



Development of digital pop-up book Pancasila education to improve learning outcomes

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Received: 15 January 2026; Revised: 12 February 2026; Accepted: 2 March 2026

Abstract: The limited use of innovative and digital based learning media reduces students' opportunities to gain meaningful and relevant learning experiences in real-life contexts. This situation has implications for low learning outcomes in Pancasila Education and becomes an obstacle in strengthening 21st-century skills. This research aims to develop learning media while assessing the feasibility and effectiveness of Digital Pop-Up Book media in Pancasila Education subjects. The research approach applied is RnD with reference to the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. The research subjects involved teachers and fifth-grade students of Pener 01 Elementary School, Pemalang, Indonesia. Data collection techniques included expert assessments, student and teacher response questionnaires, and pre- and post-tests compiled based on learning outcome indicators. Data were analyzed using normality tests, homogeneity tests, t-tests, and N-Gain tests. The results of the t-test analysis obtained a Sig. (2-tailed) value of 0.000 (<0.05), which indicates a significant difference between the pre-test and post-test scores. In addition, the N-Gain value of 0.70 (70.0%) falls within the high category, indicating a significant increase in student learning outcomes. The developed Digital Pop-Up Book media was deemed highly feasible, as indicated by validation scores of 89% from media experts and 80% from material experts. User responses also showed very positive results, with a student response percentage of 95% and a teacher response of 90%. Thus, the Digital Pop-Up Book media has proven feasible and effective for implementation in Pancasila Education. The findings suggest that the integration of Digital Pop-Up Books serves as a strategic solution for educators to transform abstract civic values into engaging visual experiences, ultimately fostering more dynamic and meaningful 21st-century learning in elementary schools.

Keywords: digital pop-up book, pancasila education, learning media development, learning outcomes

How to Cite: Ayuningtyas, F. I. & Widodo, S. T. (2026). Development of digital pop-up book Pancasila education to improve learning outcomes. *Jurnal Prima Edukasia*, 14(1), 73-85. DOI: <https://doi.org/10.21831/jpe.v14i1.95104>



Introduction

Pancasila education aims to improve students' competency in understanding national values, building civic character, and fostering a deep philosophical understanding (Apriyanto et al., 2024). Research (Iskandar & Fathurrahman, 2025) shows that innovative Pancasila learning can increase knowledge while stimulating children's motor responses through visual and interactive activities, thus significantly influencing Pancasila education learning outcomes. At the elementary school level, the implementation of interactive media has been shown to improve students' mastery of Pancasila concepts.

In the current Indonesian education context, education is implemented to improve learning quality, emphasizing mastery of competencies, character development, and higher-order thinking skills (Amelia & Sukasih, 2025). Learning is understood as an active process involving conscious, meaningful, and enjoyable activities for students to engage with the material and their learning experiences, so that the knowledge gained is meaningful and applicable to real life (Omar, 2024). Learning media is a crucial factor in supporting the success of the learning process (Cheng et al., 2024). Using appropriate learning media can make learning more effective, engaging, and facilitate student comprehension (Alshammary

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& Alhalafawy, 2023). Furthermore, students can make direct observations without having to imagine them, which also helps them review information as needed. For teachers, media also facilitates the delivery of material, making learning more effective and achieving goals easier. One way to help teachers improve learning is through the use of media (Usman et al., 2024).

A Digital Pop-Up Book is a digital media tool in the form of a book with three-dimensional elements that move when the pages are opened, thereby attracting attention, stimulating curiosity, and actively engaging students in learning (Aisyah, 2024). The engaging and interactive visual display makes the material easier for elementary school students to understand. The suitability of this media is supported by Jean Piaget's cognitive development theory, which states that elementary school students are in the concrete operational stage and require visual aids to understand concepts (Rahman et al., 2023). Furthermore, Jerome Bruner's learning theory emphasizes the importance of learning through visual representations before progressing to abstract understanding. Therefore, Digital Pop-Up Books are relevant and effective for use in elementary school learning (Fithriyah, 2024).

Based on interviews and field findings on March 7, 2025, this is because teachers rely solely on conventional teaching methods, such as one-way lectures, in the learning process. The limited availability of projectors, which must be shared between classes, and the impractical installation requirements hampers the integration of visual media into Pancasila Education learning. Furthermore, students still rely on student worksheets and supplementary materials prepared by teachers, due to the lack of comprehensive Pancasila Education textbooks, which limits the depth and breadth of the material learned. Field findings indicate that nearly 90% of fifth-grade students own mobile phones. This situation impacts students' learning patterns, as the habit of using mobile phones outside of school hours fosters a preference for visual and interactive content. When classroom instruction is delivered conventionally and with minimal digital media, students become less interested, their attention wanes, and their engagement decreases (Ramli et al., 2025).

Consequently, the learning process feels less interactive, the classroom atmosphere is less conducive, and learning tends to be boring for students. Furthermore, the school expressed a need for digital products due to limited resources for learning media (Firmansyah et al., 2024). A further impact of this situation is the low learning outcomes of Pancasila Education among elementary school students (Contrino et al., 2024). The lack of focus and active student participation results in a less-than-optimal understanding of the norms material in Pancasila Education. Furthermore, Pancasila Education teaching, which is still dominated by conventional methods and lacks engaging media, makes it difficult for students to connect the material to everyday life, thereby negatively impacting learning outcomes. Therefore, researchers decided to create a Digital Pop-Up Book as a learning medium.

One such phenomenon occurred at Pener 01 Elementary School. In Pancasila Education, the results for daily tests are less than optimal. The study subjects were 37 fifth-grade students at Pener 01 Elementary School. The average score for learning outcomes was 62.06, and 58.62% did not meet the indicators, indicating poor learning outcomes. Based on these issues, a Digital Pop-Up Book learning medium is needed to motivate and encourage students to participate in learning activities. The media used has an attractive design, both in terms of size, shape, and color, so it can attract students' attention, help them understand the material presented by the teacher, and make the learning process more enjoyable (Saputra et al., 2025).

Digital Pop-Up Books also have the potential to enhance students' imaginations, as they not only read text but also interact directly with the story through three-dimensional images. This aligns with the learning principle that experiences that engage more senses are typically more effective and memorable (Nasution & Siregar, 2024). Digital Pop-Up Book learning media is an effective means of conveying teacher messages to students. This media is essential for stimulating students' thoughts, feelings, attention, and interests, and for improving learning outcomes and ensuring a smooth learning process. In addition, the use of Digital Pop-Up Books helps reduce student boredom because learning is not centred solely on teacher-led lectures (Regina & Wulandari, 2025).

The reason for choosing the fifth grade of elementary school for this research was the need to improve student learning outcomes before facing the national assessment or ANBK. The purpose of using learning media is to facilitate the teaching and learning process in the classroom, increase learning efficiency, maintain alignment between the material being taught and the learning objectives, and improve student concentration during the learning process (Mulyati & Widodo, 2024). The presence of Digital Pop-Up Book learning media can contribute to the world of education to improve the quality of

learning (Nurkumala et al., 2024). The media developed by researchers is in the form of a Digital Pop-Up Book, designed to make it easier for both teachers and students to use and to present learning materials more engagingly through three-dimensional image visualization (Wardana et al., 2023).

Several researchers have conducted research on the development of Digital Pop-Up Book learning media in various contexts and subjects. Aisyah (2024) examined digital pop-up books in civics learning in elementary schools through a literature review and concluded that learning media plays a crucial role in helping teachers achieve learning objectives (Febriyanti & Sulistyawati, 2024). The results of the study show that learning using digital Pop-Up Book media for Pancasila education in elementary schools is very good and has been implemented effectively. Furthermore, student learning outcomes increased from a pre-test average of 50.68 to a post-test average of 84.77, with an N-Gain value of 0.73 (high category). Teacher and student responses were positive, indicating that this Digital Pop-Up Book is effective, feasible, and practical for use in learning.

However, these studies still have limitations. Most studies focus on science and language subjects, while research on the development of Digital Pop-Up Books specifically for Pancasila Education, especially those that emphasise understanding everyday values and norms, remains very limited. Furthermore, previous studies generally have not comprehensively integrated interactive digital features capable of bridging the abstract concepts of Pancasila Education with the concrete learning experiences of elementary school students (Nuraeni et al., 2023).

Therefore, this study aims to fill the gap by developing a Digital Pop-Up Book for Pancasila Education Chapter 2, “Norms and Rules” for fifth-grade elementary school students using the ADDIE model to improve learning outcomes. The main contribution of this study lies in the development of media equipped with innovative features such as three-dimensional illustrations, interactive quizzes, sound effects, audio narration, and barcode integration connected to a digital screen (Jati & Purwati, 2024). This innovation is expected to improve learning outcomes, clarify understanding of abstract norm concepts, encourage active student participation, and enhance learning outcomes in Pancasila Education, thereby strengthening the novelty and academic contribution of this study.

Methods

This study used the Research and Development (R&D) method, with the ADDIE model as the framework, to develop Digital Pop-Up Book learning media for Pancasila Education. The ADDIE model consisted of five stages: analysis, design, development, implementation, and evaluation (Sugiyono, 2021).



Figure 1. ADDIE research and development model.

This research was a Research and Development (R&D) study that employed the ADDIE model to provide a systematic framework for designing, developing, and evaluating the effectiveness of learning media. The development flow of this research is shown in Figure 1. The study involved one independent variable, the Digital Pop-Up Book learning media, and one dependent variable, the Pancasila Education learning outcomes of fifth-grade students. The subjects were one class of fifth-grade students at Pener 1 Elementary School, along with one fifth-grade teacher. The analysis phase was

conducted to identify learning needs through classroom observations, teacher interviews, and a student needs questionnaire. The questionnaire was administered to all fifth-grade students to identify student characteristics, learning difficulties, and learning media needs. The data were analysed descriptively to provide a basis for media development.

The design phase included designing the media display, material presentation flow, three-dimensional illustrations, and developing research instruments in the form of validation sheets from material experts and media experts, teacher and student response questionnaires, and pre-test and post-test questions. The development phase involved realizing the design into a Digital Pop-Up Book product, which was then validated by material and media experts to assess the appropriateness of the media's content, appearance, and function. The experts' input was used to revise the product. The implementation phase involved implementing the Digital Pop-Up Book media in Pancasila Education learning. During this phase, students engaged in media-based learning, were given pre- and post-tests to measure learning outcomes, and completed student and teacher response questionnaires. The evaluation phase was conducted to review the entire development process based on expert validation results, user responses, and improvements in student learning outcomes. Data collection techniques included observation, interviews, questionnaires, learning outcome tests, and documentation. Data analysis was conducted using quantitative descriptive methods, with Likert scales for validation data and user responses. Media effectiveness was analyzed using the Shapiro–Wilk normality test, Levene's homogeneity test, t-test, and N-Gain test to determine improvements in student learning outcomes before and after using the Digital Pop-Up Book media (Adhi et al., 2024).

Results and Discussion

Results

The results of this study reveal that the low learning outcomes of Pancasila Education, particularly in the Norms and Rules topic, are related to the limited use of innovative learning media appropriate to the characteristics of elementary school students. The main insight generated from this study indicates that the use of Digital Pop-Up Books can increase student engagement, clarify understanding of abstract norm concepts, and positively impact Pancasila Education learning outcomes. These findings are supported by empirical data from observation instruments, teacher and student questionnaires, and pre-tests and post-tests, which collectively highlight changes in learning behaviour, media acceptance, and improvements in student learning outcomes (Nurjumiati et al., 2023). The results of the needs analysis indicate that Pancasila Education learning in fifth grade is still dominated by conventional methods and minimal use of interactive media, resulting in low student engagement and suboptimal learning outcomes, particularly in the Norms and Rules topic. Students need learning media that can present material in a visual, concrete, and engaging manner appropriate to their developmental characteristics. Based on these findings, this study developed Digital Pop-Up Books as an innovative learning medium equipped with three-dimensional illustrations, interactive quizzes, audio narration, sound effects, and digital barcode integration (Sapira & Ansori, 2024). This media was designed as a solution to the problems identified during the needs analysis stage and aims to improve understanding of the concepts and learning outcomes of Pancasila Education for elementary school students.

1. Development of Digital Pop-Up Book Learning Media

Based on the needs analysis, Pancasila Education learning in fifth grade still largely uses conventional methods with little use of interactive media. This situation results in low student engagement and suboptimal learning outcomes, particularly in the topic of Norms and Rules. Therefore, Pancasila Education learning requires learning media that can present material in a visual, concrete, and engaging manner, in accordance with their developmental characteristics. Based on these findings, this study developed a Digital Pop-Up Book as an innovative learning medium equipped with three-dimensional illustrations, interactive quizzes, audio narration, sound effects, and digital barcode integration. This media was designed as a solution to the problems identified in the needs analysis stage and aims to improve elementary school students' understanding of Pancasila Education concepts and learning outcomes. The design of this Digital Pop-Up book was developed with the characteristics of fifth-grade students in mind, particularly in the selection of simple language, engaging illustrations, and

easy-to-understand presentation of the material. This media consists of several main parts: (1) digital pop-up book cover, (2) learning objectives, (3) material pages presented in the form of three-dimensional digital pop-up book illustrations, (4) concept maps, (5) audio narration and sound effects, and (6) interactive quizzes as learning evaluations. Each component is designed with ease of use, suitability to student characteristics, and the adequacy of learning materials in mind.

The material presented in this Digital Pop-Up Book focuses on Pancasila Education for fifth grade, especially Norms and Rules. The structure of this book is systematic and contextual. In addition to presenting the material, this media is equipped with interactive quizzes to directly assess student understanding. This innovation makes the Digital Pop-Up Book not only a visual medium but also an interactive, educational, and effective learning tool to improve student learning outcomes (Maulana & Widodo, 2025). This Digital Pop-Up book is designed as an interactive learning medium that combines three-dimensional visual elements with digital technology, enabling access via devices such as cell phones, tablets, laptops, and computers (Desyandri et al., 2024). This media is expected to provide a more engaging and contextually relevant learning experience that aligns with the characteristics of elementary school students (Usman et al., 2024).

The product of this research is a Digital Pop-Up Book learning media on Pancasila Education, a material on Norms and Rules for fifth-grade elementary school students. This media was developed in response to the results of a needs analysis that showed that students needed learning media that was visual, interactive, and able to explain abstract norm concepts concretely (Contrino et al., 2024). This Digital Pop-Up Book features three-dimensional illustrations to help visualise concepts, interactive quizzes to increase engagement and learning, audio narration and sound effects to strengthen understanding, and digital barcode integration that connects students to supporting content on a digital screen. The combination of these features is designed to address students' need for more engaging, context-based learning and to align with the characteristics of elementary school students' cognitive development, thereby supporting increased participation and learning outcomes in Pancasila Education (Tarmidzi et al., 2025).

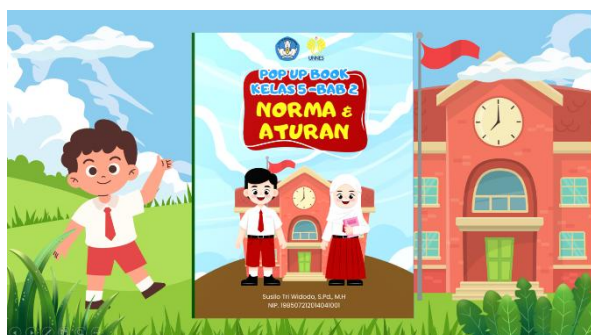


Figure 1. Illustrating Digital Pop-Up Book Cover Page



Figure 2. Illustrating Learning Objectives Page



Figure 3. Illustrating Concept Map Page



Figure 4. Illustrating Norms and Rules Material Page



Figure 5. Illustrating Interactive Quiz Page



Figure 6. Illustrating Developer Profile Page

During the learning process, students participate in learning activities according to a pre-designed scenario, utilizing digital pop-up books as a learning resource. Students are actively engaged through visual observation, audio narration, and interactive quizzes provided within the media, making the learning process more engaging and meaningful (Mulyati & Widodo, 2024).

2. Feasibility of Digital Pop-Up Book Learning Media

The feasibility test results indicate that the Digital Pop-Up Book has high validity and practicality, as perceived by experts and end users. The feasibility test data shown in Table 1 demonstrate adequate scores across all assessment sources.

Table 1. Results of the Feasibility Test and Student and Teacher Responses

No.	Assessment Source	Score (%)	Criteria
1	Media Expert	89%	Very Valid
2	Subject Matter Expert	80%	Valid
3	Student Responses	95%	Very Positive
4	Teacher Responses	90%	Very Positive

The feasibility test results indicate that the Digital Pop-Up Book has high validity and practicality. A score of 89% from media experts indicates that this media meets high design and technical standards, while a score of 80% from subject matter experts confirms the relevance and accuracy of the Pancasila Education content. Student responses reached 95%, indicating strong acceptance of this media, while teacher responses of 90% confirmed that it is practical and easy to use in the learning process.

Several students stated that "this media is interesting and not boring" and "the material is easier to understand because the images move." Furthermore, teacher responses were categorised as very positive, indicating that this media is practical for learning and effective at increasing student engagement. These findings confirm that Digital Pop-Up Books are suitable for use as a learning medium for Pancasila Education in elementary schools.

Based on the teacher questionnaire completed after using the Digital Pop-Up Book media, a 90% score was obtained, indicating a very positive response. The data in the comments column show that teachers assessed this media as able to increase student interest and engagement in learning. Teachers observed that students appeared more enthusiastic, actively engaged in discussions, and motivated to complete the quizzes and activities provided in the media. These findings indicate that the Digital Pop-Up Book is practical and supports the implementation of Pancasila Education in fifth-grade elementary schools.

3. Effectiveness of the Digital Pop-Up Book Learning Media

The effectiveness of the Digital Pop-Up Book learning media was tested to determine the extent to which the media developed improved the learning outcomes of fifth-grade students at Pener 01 Elementary School. Media effectiveness was analysed by comparing student learning outcomes before and after participating in media-based learning. The initial data used in the effectiveness analysis were student pre-test and post-test scores. The pre-test was administered before using the learning media to assess students' initial abilities, while the post-test was administered after learning with the Digital Pop-Up Book to assess changes and improvements in learning outcomes. Comparing these two sets of data

served as the primary basis for assessing the success of the developed media. Prior to hypothesis testing, the pre-test and post-test data were analysed using prerequisite statistical tests, namely the normality and homogeneity tests. The normality test was used to determine whether student learning outcome data were normally distributed, while the homogeneity test was used to assess equality of variances. The results of these prerequisite tests determined the statistical analysis techniques used in subsequent stages to ensure valid and accurate research conclusions.

Table 2. Pre-test and Post-test Normality Test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre-test of learning outcomes	.219	37	.000	.863	37	.000
Posttest of learning outcomes	.210	37	.000	.925	37	.016

Based on the table, the pre-test learning outcomes data has a significance value of 0.000 in the Kolmogorov–Smirnov test ($df = 37$) and in the Shapiro–Wilk test. Both values are below 0.05. Furthermore, the post-test learning outcomes data also show significance in the Kolmogorov–Smirnov test ($p = 0.000$, $df = 37$) and the Shapiro–Wilk test ($p = 0.016$). All significance values are also below 0.05. Thus, according to the decision-making provisions, both the pre-test and post-test data are not normally distributed. These results indicate that further analysis should use nonparametric tests appropriate to the data distribution. Furthermore, the homogeneity test is used to determine whether the data in a study are homogeneous. If the data can be fulfilled and can be carried out at the advanced data analysis stage, if not, there must be a meta-logical correction.

Table 3. Homogeneity Test of Pre-test and Post-test

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1323.919	5	264.784	1.454	.233
Within Groups	5645.000	31	182.097		
Total	6968.919	36			

Based on the ANOVA table for Pre-test Learning Outcomes, the significance value was 0.233, with $F = 1.454$, $df1 = 5$, and $df2 = 31$. The significance value of 0.233 is greater than 0.05, so the pre-test data variance can be declared homogeneous. Thus, the pre-test data meet the assumption of homogeneity of variance and is considered worthy of further analysis using parametric statistical techniques. After the pre-test and post-test score data are found to be normally distributed based on the normality test, the next step is to conduct a parametric t-test to assess the mean difference. This test is used to determine whether there is a significant difference between pre-test and post-test scores after students learn using the media. Through this average difference analysis, the level of effectiveness of the Pop-Up Book Digital learning media in improving the learning outcomes of fifth-grade students at Pener 01 Elementary School can be measured. The t-test formula is used to obtain the calculated t value, which is then compared with the t table to support decision-making regarding the increase in learning outcomes after using the media.

Table 4. T-test

		T	Df	Sig. (2-tailed)
Pair 1	Learning Outcome Pre-test - Learning Outcome Post-test	-13.549	36	.000

The Sig. (2-tailed) value is 0.000, which means the significance value is much smaller than 0.05. Using the basis of decision making that the difference is considered significant if the Sig. (2-tailed) value < 0.05 , then this result indicates a significant difference between the pre-test and post-test scores. This means that the intervention implemented in learning has been proven to have a real impact on improving student learning outcomes. This finding indicates that the learning efforts used are able to create a more effective learning experience and encourage significant improvements in student learning

outcomes. In addition, the level of improvement in student learning outcomes was analyzed using the N-Gain test to determine the category of improvement resulting from the use of media. The results of the calculation of the increase in scores were then classified based on predetermined criteria. After the pre-test and post-test scores were processed using the N-gain calculation. The summary of the average scores is as follows

Table 5. Results of the Average Gain Test (N-gain)

Average Pre-test Score	Average Post-test Score	Maximum Score	N-Gain	Category
55.4	86.8	100	0.70	High

Based on the N-Gain calculation, the average increase between the pre-test and post-test scores was 0.70, which falls within the high category. The line graph depicting the change in scores shows an average increase from 55.4 in the pre-test to 86.8 in the post-test, with a difference in increase of 31.4 points. Thus, student learning outcomes increased by approximately 56.7% after using the Digital Pop-Up Book Learning media. This increase, which is included in the high category, indicates that the Digital Pop-Up Book media in the Pancasila Education subject is effective in strengthening conceptual understanding and improving the learning outcomes of fifth-grade students at Pener 01 Elementary School

Discussion

The development of Digital Pop-Up Books for Pancasila Education demonstrates a significant contribution to the advancement of pedagogical design and learning innovation (Du et al., 2023). This medium introduces a concrete visualization approach and digital interactivity that enables students to understand abstract values and norms in a more tangible and engaging way. Conceptually, this medium expands teaching strategies by integrating cognitive, sensory, and affective aspects in a single medium. Practically, the integration of three-dimensional illustrations, audio narration, sound effects, interactive quizzes, and digital access via barcodes increases student engagement, learning motivation, and teacher effectiveness in delivering material.

This research confirms that digital media innovation not only overcomes the limitations of conventional methods but also enriches learning design and pedagogical practices in the field of Pancasila Education. The development of Digital Pop-Up Books for Pancasila Education demonstrates a significant contribution to the advancement of pedagogical design and learning innovation. This medium introduces a concrete visualisation approach and digital interactivity that enable students to understand abstract values and norms in a more tangible and engaging way (Listanto et al., 2025).

The improved learning outcomes achieved through the use of Digital Pop-Up Books can be explained by several mechanisms that support student cognitive engagement. First, three-dimensional visualizations help students conceptualize abstract Pancasila Education material into concrete representations. This not only clarifies concepts but also reduces cognitive load, thus facilitating deeper understanding. Second, interactivity through quizzes, digital navigation, and pop-up elements encourages students to think actively, make decisions, and reflect on their understanding directly. This process stimulates student participatory engagement, so they don't just passively receive information but also construct knowledge through interactive learning experiences (Nafis & Nuryanto, 2025). Third, integrating visual illustrations with audio narration, where information is processed through both visual and auditory channels simultaneously, improves memory retention and conceptual understanding, as students can connect visual representations with verbal explanations (Amelia & Sukasih, 2025).

The findings of this study align with various previous studies that have confirmed the effectiveness of interactive digital learning media in improving the quality and outcomes of student learning. In line with the findings of Darmawan et al. (2024), who emphasized that interactive digital learning media can improve learning quality and student interest. The main similarity lies in the use of visual and interactive digital media. Meanwhile, this research differs in that it focuses on Pancasila Education materials for grade V, presented concisely, contextually, and with interactive three-dimensional illustrations, thereby transforming abstract concepts into concrete representations that are easy for students to understand. In addition, the integration of interactive quizzes, audio narration, and digital access via barcodes expands the mechanism of cognitive engagement, which has not been widely

applied in previous studies that tend to emphasize digital media for general subjects or science. Thus, despite similarities in the effectiveness of digital media in general, this study expands the contribution by presenting a specific, interactive, and contextual media design for Pancasila Education, while also demonstrating how visual, audio, and interactivity elements can be integrated to improve learning outcomes (Rosmiati et al., 2024). The results of this study indicate that the use of Digital Pop-Up Books is effective in improving learning outcomes in Pancasila Education.

However, beyond simply corroborating previous empirical findings, this study's results have broader implications. From an education policy perspective, these findings support the need for institutional support for the development and utilization of innovative digital learning media, particularly in values-based subjects such as Pancasila Education. In the context of curriculum design, the use of Digital Pop-Up Books demonstrates that Pancasila Education materials can be designed in a more contextual, visual, and student-centered (Hastomo, 2024). Meanwhile, from a teacher professional development perspective, this study emphasizes the importance of improving teacher competency in designing and implementing interactive digital media so that learning is no longer verbalistic but rather able to encourage student cognitive engagement (Li et al., 2024). This focus not only on the development of learning media but also on strengthening pedagogical practices and basic education policies that are adaptive to technological developments. This alignment of results reinforces the finding that integrating digital media into Pancasila Education learning is an appropriate strategy for addressing the challenges of 21st-century learning (Usmi & Samsuri, 2022).

The development of the Digital Pop-Up Book media in this study has unique characteristics compared to previous research, particularly in the Pancasila Education content for fifth grade, which is presented concisely, visually, and contextually (Khoiruddin et al., 2023). The findings of this study indicate that the Digital Pop-Up Book is effective in improving learning outcomes in Pancasila Education because it combines concrete visualizations, interactivity, and audio support that are appropriate to the characteristics of elementary school students.

However, the main difference in this study lies in the context of Pancasila Education, specifically the material on norms and rules, which requires an understanding of values and behavior, not simply mastery of factual concepts. Therefore, this study expands on previous findings by demonstrating that Digital Pop-Up Books are not only effective in science or language subjects but are also relevant for meaningful learning. Each finding in this study directly addresses the research objectives. The high level of student engagement and positive user responses indicate that the media design successfully meets the learning needs identified during the analysis phase, namely the need for engaging and interactive media (Saputra et al., 2025).

Thus, this study aims to develop, test the feasibility, and assess the effectiveness of Digital Pop-Up Books as a learning medium for Pancasila Education for fifth-grade students, and the findings clearly align with these objectives. From a development perspective, this media was successfully designed with three-dimensional illustrations, interactive quizzes, audio narration, sound effects, and digital barcode integration, which facilitate the understanding of abstract concepts related to Norms and Rules according to students' cognitive and psychosocial characteristics. In terms of feasibility, the test showed high scores from media experts, subject matter experts, student responses, and teacher responses confirming that this media is valid and positively received. Meanwhile, the effectiveness of the media is evident in a significant increase in learning outcomes, with an average N-Gain of 0.70, which falls within the high category. This increase can be explained by the mechanism of cognitive engagement: three-dimensional visualisation transforms abstract material into concrete representations; the interactivity of quizzes and digital navigation encourages active thinking and reflection; and the integration of illustrations and audio narration (Alshammary & Alhalafawy, 2023). These findings indicate that the Digital Pop-Up Book not only overcomes the limitations of conventional methods but also systematically supports the achievement of research objectives, while providing conceptual and practical contributions to pedagogical design, learning innovation, and the development of digital literacy of elementary school students, especially in Pancasila Education learning (Pangestu et al., 2024).

Conclusion

The development of Digital Pop-Up Books has had a significant impact on improving student

learning outcomes in Pancasila Education. This medium helps enhance conceptual clarity by presenting abstract material, such as norms and rules, through three-dimensional illustrations, pop-up animations, and contextual visual representations, enabling students to grasp concepts more concretely. Furthermore, this medium enhances cognitive engagement through quiz interactivity, digital navigation, and audio integration, encouraging students to think actively, make decisions, and reflect on their understanding directly. This impact is also evident in the improved quality of the learning process, as this medium increases student enthusiasm during learning activities. The study showed that student responses reached 95% (very positive), while teacher responses reached 90% (very positive), indicating strong acceptance and perceived usefulness of the medium in classroom practice. Expert validation also supported the product's feasibility, with media experts rating it 89% (very valid) and subject matter experts rating it 80% (valid), confirming that both the technical design and content accuracy meet teaching standards. Quantitatively, the effectiveness of this media is demonstrated by an increase in pretest-posttest scores and an N-Gain value of 0.70, which is considered high. Thus, the Digital Pop-Up Book can improve learning outcomes through a combination of conceptual clarity, cognitive engagement, and the quality of the learning process, while also confirming its contribution as an effective learning media innovation for Pancasila Education.

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