

The Development of a Digital Picture Storybook Containing Pancasila Values to Improve the Understanding and Character of Mutual Cooperation in Fourth Grade Elementary School Students

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Abstract: This research aims to: (1) develop a feasible digital picture storybook based on Pancasila values to improve the understanding and mutual cooperation character of fourth-grade elementary school students; (2) examine the practicality of the developed digital picture storybook; and (3) determine its effectiveness in improving students' understanding and mutual cooperation character. This research and development employed Analysis, Design, Development, Implementation, and Evaluation (ADDIE). The feasibility test was conducted by three expert validators, including learning material and learning media experts. A one-to-one trial involved six fourth-grade students at State Elementary School 222 Palembang. A small group trial was conducted with 12 students at SD Negeri 225 Palembang, while a field trial involved 24 students at State Elementary School 226 Palembang. The effectiveness test was carried out through a quasi-experimental design during the implementation stage, involving an experimental class at State Elementary School 224 Palembang and a control class at State Elementary School 223 Palembang. Data were analyzed qualitatively and quantitatively based on expert and user responses. Several prerequisite tests were conducted, including normality, homogeneity, independent-samples t-test, N-gain score, and multivariate analysis of variance (MANOVA). The results indicate that: (1) the digital picture storybook is feasible based on expert validation; (2) it is practical according to teachers' and students' responses; and (3) it is effective in improving students' understanding and mutual cooperation character after its implementation.

Keywords: Digital Picture Storybook; Fourth-Grade Students; Mutual Cooperation Character; Pancasila Values; Students' Understanding

1. Introduction

Education plays a fundamental role in developing human potential and shaping individuals' character. According to Law No. 20 of 2003 concerning the National Education System, education is a conscious and planned effort to create a learning atmosphere and learning process that enables students to actively develop their potential, including spiritual strength, self-control, personality, intelligence, noble character, and skills needed for themselves, society, and the nation. Education is also understood as a lifelong learning process that occurs in various environments and influences individual development (Ahmadi, 2014). Therefore, education is not only aimed at developing cognitive competence but also at forming character and moral values in students.

At the elementary school level, education is intended to develop students' basic abilities and shape individuals with character based on Pancasila values (Susanto, 2013). In the Merdeka Curriculum, as regulated in the Regulation of the Minister of Primary and Secondary Education No. 13 of 2025, Pancasila Education is one of the compulsory subjects in elementary schools. This subject plays a strategic role in forming students' character as Indonesian citizens who understand their rights and responsibilities and demonstrate attitudes consistent with the noble values of Pancasila. In addition, the curriculum emphasizes the development of the Pancasila

Student Profile, which includes faith in God, global diversity, mutual cooperation, independence, critical thinking, and creativity. Thus, learning in elementary schools is expected not only to focus on cognitive aspects but also to foster students' character and personality.

Pancasila Education plays an essential role in shaping students' moral values and civic competencies. The learning process aims to develop civic knowledge, civic skills, and civic disposition, enabling students to become responsible and participatory citizens (Lubis, 2020). However, in practice, Pancasila Education learning often emphasizes theoretical understanding rather than meaningful internalization of values. As a result, students may understand the concepts of Pancasila but experience difficulties in applying these values in their daily lives.

1.1. Problem Statement

Despite the importance of Pancasila Education in developing students' character, several challenges are still found in its implementation. Field observations conducted in five elementary schools in Plaju District, Palembang (State Elementary School 222 Palembang, State Elementary School 223 Palembang, State Elementary School 224 Palembang, State Elementary School 225 Palembang, and State Elementary School 226 Palembang) revealed that students tend to understand Pancasila Education material only theoretically and experience difficulties in providing examples or applying Pancasila values in their daily lives. Students also show limited participation in group discussions and demonstrate decreasing attitudes of mutual cooperation due to individualistic tendencies and less collaborative learning activities.

In addition, the learning resources used in schools are mostly textual textbooks that are less engaging and interactive for students. As a result, Pancasila Education learning often emphasizes memorization rather than meaningful understanding of values. The results of a needs analysis also showed that teachers require more engaging learning media to support learning. Many teachers have begun integrating technology into learning and expressed the need for additional learning resources such as interactive picture storybooks integrated with digital technology. Similarly, students show high interest in reading picture storybooks and learning through digital media. However, many students still experience difficulties in understanding the implementation of Pancasila values in everyday life.

1.2. Related Research

A study conducted by Putri et al. (2023) recommended the development of digital picture storybooks and found that digital picture storybooks designed to improve speaking skills are highly feasible to be used as learning media that can help enhance students' speaking abilities. This study is similar because both studies produce digital picture storybooks and aim to develop character values. However, the difference lies in the research focus. The previous study focused on third-grade elementary school students, whereas this study focuses on fourth-grade elementary school students. A similar study was conducted by Ummah et al. (2025), which found that the use of digital picture storybook media is highly recommended as an innovative learning medium in elementary schools, particularly to increase the learning interest of fourth-grade students. The similarity between the studies lies in the development of digital picture storybooks to foster the character development of fourth-grade students. A notable difference is the research location. The previous study was conducted in Cirebon, while this study is conducted in Palembang City.

Research conducted by Syafitri (2024) concluded that digital picture storybooks have a significant effect on elementary school students' reading comprehension skills, with post-test results reaching 60 compared to the pre-test score of 37.53. The similarity between the studies lies in the fact that both were conducted at the elementary school level to improve students' understanding. The difference lies in the subject focus. The previous research focused on Indonesian language learning, while this study focuses on Pancasila Education. This study and development research shows both similarities and differences compared to the previous studies mentioned above. The similarity lies in the use of picture storybooks, the focus on fourth-grade students, and the collaborative learning approach. The differences from previous studies are related to the research location, subject focus, participants, and the intended objectives. This study highlights not only the development of the product but also the validity, practicality, and effectiveness of the product. The developed product offers advantages such as visually appealing illustrations, bright color compositions, and flexible usage.

Based on previous research findings, digital picture storybooks have proven to be effective in improving students' comprehension and learning interest. However, only a limited number of studies have integrated Pancasila values contextually into the learning media. Therefore, this study offers a novelty in the development of learning media that integrates Pancasila values in elementary schools.

1.3. Research Objectives

The focus of this research is also directed toward the development of learning media in the form of a digital picture storybook containing Pancasila values, which aims to improve students' understanding and mutual cooperation character. This limitation is intended to ensure that the research remains focused and does not expand into other aspects beyond the main objectives that have been previously determined. Based on the research problems described above, the objectives of this development are as follows:

- a. To produce a feasible digital picture storybook based on Pancasila values material to improve the understanding and mutual cooperation character of fourth-grade elementary school students.
- b. To determine the practicality of the digital picture storybook based on Pancasila values material in improving the understanding and mutual cooperation character of fourth-grade elementary school students.
- c. To determine the effectiveness of the digital picture storybook based on Pancasila values material in improving the understanding and mutual cooperation character of fourth-grade elementary school students.

2. Theoretical Framework

2.1. Digital Picture Storybooks

Ngura (2022) defines a picture storybook as a book presented using text and illustrated images that are usually intended for children. These two elements work together to produce a story supported by visual illustrations. The images in the book contain narrative elements; they are used to concretize characters and the storyline, serve as a means to support children's comprehension and imagination of the still-limited textual narrative, and help enrich children's imagination (Nurgiyantoro, 2017). A picture storybook is a work that combines illustrations and written text, in which the illustrations are equally important, or even more important, than the words in the story text (Daryanto, 2013). Furthermore, (Apriliani & Radia, 2020) state that picture storybooks should contain engaging content and storylines so that they are appealing to children.

Similarly, Jean Piaget (in Nurgiyanto, 2015) explains that at the fourth stage, the Formal Operational Stage (11–12 years old), storybooks that present problems can encourage

children to search for and discover cause-and-effect relationships and understand their implications for the characters. Understanding children's intellectual abilities will help in selecting reading materials that are appropriate for their age and cognitive development. Adisa (2024) also states that through storybooks, children can learn moral values, develop empathy, solve problems, and engage in reflection and discussion that strengthen their understanding of morality.

The perspectives mentioned above indicate that picture storybooks are works that combine text and illustrations in a balanced manner, where images not only clarify the text but also play an important role in enriching imagination, explaining abstract concepts, and attracting children's interest. This type of book functions not only as a form of entertainment but also as a learning medium that aligns with children's stages of cognitive development, particularly during the formal operational stage when children begin to understand cause-and-effect relationships in stories. In addition, picture storybooks help children learn moral values, develop empathy, practice problem-solving skills, and encourage reflection and discussion that strengthen their understanding of morality. Therefore, picture storybooks have a dual function: as a medium of visual literacy and as a tool for children's character education.

2.2. Digital Learning Media

Digital learning media utilize digital technology to enrich and improve the quality of the teaching and learning process. These media involve the use of hardware and software, such as computers, tablets, mobile devices, as well as digital learning applications and platforms (Nurhayati et al., 2024). The use of digital learning media enables the delivery of engaging materials filled with new ideas through the use of interactive multimedia elements, such as text, images, audio, video, and other interactive components, thereby improving students' understanding and information retention (Novela et al., 2024). Digital media refers to any form of media that uses electronic devices for its distribution. Digital media can be created, viewed, modified, and distributed through electronic devices (Taufiq et al., 2023).

Furthermore, learning media can be defined as learning aids, namely anything that can be used to stimulate students' thoughts, emotions, attention, skills, or abilities in order to enhance the learning process (Putri et al., 2022). Digital media are media whose content consists of a combination of data, text, sound, and various types of images stored in digital formats and distributed through networks such as broadband fiber-optic cables, satellites, and microwave systems (Fatira et al., 2021).

In addition, the use of digital learning media can provide richer and more varied learning experiences and allows greater flexibility in the teaching and learning process (Otta, 2024). It can therefore be concluded that digital learning media are learning tools that utilize electronic devices and multimedia technology to enrich the learning experience. Their use enables the presentation of materials in a more interactive, engaging, and varied manner through text, images, audio, video, and other interactive elements. Thus, digital media function not only as tools for delivering information but also as means to stimulate students' thinking, emotions, attention, and skills. Besides improving comprehension and information retention, digital media also provide flexibility in the teaching and learning process, thereby creating a more effective, creative, and learner-centered learning experience.

2.3. Students' Understanding

Understanding is a behavior that reflects students' ability to grasp the meaning of a concept and connect knowledge with their experiences (Sudjana, 2010). Understanding is the ability to translate, interpret, conclude, or extrapolate concepts using one's own words or other selected symbols (Ayuwardani, 2023). Understanding of learning material is a behavior that demonstrates students' ability to comprehend the meaning of a concept and construct their own knowledge (Sanjaya, 2013). Bloom's taxonomy, as cited in Lactona and Cahyono (2024), defines understanding as the ability to construct meaning or interpret learning messages, including those conveyed through speech, writing, and images. In brief, understanding includes the ability to interpret, explain, and summarize learning materials. Understanding is an

internal process indicating that students are able to restate the material they have received in their own words and apply it in different situations (Susanto, 2013)

Essentially, understanding is a cognitive ability demonstrated by students in grasping the meaning of a concept, interpreting, translating, concluding, and connecting it with their experiences. Understanding also includes the ability to explain learning material in one's own words, construct meaning from learning messages delivered orally, in written form, or visually, and apply them in different contexts. Therefore, understanding is not limited to remembering information, but rather involves the ability to construct knowledge, interpret it deeply, and use it appropriately in real-life situations. The indicators of students' knowledge and understanding of a concept can be measured in four ways (Hikmah & Vioeza, 2023), namely: (1) defining the concept, (2) identifying the characteristics of the concept, (3) connecting the concept with other related concepts, and (4) identifying or providing examples of concepts that have not previously been encountered.

2.4. Mutual Cooperation

The term *gotong royong* originates from the Javanese language, where it is synonymous with the terms *pikul* or *naik*. The word *royong* is synonymous with "together." Thus, *gotong royong* is a distinctive characteristic of Indonesian society and is reflected in the third principle of Pancasila, "The Unity of Indonesia." The value of *gotong royong* refers to a concept that emphasizes cooperation, togetherness, and mutual assistance in daily life to accomplish tasks and achieve the common good (Anne et al., 2023). *Gotong royong* is an activity carried out to achieve higher aspirations and provides opportunities for individuals to help one another in fulfilling their responsibilities within collective life (Syofyan, 2023). It is also defined as a cooperative activity carried out together for the benefit of the public (Arief et al., 2023). *Gotong royong* represents a cultural value that emerges from social interactions among members of society and becomes a necessity for individuals as well as communities (Serungke et al., 2023).

Amaliyah and Fatimah (2023) explain that in the context of the Pancasila Student Profile, the concept of *gotong royong* reflects core values such as solidarity, collaboration, togetherness, and social responsibility. *Gotong royong* is a form of social solidarity that is formed through mutual assistance for both personal and collective interests, in which there is loyalty among members of the community as a unified entity (Arief et al., 2023). Furthermore, *gotong royong* is interpreted as an individual's ability to work together voluntarily toward a shared goal so that activities can be carried out smoothly, easily, and efficiently (Widya et al., 2023). In the academic manuscript on Deep Learning published by the Ministry of Primary and Secondary Education of the Republic of Indonesia (2025), the character of *gotong royong* or collaboration is included as one of the eight dimensions of the Pancasila Student Profile. In this competence, "individuals are able to collaborate effectively with others through mutual cooperation to achieve shared goals by sharing roles and responsibilities" (Kementerian Pendidikan Dasar dan Menengah Republik Indonesia, 2025)

Gotong royong is a form of togetherness that arises from mutual assistance for both personal and public interests, in which loyalty among community members as a unified group is present (Haryati, 2022). This is reinforced by Triyanto et al. (2025) state that *gotong royong* plays an important role in education and learning because it teaches students to help one another, collaborate, and share resources in order to achieve common goals. Furthermore, Munawwaroh (2020) explains that *gotong royong* is the ability of individuals to carry out activities together voluntarily so that shared goals can be achieved smoothly, easily, and efficiently. From the explanations above, it can be concluded that *gotong royong* is a noble value that characterizes Indonesian society and originates from traditions of togetherness and social solidarity. This principle reflects the willingness to help one another, work collectively, and share responsibilities to achieve common goals. Within the framework of Pancasila, *gotong royong* represents the manifestation of the third principle, The Unity of Indonesia, which emphasizes the importance of solidarity and social concern in interactions among members of society.

In the field of education, particularly within the context of the Pancasila Student Profile, *gotong royong* reflects students' ability to collaborate effectively, appreciate each other's roles, and build a sense of collective responsibility. Thus, *gotong royong* is not merely an activity but also a foundational national character that supports the development of solidarity, loyalty, and care for others in achieving the common good. (Atmojo et al., 2024) explain several indicators of the *gotong royong* character, including: a) collaboration and cooperation among students, reflected in positive actions such as helping and supporting one another; b) caring, which is a key aspect that students need to possess in order to implement the value of *gotong royong*; c) sharing, which involves both giving and receiving things that are important for individual and collective life, as well as the willingness and ability to live together while prioritizing the responsible and healthy use of shared resources and spaces within society.

3. Method

3.1. Research Design

This study focuses on research and development, specifically the development of a digital picture storybook containing Pancasila values to improve the understanding of fourth-grade elementary school students. This development methodology is not intended to validate a theory but rather to create and authenticate a product. The researcher decided to use the ADDIE research model (Branch, 2009). The selection of this model was based on a comprehensive consideration of its implementation stages, characteristics, as well as its strengths and weaknesses.

The ADDIE model helps the researcher examine how the product is used in the classroom and its impact on students, as the researcher aims to observe the level of students' understanding. This model selection is supported by Rhamayanti (2025), who states that the use of the ADDIE model in the development of learning media produces significant results in improving students' motivation, learning outcomes, and understanding. The ADDIE model consists of five stages: analysis, design, development, implementation, and evaluation. This model provides researchers with the opportunity to develop and test the product, and in the evaluation stage, it enables them to assess the validity, practicality, and effectiveness of the product comprehensively.

3.2. Respondents

The population of this study consisted of fourth-grade elementary school students and their homeroom teachers from five schools in Plaju District, Palembang. The sample comprised 60 students, with 30 assigned to the control class and 30 to the experimental class, selected through purposive sampling. The selection was based on the availability of supporting facilities, such as smart TVs and computer laboratories, as well as recommendations from the school principals. For the product trials, participants were organized into three stages: a one-to-one trial (6 students and 1 teacher), a small group trial (12 students and 1 teacher), and a field trial (24 students and 1 teacher). Student selection at these stages was based on varying levels of prior knowledge—low, moderate, and high—as indicated by their daily test results.

3.3. Data Collection

Data in this study were collected using several techniques, namely interviews (Table 1 and 2), observations (Table 3), questionnaires (Table 4, 5 and 6), and tests (Table 7). The data obtained were collected using data collection instruments. Validity, practicality, and effectiveness in the product development process are the three criteria used to measure the quality of the final product.

Table 1. Interview Guide Grid for Teachers

No.	Aspect	Indicator	Item Number	Number of Items
1	Picture Storybooks Used in	• Availability of engaging picture storybooks at school	1,2,3,4	4

2	Learning within the Merdeka Curriculum	• Picture storybooks that support learning in the implementation of the Merdeka Curriculum	5,6	2
	Overview of Education in Schools	• Description of the learning process in schools • Learning facilities that support digital-based learning		
3	Teachers' Perceptions of Students' Understanding and mutual cooperation	• Description of students' understanding and mutual cooperation • Facilities that support students' understanding and mutual cooperation	7,8,9,10	4
Total				10

Table 2. Student Interview Guide Grid

No.	Aspect	Indicator	Item Number	Number of Items
1	Learning Preparation	• Activities before learning • Enthusiasm in participating in the learning process	1,2,3	3
2	Learning Process in the Classroom	• Digital picture storybooks that have been used during learning • Classroom learning conditions	4,5,6,7	4
3	Need for Digital Picture Storybooks	• Digital picture storybooks preferred by students	8,9,10	3
Total				10

Table 3. Observation Grid of the Learning Process

No.	Aspect	Indicator	Item Number	Number of Items
1	Introduction	• Teacher's preparation for teaching	1,2	2
2	Learning Process	• Teaching and learning process	3,4,5,6	4
3	Closing of Learning	• Activities in closing the lesson	7	1
Total				7

Table 4. Teacher and Student Needs Analysis Questionnaire Grid

No.	Aspect	Indicator	Item Number	Number of Items
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1	Availability of Digital Picture Storybooks for Students	• Availability of picture storybooks in school • Digital picture storybooks to support students' understanding	1,2,3,4,5,6	6
2	Students' Understanding and mutual cooperation	• Learning processes that enable students to relate the material to daily life • Learning processes that help students understand Pancasila and mutual cooperation Education conceptually • Facilities that support students in understanding the material	7,8,9,10	4
Total				7

Table 5. Teacher and Student Response Questionnaire Grid

No.	Aspect	Indicator	Item Number	Number of Items
1	Display of the Digital Picture Storybook	• Size • Cover • Images • Font • Language	1,2,3,4,5,6,7,8,9,10,11,12	12
2	Presentation of the Digital Picture Storybook	• Easy to understand • Interesting storybook • Ease of application/use	13,14,15,16,17,18,19	7
3	Benefits of the Digital Picture Storybook	• Improving students' understanding and the character of gotong royong	20	1
Total				20

Table 6. Grid of the Mutual Cooperation Questionnaire

No.	Aspect	Indicator	Item Number	Number of Items
1	Collaboration	• Cooperation • Communication • Positive interdependence	1,2,3,4,5	5
2	Caring	• Social coordination • Responsiveness to the social environment • Social perception	6,7,8	3

3	Sharing	• Giving and receiving things considered important or valuable	9,10	2
Total				10

Table 7. Student Understanding Assessment Grid

No.	Aspect	Indicator	Item Number	Number of Items
1	Translating	• Able to present reasons or a coherent explanation of a concept	1,2,3,4,5	5
2	Interpreting	• Able to explain the material in their own words	6,7,8,9,10	5
3	Extrapolating	• Enhances students' understanding	11,12,13,14,15	5
Total				15

3.4. Data Analysis

This study used research and development with qualitative and quantitative data analysis. Qualitative analysis was conducted during the needs analysis stage, based on data obtained from observations and interviews, to identify problems and determine the requirements for product development. Quantitative analysis was used to evaluate product feasibility, practicality, and effectiveness, as well as to test the research hypotheses. The analysis began with prerequisite tests, including normality and homogeneity tests, to ensure that the data met the assumptions for parametric testing. Subsequently, an independent samples t-test was conducted to examine differences between the control and experimental groups for each variable. Finally, MANOVA was performed to analyze the simultaneous effect of the treatment on students' understanding and the character of gotong royong.

In addition, descriptive statistics were used to support the interpretation of the data, particularly in analyzing validation results, practicality, and questionnaire responses. A four-point Likert scale was used to quantify qualitative judgments, and the percentage of each item was calculated for analysis. During the development stage, prior to wider implementation, three trial phases were conducted: one-to-one, small group, and field trials. These stages were intended to evaluate the feasibility, practicality, and effectiveness of the developed product. The product developed in this study was a digital picture storybook containing Pancasila values.

3.5. Validity and Reliability

In development research, validation is conducted by experts in their respective fields, including instrument validation, expert validation, and content validation. In this study, reliability refers to the consistency of the product when used in different implementation stages rather than to the statistical reliability of a questionnaire or test. The consistency of product use was examined through three stages of formative evaluation: one-to-one evaluation involving six students and one teacher, small-group evaluation involving twelve students and one teacher, and a field trial involving twenty-four students and one teacher. These stages were conducted to ensure that the digital picture storybook could be used consistently, that students were able to follow the storyline, understand the Pancasila values presented, and complete the learning activities effectively. Thus, the validation process and the consistency of product implementation ensure that the digital picture storybook is aligned with the intended learning objectives and can be applied consistently in the learning process.

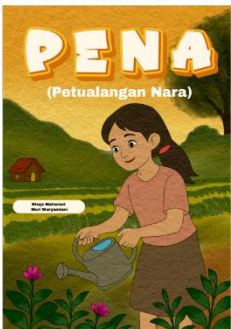
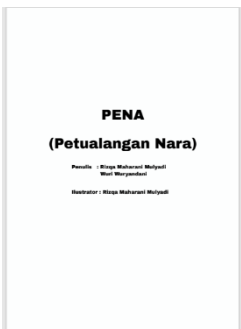
4. Findings

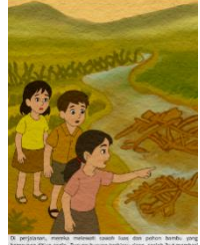
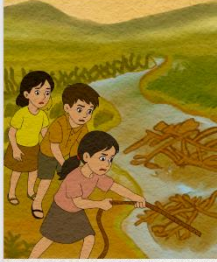
The result of this development is a Pancasila-based digital picture storybook entitled PENA, an acronym for *Petualangan Nara* (Nara's Adventure). This study aims to demonstrate the feasibility and effectiveness of the Pancasila-based digital picture storybook for the learning process of fourth-grade elementary school students in the Pancasila education subject.

4.1. Digital Picture Storybook Product

The digital picture storybook is designed attractively with engaging illustrations, storyline, characters, and conflicts, so that children feel immersed in the story. The following Table 8 shows the appearance of the Pancasila-based digital picture storybook, which is intended to help facilitate students' learning through appealing visuals.

Table 8. Appearance of the Digital Picture Storybook

No.	Page Section	Appearance
1.	Cover Page	
2.	Cover Page (Explanation)	
3.	Foreword	

No. Page Number	Appearance
4. Introduction	
5. Opening	  Di situ ada desa kecil bernama Bontomatene, sebuah kampung di perbatasan antara dua negeri.  Nara juga mengajarnya apa yang harus dilakukan di rumah. Ia membawa Pak Darto membantu Nara, dan menolong dia ketika Nara merasa takut di tengah hutan.
6. Problem Emergence	  Suatu pagi, Nara melihat air sumur di tengah desa menjadi keruh dan berbau. Nara mulai merasa bahwa itu tidak seperti sumur air bersih.  Ia berdiri di pinggir dan bertanya kepada kakaknya. Kakak menjawab bahwa itu adalah pertanda bahwa desa itu akan mengalami bencana.
7. Sequence of Events	  Mereka pergi. Nara mengajarnya apa yang harus dilakukan di rumah. Ia membawa Pak Darto membantu Nara, dan menolong dia ketika Nara merasa takut di tengah hutan.  Ia berdiri di pinggir dan bertanya kepada kakaknya. Kakak menjawab bahwa itu adalah pertanda bahwa desa itu akan mengalami bencana.  Di pinggir, Nara melihat air sumur di tengah desa menjadi keruh dan berbau. Nara mulai merasa bahwa itu tidak seperti sumur air bersih.  Mereka pergi. Nara mengajarnya apa yang harus dilakukan di rumah. Ia membawa Pak Darto membantu Nara, dan menolong dia ketika Nara merasa takut di tengah hutan.  Ia berdiri di pinggir dan bertanya kepada kakaknya. Kakak menjawab bahwa itu adalah pertanda bahwa desa itu akan mengalami bencana.  Di pinggir, Nara melihat air sumur di tengah desa menjadi keruh dan berbau. Nara mulai merasa bahwa itu tidak seperti sumur air bersih.

[illegible]

No.	Page Section	Appearance
11.	Biography	BIODATA 

4.2. Feasibility Validation

The feasibility of the digital picture storybook was assessed by experts in instruments, media, and content. The results of their evaluations are summarized in the Table 9 below, showing the level of feasibility for each aspect of the book, including story content, illustrations, language, and supporting activities.

Table 9. Feasibility Validation

	Feasibility Validation	Description
Instrument Expert	3.8	Very feasible
Content Expert	3.4	Very feasible
Media Expert	3.4	Very feasible

4.3. Practicality Validation

The practicality of the digital picture storybook was evaluated based on observations and feedback from teachers and students during the trial stages. The results are presented in the Table 10 below, indicating how easily the book can be used in the learning process, how accessible the content is, and the overall convenience for both teachers and students.

Table 10. Practicality Validation

	Practicality Validation		Description
One to one trial	Teacher	3.8	Very practical
	Students	3.4	
Small group trial	Teacher	3.9	Very practical
	Students	3.6	
Field Trial	Teacher	4	Very practical
	Students	3.8	

4.4. Effectiveness of the Digital Picture Storybook

The effectiveness of the product was evaluated based on the improvement in students' understanding and the development of the gotong royong character. The implementation took place from January 28 to February 24, 2026. This stage involved two schools: SDN 223 Palembang as the control class, using the school's regular textbooks, and SDN 224 Palembang as the experimental class, using the PENA (Petualangan Nara) digital picture storybook. Both

the control and experimental classes received six learning sessions, with pretests and posttests administered. The selection of the experimental and control classes was done through purposive sampling, ensuring that both classes were comparable.

4.4.1. Analysis of Product Effectiveness on Student Understanding

The implementation data of the development product to assess students' understanding consisted of pretest and posttest scores. Implementation data were used to measure the effectiveness of the developed product in improving students' understanding. Product effectiveness can be seen from the increase in pretest and posttest scores as well as the rise in average scores. The data analysis for this study used parametric statistics, beginning with a normality test using Shapiro-Wilk (Table 11), a homogeneity test (Table 12), t-test (Table 13), and N-Gain score analysis (Table 14). All data were analyzed using SPSS version 25.

Table 11. Results of the Normality Test for Students' Understanding

Tests of Normality							
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Class	Statistic	Df	Sig.	Statistic	Df	Sig.
Score	Control pretest	.145	30	.108	.955	30	.226
	Experimental pretest	.159	30	.051	.952	30	.191
	Control posttest	.159	30	.052	.931	30	.052
	Experimental posttest	.145	30	.106	.954	30	.219

Based on the Shapiro-Wilk test above, the control group had a sig. value of 0.226 for the pretest and 0.052 for the posttest, both higher than 0.05. The experimental group also showed values above 0.05 (0.191 pretest and 0.219 posttest). Thus, it can be assumed that all data are normally distributed, allowing for parametric tests to be conducted

Table 12. Results of the Homogeneity Test for Students' Understanding

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Pretest	Based on Mean	.036	1	58	.851
	Based on Median	.021	1	58	.885
	Based on Median and with adjusted df	.021	1	57.984	.885
	Based on trimmed mean	.037	1	58	.848
Posttest	Based on Mean	1.250	1	58	.737
	Based on Median	1.246	1	58	.807
	Based on Median and with adjusted df	1.246	1	54.833	.808
	Based on trimmed mean	1.345	1	58	.707

The significance values of the homogeneity test show 0.851 for the pretest and 0.737 for the posttest. Since both values are greater than 0.05, the pretest and posttest data for the control and experimental classes are considered homogeneous.

An Independent t-test was used to evaluate the differences in scores before conducting the MANOVA test. The hypotheses were formulated as follows:

H0: There is no increase in students' understanding using the Pancasila-based digital picture storybook compared to students who do not use it.

Ha: There is an increase in students' understanding using the Pancasila-based digital picture storybook compared to students who do not use it.

The criteria: a significance value > 0.05 indicates acceptance of H_0 and rejection of H_a , while a value < 0.05 indicates rejection of H_0 and acceptance of H_a .

Table 13. Results of the Independent Samples t-Test for Students' Understanding

Data	Class	Df	Sig. (2-tailed)	Description
Understanding	Control	58	$p < .001$	Ha accepted and H_0 rejected (have different)
	Experiment			

Based on the results above, the independent t-test shows that the significance value for students' understanding in both control and experimental classes is below 0.05, indicating that H_a is accepted and H_0 is rejected. This means that students using the digital picture storybook showed a significant improvement in understanding compared to those who did not use it.

The implementation was conducted in six sessions, each lasting 2×45 minutes. The first session was for the pretest, sessions two to five provided the treatment (experimental class used the PENA digital picture storybook, while the control class used school textbooks), and the final session was for the posttest. Pretest and posttest scores were compared to assess the product's effectiveness.

Table 14. N-Gain Scores for Students' Understanding

Descriptive Statistic					
N – Gain					
Class	Mean Score	N	Std. Deviation	Min	Max
Control	.3204	30	.20320	0.00	0.83
Experimental	.5761	30	.21662	0.00	1.00
Total	.4483	60	.24492	0.00	1.00

Table 15. Interpretation of N-gain Scores for Students' Understanding

No.	Class	Score Pre	Mean Score Post	Gain	Criterion
1.	Control	60	73	0.32	Not effective

2.	Experimental	61	84	0.57	Moderately effective
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Referring to the table above, the experimental class had a pretest score of 61 and a posttest score of 84, while the control class had a pretest score of 60 and a posttest score of 73. The gain for the control class is categorized as "Not Effective", while the experimental class is categorized as "Moderately Effective".

Based on this data, it can be concluded that the PENA (Petualangan Nara) digital picture storybook is effective in improving students' understanding.

4.4.2. Analysis of Product Effectiveness on Mutual Cooperation

In the implementation phase to assess the effectiveness of the *gotong royong* (collaborative) character, a pretest-posttest self-assessment questionnaire was used. The effectiveness of the digital picture storybook can be determined from the questionnaire data, which aims to measure the improvement of students' collaborative character. The data analysis for this study used parametric statistics, including normality tests, homogeneity tests, and hypothesis testing through Independent t-tests. All data were analyzed using SPSS version 25.

Table 16. Results of the Normality Test for Mutual Cooperation

		Tests of Normality					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Class	Statistic	Df	Sig.	Statistic	df	Sig.
Score	Control pretest	.159	30	.051	.959	30	.299
	Experimental pretest	.134	30	.182	.937	30	.076
	Control posttest	.133	30	.183	.949	30	.162
	Experimental posttest	.169	30	.029	.940	30	.089

The Table 16 above shows that the significance values for both the control and experimental classes are greater than 0.05, indicating that the data are normally distributed. Specifically, the pretest significance value is 0.299 for the control class and 0.076 for the experimental class, while the posttest significance value is 0.162 for the control class and 0.089 for the experimental class. Since the average distribution of both classes is normal, the analysis continued with a homogeneity test.

Table 17. Results of the Homogeneity Test for Mutual Cooperation

		Test of Homogeneity of Variances				
		Levene Statistic	df1	df2	Sig.	
Pre	Based on Mean	1.744	1	58	.192	
	Based on Median	1.366	1	58	.247	
	Based on Median and with adjusted df	1.366	1	50.260	.248	
	Based on trimmed mean	1.758	1	58	.190	
Post	Based on Mean	3.170	1	58	.080	

Based on Median	2.351	1	58	.131
Based on Median and with adjusted df	2.351	1	49.60 4	.132
Based on trimmed mean	3.135	1	58	.082

The significance values of the homogeneity test are 0.192 for the pretest and 0.080 for the posttest, both greater than 0.05 (Table 17). This indicates that the data are homogeneous. After confirming homogeneity, the analysis proceeded with Independent t-tests.

The t-test was conducted to determine whether the collaborative character variable differs significantly between the two samples. The hypotheses were:

H0: There is no increase in the gotong royong character of students using the Pancasila-based digital picture storybook compared to students who do not use it.

Ha: There is an increase in the gotong royong character of students using the Pancasila-based digital picture storybook compared to students who do not use it.

The criterion for testing: a significance value > 0.05 indicates acceptance of H_0 and rejection of H_a , while a value < 0.05 indicates rejection of H_0 and acceptance of H_a .

Table 18. Results of the Independent Samples t-Test for Mutual Cooperation

Data	Class	Df	Sig. (2-tailed)	Description
Mutual Cooperation	Control	58	$p < .001$	Ha accepted and H_0 rejected (have different)
	Experiment			

Based on the Table 18 above, the independent t-test shows that the significance value for students' gotong royong character in the control and experimental classes is below 0.05, indicating that H_a is accepted and H_0 is rejected. Therefore, it can be concluded that the collaborative character of students using the digital picture storybook improved significantly compared to students who did not use it.

The implementation was conducted in six sessions, each lasting 2×45 minutes. The first session was for the pretest, sessions two to five provided the treatment (experimental class used the PENA digital picture storybook, while the control class used school textbooks), and the final session was for the posttest. Pretest and posttest results were compared to assess the product's effectiveness.

Table 19. N-Gain Scores for Mutual Cooperation

Descriptive Statistic					
N – Gain Score					
Class	Mean	N	Std. Deviation	Minimum	Maximum
Control	.4621	30	.26389	.00	1.00
Experimental	.6824	30	.21955	.14	1.00
Total	.5723	60	.26506	.00	1.00

Table 20. Interpretation N-Gain Scores for Mutual Cooperation

No.	Class	Mean	Score	Gain	Criterion
		Pre	Post		
1.	Control	30	34	0.46	Less effective
2.	Experimental	31	37	0.68	Moderately effective

Referring to the Table 19 and 20 above, the experimental class had a pretest score of 31 and a posttest score of 37, while the control class had a pretest score of 30 and a posttest score of 34. The gain for the control class is categorized as "Less Effective", whereas the gain for the experimental class is categorized as "Moderately Effective".

Based on these data, it can be concluded that the PENA (Petualangan Nara) digital picture storybook is effective in improving students' gotong royong character, and the analysis can proceed to the MANOVA test.

4.4.3. MANOVA Test

The MANOVA test was conducted to answer one of the research questions, namely the effectiveness of the developed digital picture storybook in improving students' understanding and gotong royong (collaborative) character. Data are considered to have a significant difference if the significance value (Sig.) < 0.05.

Before conducting the MANOVA, the underlying assumptions were examined. The homogeneity of variance-covariance matrices was assessed using Box's M test, which yielded Box's M = 8.853, F = 2.841, and p = .036. Following the commonly recommended criterion for Box's M (p > .001), the assumption of homogeneity of variance-covariance matrices was considered satisfied. In addition, Levene's test indicated that the error variances were homogeneous for both dependent variables, namely students' understanding (F = 1.250, p = .268) and gotong royong character (F = 2.950, p = .091), as both significance values exceeded .05. Therefore, the assumptions required for conducting MANOVA were met.

The hypotheses for the MANOVA test in this study are formulated as follows:

H0: There is no substantial difference in the combination of understanding and gotong royong character of fourth-grade elementary school students who use the Pancasila-based digital picture storybook compared to those who do not.

Ha: There is a significant difference in the combination of understanding and gotong royong character of fourth-grade elementary school students who use the Pancasila-based digital picture storybook compared to those who do not use it.

The results of the MANOVA test using SPSS version 25 are presented in Table 21 below:

Table 21. Results of the MANOVA for Students' Understanding and Mutual Cooperation

Multivariate Tests ^a						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.997	10862.978 ^b	2.000	57.000	.000
	Wilks' Lambda	.003	10862.978 ^b	2.000	57.000	.000
	Hotelling's Trace	381.157	10862.978 ^b	2.000	57.000	.000
	Roy's Largest Root	381.157	10862.978 ^b	2.000	57.000	.000
Treatment	Pillai's Trace	.408	19.601 ^b	2.000	57.000	.000
	Wilks' Lambda	.592	19.601 ^b	2.000	57.000	.000
	Hotelling's Trace	.688	19.601 ^b	2.000	57.000	.000

Roy's Largest Root	.688	19.601 ^b	2.000	57.000	.000
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Based on the multivariate test results, the treatment had a statistically significant effect on the combined dependent variables, as indicated by Pillai's Trace = .408, $F(2, 57) = 19.601$, $p < .001$. Similar results were obtained using Wilks' Lambda ($\Lambda = .592$, $F(2, 57) = 19.601$, $p < .001$). These findings indicate that there was a significant multivariate difference between students who learned using the Pancasila-based digital picture storybook and those who did not. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_a) was accepted. This finding demonstrates that the use of the developed digital picture storybook had a significant positive effect on the combined outcomes of students' understanding and gotong royong character.

5. Discussion

The development and implementation of the digital picture storybook PENA (Petualangan Nara), which integrates Pancasila values, has demonstrated empirical evidence of being valid, practical, and effective. Validation by experts in instruments, materials, and media indicated that the book is highly feasible for educational use. Additionally, practical trials involving teachers and students through one-to-one trials, small group trials, and field trials confirmed that the book is highly user-friendly and can be applied effectively in classroom settings.

a. Feasibility of the Digital Picture Storybook

The storybook was designed with a focus on simplicity of language, appropriate font size, engaging characters, clear narrative structure, and illustrative visuals that concretize story elements. These design elements were aligned with the curriculum objectives and intended learning outcomes for fourth-grade students. The storybook supports interactive and innovative learning experiences, enabling students to internalize the values of Pancasila while actively engaging with the narrative. Previous research supports that illustrated storybooks enhance students' comprehension and imaginative capacity (Nurgiyanto, 2015; Sumiati & Tirtayani, 2021).

b. Practicality of the Digital Picture Storybook

Practicality was measured by direct user feedback from teachers and students during implementation trials. Across all stages—one-to-one, small group, and field trials—the book received high practicality scores, categorized as "very practical", indicating that the book can be effectively used in classroom settings without significant technical or operational difficulties. The book's design allows teachers to facilitate learning efficiently, while maintaining student engagement and participation (Gazali, 2016; Millenia, 2023; Wuryandani et al., 2022).

c. Effectiveness in Improving Understanding and Gotong Royong Character

Effectiveness was evaluated through pretest–posttest data on students' conceptual understanding and gotong royong (collaborative) character. The experimental class using the digital picture storybook showed significant improvement in both variables compared to the control class using standard textbooks. N-Gain scores for understanding (0.57) and gotong royong character (0.68) indicated moderate effectiveness, whereas the control class showed lower gains (0.32 and 0.46, respectively). Parametric tests, including normality, homogeneity, t-tests, and MANOVA, confirmed statistically significant differences ($p < 0.05$) between the experimental and control groups.

The effectiveness of the digital picture storybook can be explained by several pedagogical characteristics of the developed product. First, the illustrations help students visualize abstract Pancasila values through concrete situations that are familiar to their daily lives. This visualization enables students to understand concepts such as cooperation, responsibility, and mutual respect more easily because elementary school students generally learn more effectively from

concrete representations than from abstract explanations. Second, the storyline embeds moral values within meaningful narratives, allowing students to observe how the characters solve problems collaboratively and demonstrate positive social behaviours. Such moral narratives encourage students not only to understand the concepts cognitively but also to internalize the values through the experiences of the story characters. Third, the digital format and the accompanying learning activities actively engage students throughout the learning process. The combination of attractive illustrations, contextual stories, and interactive tasks increases students' attention, motivation, and participation, which contributes to improved conceptual understanding as well as the development of gotong royong character.

These findings are consistent with previous studies demonstrating that digital picture storybooks with engaging visual representations and meaningful narrative contexts improve students' comprehension while simultaneously strengthening social and moral values (Fariza et al., 2024; Syafitri, 2024; Ummah et al., 2025). By integrating visual representations, moral narratives, and interactive learning activities into a single learning medium, the developed digital picture storybook provides meaningful learning experiences that support both cognitive achievement and character development, particularly in fostering cooperation, empathy, responsibility, and sharing among elementary school students.

6. Conclusion

Overall, the findings confirm that the digital picture storybook PENA (Petualangan Nara) is an effective learning medium for improving both students' understanding of Pancasila concepts and their gotong royong character. The study highlights the potential of multimedia-based, value-integrated learning resources in elementary education, supporting the dual goal of academic achievement and character formation.

Limitation

The limitations of this study can be identified based on the research scope and the product developed. One limitation of the research is that it did not involve private schools or Islamic elementary schools/Madrasah Ibtidaiyah (MI) during data collection. Additionally, the study only included five schools within a single district. The digital picture storybook was specifically designed to meet the needs of fourth-grade students, and its use is limited to lessons on Pancasila education that discuss the implementation of Pancasila values and the character of gotong royong. Furthermore, access to the digital picture storybook requires an internet connection to use the Flibook, which suggests that future researchers could develop versions accessible offline.

Thus, although this study provides valuable insights into the development of a digital picture storybook, several aspects should be considered for future research. Limitations regarding the sample, content scope, and dependence on internet access need to be addressed. Future studies involving a wider range of schools, educational levels, and more diverse learning platforms could further enrich the understanding and application of digital picture storybooks in broader educational contexts.

Recommendation

The digital picture storybook containing Pancasila values has been proven effective in improving students' understanding and the character of gotong royong according to the measured indicators. This digital picture storybook is highly relevant for learning in the digital era because it utilizes technological devices and attractive illustrations, which help enhance students' comprehension and collaborative character. The digital picture storybook is easily accessible to students and offers flexibility, allowing them to engage with it anytime and anywhere.

Teachers guiding students in the use of the digital picture storybook can easily integrate it into each lesson, making it a practical educational tool. However, the successful implementation

and smooth use of the digital picture storybook with Pancasila values may pose a challenge for teachers who have not yet integrated reading materials into learning media. The effectiveness of the digital picture storybook should be further demonstrated on a larger scale, involving more students and both public and private schools proportionally.

Conflict of Interest Statement

The author(s) declare(s) that there is no conflict of interest.

Declaration of Generative AI and AI-assisted Technologies

This manuscript was prepared with the assistance of Generative AI Translator. The AI was used to assist in language refinement. All intellectual contributions, critical analyses, and final revisions were conducted by the authors. The authors take full responsibility for the accuracy, originality, and integrity of the content presented in this work.

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