari & Witanto (2022) demonstrated that the use of Articulate Storyline can optimise students' critical thinking abilities and independent learning. Previous studies also showed the effectiveness of interactive multimedia based on Articulate Storyline in Civic Education learning (Pratama & Batubara, 2021). However, the novelty of this study lies in the research location, time, learning material, and focus on developing innovative and creative media to improve students' independence dimensions and learning outcomes. Properly structured learning media can enhance the efficiency and effectiveness of the educational process, support students' comprehension of extensive Civic Education content, and encourage independent concept discovery (Brata et al., 2021). Therefore, this study aims to develop, test the feasibility, and evaluate the effectiveness of interactive multimedia based on Articulate Storyline as an alternative solution to improve the independence and learning outcomes of fifth-grade students on the topic of Indonesian regional culture in Civic Education.

2. Method

This study aims to develop, evaluate the feasibility, and assess the effectiveness of Articulate Storyline-based interactive multimedia as an alternative to enhance the independence and learning outcomes of fifth-grade students in Pancasila education, specifically concerning Indonesian regional culture (Aka, 2019). The Borg & Gall development model comprises ten steps (Sugiyono, 2019). This research applies only eight consecutive steps (see Figure 1) due to time and budget constraints that prevent mass production, as well as a focus on assessing media feasibility and effectiveness.

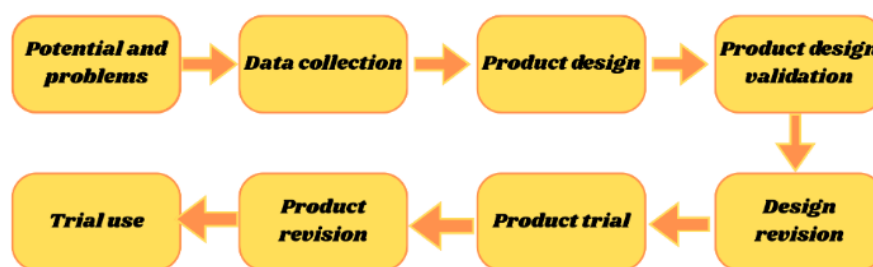


Figure 1. Model Borg & Gall

The potential and problem analysis was conducted during the pre-research phase through interviews and observations to identify issues and needs in the Pancasila education process for fifth-grade students at SDN Ngaliyan 05 Semarang. Data were collected via observation, interviews, documentation, and needs questionnaires. The product design involved creating a prototype of interactive multimedia using the Articulate Storyline platform, developed based on the collected data. Validation was performed by two experts, media and material specialists, who evaluated the product and provided improvement suggestions. Revisions were made accordingly until the media was deemed suitable for testing. The trial phase involved six fifth-grade students in a small-scale test to assess the product's feasibility, followed by refinement based on the feedback. However, no further revisions were necessary due to positive responses from both teachers and students. Finally, a broader usability trial was conducted with 23 fifth-grade students.

The subjects in this study were fifth-grade students from SDN Ngaliyan 05 Semarang, totalling 29 students, divided into two groups: 6 students as research subjects for small-scale tests and 23 students as research subjects for large-scale tests. Sampling was used to select six students as research subjects for the small-scale tests.

The research instruments included both test and non-test methods. The test method consisted of two stages: a pretest administered at the start of learning and a posttest administered after instruction, each comprising 20 multiple-choice questions. The pretest measured students' initial knowledge before they used the product, while the posttest evaluated their understanding after the treatment. Non-test methods comprised observation, interviews, and questionnaires. Observations took place in the fifth-grade class of SDN Ngaliyan 05 Semarang in November 2024, and interviews were conducted with the fifth-grade teacher. Three types of questionnaires were employed: a needs questionnaire, a response questionnaire adapted from Arsyad (2020) and an independent dimension questionnaire based on the seven subelements (Kemendikbudristek, 2022). The needs questionnaire targeted both teachers and students to assess the demand for Pancasila education media related to Indonesian regional culture. The response questionnaire gathered feedback from the same group after using the Articulate Storyline-based interactive multimedia. The Independent Dimension questionnaire, administered to students, aimed to measure improvements in students' independence following media use. All questionnaires utilised a four-point Likert scale, ranging from "strongly agree" to "strongly disagree" (Sugiyono, 2019).

Data analysis comprises three tests: feasibility test, initial data analysis, and final data analysis. The feasibility test was conducted with assessments from two experts: media experts and material experts, to evaluate the quality of the media. The feasibility test was conducted using a validation questionnaire with a rating scale ranging from 1 to 4.

Table 1. Interpretation of the feasibility level of media validation

Persentase	Kriteria
76% - 100%	Very Feasible
51% - 75%	Worth
26% - 50%	Decent Enough
0% - 25%	Less Feasible

Initial data analysis involved testing the normality of pretest and posttest scores using the Shapiro-Wilk test, supported by SPSS version 30. The final analysis included a t-test and N-Gain

test on the pretest and posttest results. The t-test assessed the media's effectiveness on student learning outcomes, while the N-Gain test measured the improvement by comparing scores before and after the implementation of the Articulate Storyline-based interactive multimedia.

Table 2. Interpretation N-Gain index

N-Gain Value	Criteria
$N\text{-gain} \geq 0,70$	High
$0,30 < N\text{-gain} < 0,70$	Medium
$N\text{-gain} \leq 0,30$	Low

3. Results

This section presents the results and discussion of each phase of the Borg & Gall model applied in this study. This model development stages present a structured and systematic methodology, complete and thorough at each step of development, application, and assessment. To present the findings in a structured manner, ensuring that the entire research phase's findings are reviewed and interpreted, thereby offering an in-depth and integrated understanding of each phase.

3.1 Potential and problems

During the potential and problem identification phase, researchers conducted observations and interviews in the fifth-grade class of SDN Ngaliyan 05 Semarang. The findings revealed challenges in teaching Pancasila education related to Indonesian regional culture, including underutilization of technology-based interactive media, limited teaching time due to extensive material, lack of student focus, passive participation, and low levels of student independence. These factors negatively impacted academic achievement. To address these issues, the study proposed developing Articulate Storyline-based interactive multimedia to enhance student motivation and independence in learning Pancasila education for fifth graders.

3.2 Data collection

This data collection stage involved interviews, documentation, and a media needs questionnaire to guide the development of Articulate Storyline-based interactive multimedia. Both teachers and fifth-grade students at SDN Ngaliyan 05 Semarang completed the questionnaire to assess the alignment of the proposed learning media with their needs. The questionnaire, consisting of 14 Likert-scale items, focused on students' media preferences. A summary of the responses from 29 students is presented in Table 3.

Table 3. Recapitulation of the student needs questionnaire

No. of questions	SS (4)	S (3)	TS (2)	STS (1)	Total score	Mean score	Percentage	Interpretation
1-14	221	144	38	6	1398	48,2	86%	SS

Table 3 summarises the students' needs analysis questionnaire, consisting of 14 items, revealing an average score of 48.2 out of 56 (86%). This result indicates that most students strongly support delivering Indonesian regional culture topics through Articulate Storyline-based interactive multimedia. Additionally, students prefer technology-based learning accessible via

mobile phones or laptops, especially for Pancasila education on regional culture. They also showed strong interest in the proposed media, suggesting that its development is likely to foster independent dimensions and enhance learning outcomes. **Table 4** displays the recapitulated data from the teacher needs questionnaire.

Table 4. Recapitulation of the teacher needs questionnaire

No. of questions	SS (4)	S (3)	TS (2)	STS (1)	Total score	Mean score	Percentage	Interpretation
1-24	16	4	4	0	84	3,5	88%	SS

Table 4 summarises the teacher needs analysis questionnaire, which consists of 24 items, yielding a total score of 84 out of 96 (88%). This indicates strong teacher support for integrating Indonesian regional culture content through Articulate Storyline-based interactive multimedia. Teachers emphasised the need for technology-based media to boost student engagement and introduce innovative learning methods. They also agreed that such multimedia is well-suited to deepen understanding of Pancasila education related to regional culture. Consequently, this multimedia development is expected to enhance the independent dimension and improve learning outcomes.



Figure 2. Interactive multimedia based on articulate storyline design

Based on this analysis, the researcher decided to develop interactive multimedia content using the Articulate Storyline platform, focusing on Indonesian regional culture (traditional clothing, traditional houses, and regional dances), and incorporating quizzes.

3.3 Product design

Based on the needs analysis of teachers and students, the researcher developed a prototype of interactive multimedia using the Articulate Storyline platform, an electronic-based interactive media. The resulting multimedia product for Indonesian regional culture material, shown in **Figure 2**, aims to serve as an innovative technological tool that is easily accessible, enhances student motivation and learning outcomes, and promotes learner independence.

3.4 Product design validation

The validation stage involves presenting the product design to experts to identify flaws and ensure proper functionality (Latifah et al., 2022). Using a validation questionnaire developed by the researcher, two experts evaluated the Articulate Storyline-based interactive multimedia. Their feasibility assessment, conducted by media and material experts, is summarised in Table 5.

Table 5. Recapitulation of media feasibility assessment results

Expert	Total Score	Average	Percentage	Criteria
Media	55	3,67	91,67%	Very Feasible
Material	55	3,93	98,21%	Very Feasible


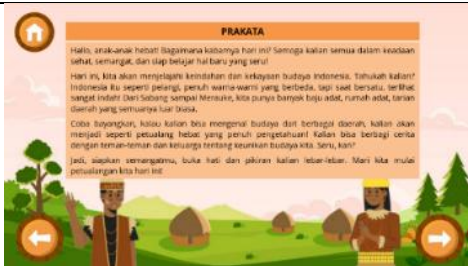
Table 5 shows that the media expert rated the Articulate Storyline-based interactive multimedia 55 out of 60 (91,67%), while the subject matter expert gave 55 out of 56 (98,21%). Both ratings classify the media as "Very Feasible," confirming its suitability as instructional material for Pancasila Education on Indonesian regional culture for fifth-grade students. These expert evaluations validate the media's feasibility, and their feedback was used to revise and improve the product in the next development phase.

3.5 Product design revision

Based on feedback from media and material experts, revisions were made to the product design. These adjustments aimed to enhance the effectiveness and usefulness of the Articulate Storyline-based interactive multimedia for supporting student learning. A summary of the design revisions is presented in Table 6.

Table 6. Product design revision

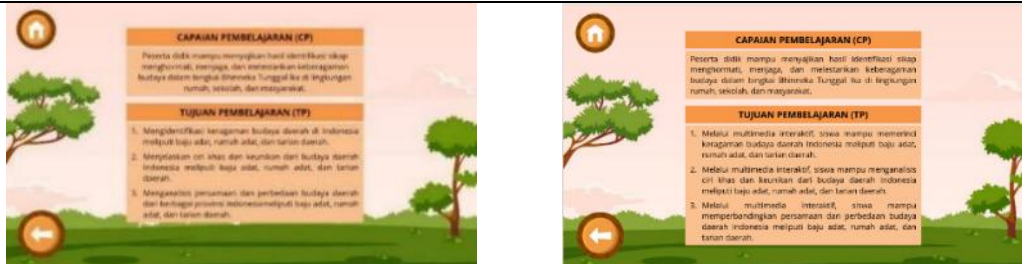
No	Before	After
1.	Improving the information menu, namely, adding a title to the preface.	

2. Improvements to the information menu should include the supervisor's identity.



3. Improved learning objectives.



4. Enhanced material explanations that add meaning to each regional culture.



3.6 Product trial

Six fifth-grade students from SDN Ngaliyan 05 Semarang participated in a small-scale pilot study to evaluate changes in student independence and learning outcomes before and after using the media. Effectiveness was assessed by comparing average scores on a 20-question pretest and posttest. Students completed the pretest prior to using the media, followed by the posttest after engaging with the Articulate Storyline-based interactive multimedia developed by the researcher.

Table 7. Recapitulation of pretest and posttest scores of small-scale test students

Test Type	Total	Average	Difference	Highest Score	Lowest Score
Pretest	270	45	41,67	70	20
Posttest	520	86,67		100	75

Table 7 shows a significant improvement in students' learning outcomes, with the average pretest score increasing from 45 to 86.67 in the posttest, representing an average gain of 41.67 points. This indicates that the use of Articulate Storyline-based interactive multimedia effectively enhanced students' understanding of Indonesian regional culture.

Students completed an independent dimension questionnaire both before and after using the Articulate Storyline-based interactive multimedia to assess the level of independence, measured across seven subelements.

Table 8. Recapitulation of the small-scale students' independent dimension questionnaire

Media Usage	Total Score	Percentage	Interpretation	Score Difference	Percentage Difference
Before	119	50%	Low	109	45%
After	228	95%	High		

Table 8 shows that student independence scores increased from 50% before using the Articulate Storyline-based interactive media to 95% after its implementation. This significant improvement demonstrates that the multimedia effectively enhances students' independence, which is closely related to better academic performance. Most students responded with "strongly agree," indicating a high level of independence fostered by the interactive media.

3.7 Product revision

No product revisions were made, as teachers and students provided highly positive feedback on the response questionnaire, allowing the research to proceed to the large-scale testing phase.

3.8 Trial Usage

The interactive multimedia, based on Articulate Storyline, was tested on a larger group of 23 fifth-grade students at SDN Ngaliyan 05, Semarang. Effectiveness was evaluated by comparing average scores on a 20-question pretest and posttest. Students completed the pretest before using the media, and the posttest was administered after the learning session with the developed multimedia.

Table 9. Recapitulation of pretest and posttest scores of large-scale test students

Test Type	Total	Average	Difference	Highest Score	Lowest Score
Pretest	1010	43,91	40,65	70	20
Posttest	5945	84,57		95	75

Table 9 shows a significant increase in student learning outcomes, with the average pretest score rising from 43.91 to 84.57 in the posttest, reflecting an average improvement of 40.65 points. This demonstrates that, after using the Articulate Storyline-based interactive multimedia, most students in the large-scale trial showed a better understanding of Indonesian regional culture material.

Students completed an independent dimension questionnaire, covering seven subelements, prior to using the Articulate Storyline-based interactive multimedia.

Table 10. Recapitulation of the large-scale student dimension questionnaire

Media Usage	Total Score	Percentage	Interpretation	Score Difference	Percentage Difference
Before	433	47%	Low	411	45%
After	844	92%	High		

Table 10 shows that the student independence score increased from 433 out of 920 (47%) before using the Articulate Storyline-based interactive media to 844 out of 920 (92%) after implementation. This significant improvement places student independence in the high category. Most students responded with "strongly agree," indicating that the multimedia is effective in fostering greater independence during learning.

To determine whether the pretest and posttest data in the fifth-grade SDN Ngaliyan 05 Semarang are normally distributed, the next step is to perform a normality test. The criteria for normally distributed data are a significant level (p -value) of more than 0.050 ($p > 0.050$). This aligns with Setyawan's theory (2021), which states that data can be considered normally distributed if the significance value is greater than 0,050. With the help of the SPSS version 30 application, the Shapiro-Wilk test formula was used to calculate the normality test. According to the theory proposed by Setyawan (2021), normality testing can be conducted using the Shapiro-Wilk method when the sample size is less than 50 (Table 11). The results of the pretest calculation show that $0.242 > 0.050$ is also normally distributed, and the results of the posttest calculation show that $0.069 > 0.050$ is also normally distributed. Therefore, it can be concluded that both datasets have $p > 0,050$, so the calculation of pretest and posttest results is considered normally distributed.

Table 11. Normality test of pretest and posttest

Test	Statistic	df	Sig.	Criteria
Pretest	.955	29	.242	Normal
Posttest	.934	29	.069	Normal

To determine significant changes resulting from the use of interactive multimedia based on Articulate Storyline learning materials on Indonesian regional culture, the next stage involves calculating the comparison of average pretest and posttest scores using the t-test. Data is declared significant if $\text{sig. (2-tailed)} < 0,05$. This is consistent with the theory proposed by Nuryadi et al. (2017), which states that the t-test result is considered significant if the significance value is less than 0.05, and not significant if the significance value exceeds 0.05—obtained significant differences from the pretest and posttest results, seen in Table 12, t-test data which shows that sig. (2-tailed) obtained 0,001.

Table 12. Results of the t-test of pretest and posttest

Test	N	t-count	t-table	Description	Sig. (2-tailed)	Description
Pretest	29	23,751	2,04	Ha accepted	<.001	Signifikan
Posttest	29			Ha accepted		

Furthermore, the N-gain calculation is used to assess the improvement in students' average scores from pretest to posttest. Based on Table 13, the N-Gain test results for fifth-grade SDN Ngaliyan 05 Semarang showed a high criterion of 0,73. This score indicates a notable improvement in average learning outcomes. This classification aligns with Supriadi's theory,

which states that N-Gain scores greater than 0.7 are categorised as high, those between 0.3 and 0.7 as moderate, and scores below 0.3 as low (Supriadi, 2021).

Table 13. N-Gain test results

Category	Value
Pretest	44,14
Posttest	85
Average difference	40,86
Class N-gain	0,73
Criteria	High
N-gain score	73%

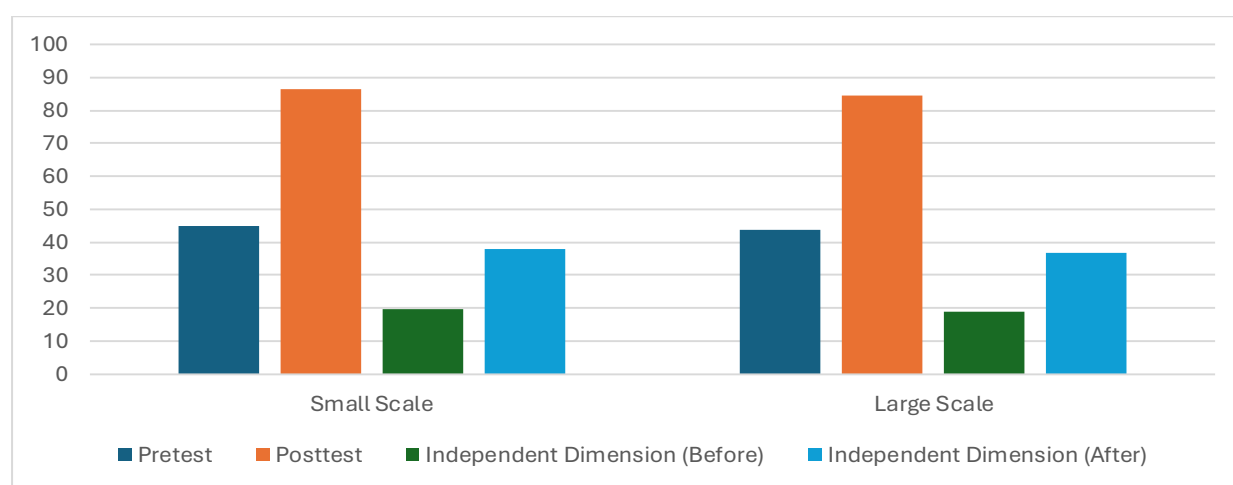


Figure 3. Comparison of learning outcome improvement and independent dimension

Based on the data in Figure 3, it is concluded that the application of interactive multimedia, based on Articulate Storyline, can optimise the independent dimension and learning outcomes of Pancasila education in Indonesian regional culture materials. There was a significant increase from before and after the application of the media. This increase demonstrates that Articulate Storyline-based interactive multimedia is effective in optimising the independent dimension and is deemed adequate, as it positively impacts student cognitive learning outcomes.

4. Discussion

The findings of this study demonstrate that Articulate Storyline-based interactive multimedia enhances students' independence and learning outcomes. In line with the findings of Rafmana et al. (2018), who found that this multimedia supports the learning process and addresses the limited school learning time by enabling independent study. Reinforced by the findings of (Suhardiansyah et al., 2023), which highlighted the significant positive impact of interactive multimedia on student autonomy. These results emphasise that such media optimise students' motivation and engagement, encouraging active participation in learning. Furthermore, Articulate Storyline-based multimedia provides flexible, self-directed access, allowing students to tailor their learning according to individual needs and manage their time and learning progression effectively.

A significant increase in the results of the independent dimension questionnaire evidences the improvement in the independent dimension observed in this study. This growth is further reflected in students' increased activity, discipline, and initiative in accessing learning materials independently. Aligning with the P3 independent dimension characteristics, students are expected to take personal responsibility for both the learning process and outcomes (Kemendikbudristek, 2022). The developed media successfully meets these goals, as its design facilitates flexible learning supported by various integrated features.

Findings (Saputri et al., 2018) interactive multimedia integrates various media types, including audio, text, graphics, video, and animation, to enhance students' understanding and motivation to learn. Given that Pancasila education is often perceived as abstract, the use of Articulate Storyline-based interactive multimedia provides concrete support for students by presenting the material through engaging animations and visually appealing narratives.

The use of interactive multimedia in the learning environment has been proven effective in significantly enhancing learning outcomes and encouraging active student participation. The results of this study are evident from the notable increase in scores between the pretest and posttest. Supported by the findings of Anggraeni & Suryanti (2023), which demonstrate that interactive multimedia is highly feasible, practical, and effective, with a 90% improvement in mastery rate. These findings confirm that Articulate Storyline-based interactive multimedia can enhance lesson quality, boost student motivation, and increase learning engagement, thereby optimising learning outcomes. Additionally, the developed multimedia content delivers information efficiently and engagingly, further enhancing student achievement.

Based on the validation conducted, the interactive multimedia supported by Articulate Storyline is highly feasible and effective in enhancing the independent dimension and learning outcomes of fifth-grade students at SDN Ngaliyan 05 Semarang, specifically in the context of Indonesian regional culture within the Pancasila education subject. The diverse features of this media motivate students to engage actively and independently in the learning process. Furthermore, the development of this media has undergone iterative refinements based on expert feedback to ensure its suitability and effectiveness for student use. Overall, this media addresses the gap in technological learning innovations that stimulate student motivation and holds potential for application across various other subjects.

5. Conclusion and Implications

This study successfully designed and developed an innovative interactive multimedia product based on Articulate Storyline for Pancasila education, focusing on Indonesian regional culture material for fifth-grade students at SDN Ngaliyan 05 Semarang. The developed media was deemed highly feasible, receiving scores of 91,67% from media experts and 98,21% from material experts. The teacher and student responses were also very positive and enthusiastic about the media's implementation. The use of Articulate Storyline-based interactive multimedia proved effective in supporting learning, as evidenced by normality tests and a t-test, which showed a significant improvement in student outcomes ($p\text{-value} = 0.001 < 0.05$). Additionally, the average N-gain score of 0,73 indicates a high level of learning gain. This research highlights the media's effectiveness in enhancing both the independent learning dimension and student achievement in Pancasila education, particularly concerning Indonesian regional culture. The interactive multimedia increased student motivation, active participation, and autonomy, making it a highly feasible tool to improve these aspects of learning.

These findings highlight the significant potential of using Articulate Storyline-based interactive multimedia across other subjects, thereby promoting the broader adoption of technology-driven innovative media in basic education. Future research should expand the scope and scale of developing such interactive multimedia learning tools for various subjects. Additionally, studies should examine the long-term impact of using interactive multimedia on students' ability to develop and maintain discipline.

Credit authorship contribution statement

Putri Rifkiyani: Collected and analyzed the data, developed the learning media, and synthesized the findings. **Kurotul Aeni:** Supervisor.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Declaration

All participants provided informed consent prior to their involvement in the study. They were informed about the study's purpose, procedures, and their right to withdraw at any time without consequence.

References

- Aka, K. A. (2019). Integration of Borg & Gall's (1983) and Lee & Owen's (2004) models as an alternative model for design-based research on interactive multimedia in elementary schools. *Journal of Physics: Conference Series*, 1318(1), 0–8. <https://doi.org/10.1088/1742-6596/1318/1/012022>
- Altun, M., & Ahmad, H. K. (2021). The Use of Technology in English Language Teaching: A Literature Review. *International Journal of Social Sciences & Educational Studies*, 8(1), 226–232. <https://doi.org/10.23918/ijsses.v8i1p226>
- Anggraeni, T. N., & Suryanti. (2023). Pengembangan multimedia interaktif “malaya” berbasis articulate storyline materi sistem tata surya untuk meningkatkan hasil belajar siswa kelas VI SD Tarissa Nur Anggraeni. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, Vol 11(2), 414–427.
- Arsyad, A. (2020). *Media Pembelajaran*. Jakarta: PT Raja Grafindo Persada.
- Brata, W. W. W., Wibowo, F. C., & Rahmadina, N. (2021). Implementation of discovery learning in a digital class and its effect on student learning outcomes and learning independence level. *F1000Research*, 10, 386. <https://doi.org/10.12688/f1000research.51763.1>
- Cahyani, A., & Abdul Aziz, T. (2023). Studi Literatur: Kemandirian Belajar Siswa Dan Pembelajaran Konstruktivisme Dalam Kurikulum Merdeka. *Jurnal Ilmiah PGSD FKIP Universitas Mansdiri*, 09(Desember), 4122–4135.
- Firdaus, M. N., & Dkk. (2024). *Dasar-Dasar Pendidikan Pancasila (e-book)*. Bandung: Widina Media Utama.
- Gresinta, E., & Tukiran, M. (2024). *Literature Review : Teacher Innovativeness in Learning in the Digital Era*. 03(03), 9–15.
- Gunawardhana, L. K., & Palaniappan, S. (2016). Using Multimedia as an Education Tool. 9th

- Annual International Conference on Computer Games Multimedia & Allied Technologies (CGAT2016), September 2016*, 1316–1356. https://doi.org/10.5176/2251-1679_CGAT16.1598
- Kemendikbudristek. (2022). Dimensi, Elemen, dan Subelemen Profil Pelajar Pancasila pada Kurikulum Merdeka. *Kemendikbudristek*, 1–37.
- Latifah, A., Tresnawati, D., & Sanjaya, H. (2022). Media Pembelajaran Menggunakan Teknologi Augmented Reality untuk Tanaman Daun Herbal. *Jurnal Algoritma*, 19(2), 515–526. <https://doi.org/10.33364/algoritma/v.19-2.1138>
- Nuryadi, Astuti, T. D., Utami, E. S., & Budiantara, M. (2017). Buku Ajar Dasar-dasar Statistik Penelitian. In *Sibuku Media*.
- Pagarra H & Syawaludin, D. (2022). Media Pembelajaran. In *Badan Penerbit UNM*. Badan Penerbit UNM.
- Pratama, A. N., & Batubara, H. H. (2021). Pengembangan Multimedia Interaktif Berbasis Articulate Storyline Materi Penerapan Nilai-nilai Pancasila. *Bidayatuna Jurnal Pendidikan Guru Mandrasah Ibtidaiyah*, 4(2), 157. <https://doi.org/10.54471/bidayatuna.v4i2.1082>
- Rafmana, H., Chotimah, U., & Alfiandra. (2018). Pengembangan Multimedia Interaktif Berbasis Articulate Storyline untuk Meningkatkan Motivasi Belajar Siswa pada Mata Pelajaran PKN Kelas XI di SMA Srijaya Negara Palembang. *Jurnal Bhineka Tunggal Ika*, 5(1), 52–65.
- Rahman, A., Munandar, S. A., Fitriani, A., Karlina, Y., & Yumriani. (2022). Pengertian Pendidikan, Ilmu Pendidikan dan Unsur-Unsur Pendidikan. *Al Urwatul Wutsqa: Kajian Pendidikan Islam*, 2(1), 1–8.
- Rajendra, I. M., & Sudana, I. M. (2018). The Influence of Interactive Multimedia Technology on Enhancing Achievement of Students in Practical Skills in Mechanical Technology. *Journal of Physics: Conference Series*, 953(1). <https://doi.org/10.1088/1742-6596/953/1/012104>
- SAPUTRI, D. Y., RUKAYAH, R., & INDRIAYU, M. (2018). Need Assessment of Interactive Multimedia Based on Game in Elementary School: A Challenge to Learning in the 21st Century. *International Journal of Educational Research Review*, 3(3), 1–8. <https://doi.org/10.24331/ijere.411329>
- Sari, N. E., & Witanto, Y. (2024). Multimedia-based Apsimas Learning Media on the meaning of the Pancasila Precepts in the Community Environment to Improve Students' Learning Outcomes. *International Journal of Elementary Education*, 8(2), 258–268.
- Setyawan, D. A. (2021). *Petunjuk Praktikum Uji Normalitas & Homogenitas Data dengan SPSS*. Tahta Media Group.
- Sudjana, N & Rivai, A. (2019). *Media Pengajaran*. Bandung: Sinar Baru Algensindo.
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Penerbit Alfabeta.
- Suhardiansyah, Ifrianti, S., Sari, I. P., & Asiah, N. (2023). Pengembangan Media Pembelajaran Interaktif Berbasis Articulate Storyline Pada Pembelajaran Tematik Untuk Meningkatkan Belajar Mandiri Peserta Didik Kelas IV SD/MI. *Jurnal Pendidikan Dan Pembelajaran Dasar*, 10, 101–114.
- Sulianti, A., Efendi, Y., & Sa'diyah, H. (2020). Penerapan Nilai-Nilai Pancasila dalam Lembaga Pendidikan. *Jurnal Pancasila Dan Kewarganegaraan*, 5(1), 54–65. <https://doi.org/10.24269/jpk.v5.n1.2020.pp54-65>
- Supriadi, G. (2021). *Statistik Penelitian Pendidikan*. UNY Press.
- Utia, M., Mas, S. R., & Sukung, A. (2024). IMPLEMENTASI KURIKULUM MERDEKA DALAM MENINGKATKAN KEMANDIRIAN BELAJAR SISWA. *Equity in Education Journal (EEJ)*, 6(2), 69–76.
- Wahyudi, A. E., Sunarni, & Ulfatin, N. (2023). Implementasi Kurikulum Merdeka Berorientasi

Pembentukan Karakter Profil Pelajar Pancasila di Sekolah Dasar. *JURNAL MORAL KEMASYARAKATAN*, 8(2), 179–190.

Wu, T. J., & Tai, Y. N. (2016). Effects of Integrating Multimedia information Technology into Multisensory Instruction on Students' Learning Motivation and Outcomes. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(4), 1065–1074. <https://doi.org/10.12973/eurasia.2016.1552a>

Zahara, J., Gandamana, A., Sitohang, R., & Aulia, S. M. (2024). *Pengembangan Media Pembelajaran Interaktif Berbasis Articulate Storyline pada Mata Pelajaran Pendidikan Pancasila di Kelas II SD Panca Budi T. A 2023 / 2024*. 4, 5394–5411.