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The Effect of Inquiry Learning on Students' Critical Thinking Skills in Pancasila Education

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History: Received 07/05/2026 | Revised 11/05/2026 | Accepted 18/06/2026 | Published 30/06/2026

Abstract. Low critical thinking in elementary Pancasila Education limits students' capacity to analyze civic problems and make reasoned moral decisions. This study examined the effect of inquiry-based learning on fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. A quantitative pre-experimental design with a one-group pretest-posttest procedure was employed. The participants were 26 fourth-grade students selected through saturated sampling. Data were collected using essay-based pretest and posttest instruments and documentation, while instrument quality was confirmed through validity testing and reliability analysis, yielding a Cronbach's Alpha value of 0.811. Data were analyzed using the Shapiro-Wilk normality test and the Wilcoxon Signed-Rank Test. The findings showed that students' mean score increased from 56.15 in the pretest to 84.23 in the posttest. The Wilcoxon test produced a significance value of 0.000, indicating a statistically significant improvement after inquiry-based learning. These results demonstrate that inquiry-based learning effectively enhances students' critical thinking through investigation, discussion, analysis, and conclusion-making. The novelty of this study lies in applying inquiry-based learning within elementary Pancasila Education. Its contribution is to provide an evidence-based pedagogical strategy for strengthening critical civic learning in elementary schools.

Keywords: *Inquiry-Based Learning; Critical Thinking Skills; Pancasila Education; Elementary School Students; Civic Education Pedagogy*

INTRODUCTION

Education is a fundamental mechanism for developing human resources capable of responding to the social, ethical, and intellectual demands of the twenty-first century. In Indonesia, schooling is not merely designed to improve academic achievement but also to cultivate character, civic responsibility, democratic awareness, and reflective decision-making. Within this framework, Pancasila Education occupies a strategic position because it introduces students to the philosophical, moral, and civic foundations of Indonesian national life. Pancasila is widely recognized as a foundational value system that guides citizenship, justice, social cohesion, and national identity in Indonesia (Kameo & Prasetyo, 2021; Rani et al., 2020; Winarni, 2020). Therefore, Pancasila Education at the elementary school level is expected to help students understand national values, respect diversity, participate responsibly in social life, and apply moral reasoning in everyday contexts. As social life becomes increasingly shaped by globalization, digital information, and complex civic issues, elementary students need learning experiences that move beyond memorization and enable them to analyze problems, evaluate information, and formulate reasoned judgments.

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The urgency of strengthening critical thinking in Pancasila Education is closely related to the need to prepare students as reflective citizens. Critical thinking is not only a cognitive ability but also a disposition that enables learners to examine assumptions, evaluate evidence, interpret situations, and make decisions responsibly. Rahardhian (2022) emphasized that critical thinking is essential for reflective reasoning, while Dermawan and Maulana (2023) found that critical thinking remains a major concern in elementary civic learning. In the context of character and citizenship education, critical thinking supports students' ability to understand moral problems, assess social phenomena, and respond to differences with rational and ethical consideration. Previous studies have also demonstrated that character education and critical thinking are mutually reinforcing, particularly when classroom activities require students to connect values with authentic social experiences (Amin et al., 2022; Axtell, 2024; Suhirman et al., 2021). Thus, developing critical thinking through Pancasila Education is pedagogically important because the subject deals directly with values, civic participation, and moral reasoning.

Despite this importance, the learning process in elementary Pancasila Education often remains constrained by conventional instructional practices. Classroom learning frequently emphasizes teacher explanation, textbook-based memorization, and reproduction of factual knowledge. Such practices may help students recall concepts but provide limited opportunities to ask questions, evaluate information, discuss alternative views, or construct independent arguments. This condition is problematic because Pancasila Education requires not only conceptual understanding but also the ability to interpret values in real social situations. When students are positioned mainly as passive recipients of information, their opportunities to develop analytical reasoning become limited. As a result, students may understand civic concepts at a surface level but experience difficulty when they are required to explain, evaluate, or apply those concepts in daily life. This issue indicates the need for learning models that transform classroom interaction from teacher-centered transmission into active, dialogic, and inquiry-oriented learning.

Preliminary observations in grade IV at SD Negeri 20 Palu showed that students' critical thinking skills in Pancasila Education required pedagogical improvement. Students tended to depend on teacher explanations, participated passively during classroom activities, and rarely engaged in investigation, discussion, or problem-solving tasks. Learning activities were dominated by concept memorization rather than exploration and analysis, thereby limiting students' opportunities to construct understanding independently. Similar problems have been reported in previous elementary school studies, where students often demonstrate low critical thinking because instructional practices do not consistently stimulate interpretation, analysis, evaluation, inference, explanation, and self-regulation (Dermawan & Maulana, 2023; Ulfa &

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Makki, 2023). A general solution to this problem is the implementation of student-centered learning strategies that involve learners directly in questioning, reasoning, collaboration, and problem solving. Such strategies are expected to provide meaningful learning experiences that support both cognitive development and civic value internalization.

Inquiry-based learning is one pedagogical model that offers a specific solution to the problem of limited critical thinking development. This model emphasizes active investigation, questioning, exploration, evidence collection, analysis, and conclusion-making. In inquiry-based learning, students are guided to identify problems, formulate temporary explanations, collect and examine information, discuss findings, and construct conclusions through reasoning. This process is consistent with constructivist learning theory, which views knowledge as actively constructed through interaction with experiences rather than passively transferred from teacher to learner. Gulo (2017) explained that inquiry learning involves students directly in discovering concepts through systematic and analytical thinking processes. Similarly, Prasetiyo and Rosy (2021) argued that inquiry learning can serve as a strategy for developing students' critical thinking because it requires learners to engage in reasoning activities rather than merely receiving information. Therefore, inquiry-based learning is theoretically compatible with the objective of strengthening critical thinking in Pancasila Education.

Empirical studies have consistently shown the effectiveness of inquiry-based learning in improving students' critical thinking across educational contexts. Maryam et al. (2020) found that inquiry learning significantly improved students' critical thinking by engaging them in investigation and collaborative learning. Sutiani et al. (2021) reported that inquiry learning integrated with scientific literacy improved students' critical thinking skills, while Pahrudin et al. (2021) demonstrated that inquiry-oriented learning within the Indonesian curriculum strengthened critical thinking among secondary students. Wale and Bishaw (2020) also showed that inquiry-based learning enhanced students' critical thinking in language learning, suggesting that the model is applicable beyond science-based subjects. Other studies further confirmed that inquiry learning improves learning motivation, analytical ability, active participation, and evidence-based reasoning (Sari et al., 2021; Verawati & Prayogi, 2020). These findings indicate that inquiry-based learning has strong pedagogical potential because it creates a learning environment where students must question, interpret, evaluate, and justify their ideas.

In relation to citizenship and value-based learning, inquiry-based approaches are particularly relevant because they encourage students to examine social issues and civic values through reflective dialogue. Firdaus and Irianto (2024) reported that inquiry-based learning positively influenced elementary students' critical thinking in Pancasila Education, especially when supported by meaningful media and problem-solving activities. Khoirudin et al. (2023) also

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found that inquiry learning improved students' critical thinking in Pancasila and Citizenship Education by encouraging classroom participation and analytical engagement. Moreover, research on Pancasila-based character education has emphasized the importance of contextual, culturally responsive, and value-oriented learning in helping students internalize civic principles (Komalasari et al., 2024; Maisyaroh, 2023; Nurizka et al., 2020; Wulandari et al., 2023). However, although inquiry learning has been widely examined in science, mathematics, and secondary education, empirical studies focusing specifically on fourth-grade elementary students in Pancasila Education remain limited. The available literature also provides insufficient evidence regarding the implementation of inquiry-based learning in SD Negeri 20 Palu, creating a contextual and methodological research gap.

The novelty of this study lies in its specific examination of inquiry-based learning as a strategy for enhancing fourth-grade students' critical thinking skills in elementary Pancasila Education. Unlike many previous studies that focused primarily on science, mathematics, language learning, or higher educational levels, this study places inquiry-based learning within the context of civic and value education in an Indonesian elementary school. The hypothesis underlying this study is that inquiry-based learning can significantly improve students' critical thinking because the model provides structured opportunities for learners to identify civic problems, discuss alternative ideas, evaluate information, and formulate conclusions independently. The scope of the study is limited to fourth-grade students at SD Negeri 20 Palu, the implementation of inquiry-based learning in Pancasila Education, and the measurement of students' critical thinking skills through essay-based assessment indicators. This scope allows the study to contribute focused evidence on how inquiry-oriented pedagogy supports critical civic learning among young learners.

Based on the background, problem identification, theoretical foundation, and research gap described above, this study aims to determine the effect of inquiry-based learning on the critical thinking skills of fourth-grade students in Pancasila Education at SD Negeri 20 Palu. The study is expected to provide theoretical contribution by expanding evidence on inquiry-based learning in elementary civic education and practical contribution by offering teachers an alternative instructional strategy for improving students' analytical and reflective reasoning. Accordingly, the research question addressed in this study is: Does inquiry-based learning significantly affect the critical thinking skills of fourth-grade students in Pancasila Education at SD Negeri 20 Palu?

LITERATURE REVIEW

The development of research on inquiry-based learning and critical thinking has moved from a general concern with active learning toward more specific investigations of how inquiry

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processes shape students' reasoning, problem-solving, and reflective judgment. Inquiry-based learning is grounded in the assumption that students learn more meaningfully when they are positioned as active constructors of knowledge rather than passive recipients of teacher explanation. In this model, learning is organized through questioning, problem identification, hypothesis formulation, evidence collection, analysis, discussion, and conclusion-making. This pedagogical orientation is closely aligned with the development of critical thinking because students are required to interpret information, evaluate alternatives, justify arguments, and construct conclusions based on evidence. Earlier studies in the Indonesian context have emphasized inquiry learning as a strategy for developing students' analytical abilities and higher-order thinking skills (Maryam et al., 2020; Prasetiyo & Rosy, 2021; Sa & Aini, 2022). More recent international literature has expanded this line of inquiry by integrating inquiry learning with scientific literacy, digital learning, collaborative learning, local wisdom, ethnoscience, and technology-supported learning environments (Arifin et al., 2025; Pahrudin et al., 2021; Sutiani et al., 2021; Verawati & Prayogi, 2020).

A major thematic development in the literature concerns the effectiveness of inquiry-based learning in improving critical thinking in science, technology, engineering, and mathematics education. Studies in science education have reported that inquiry-based learning strengthens students' ability to analyze scientific problems, evaluate evidence, and construct reasoned explanations. Sutiani et al. (2021) showed that inquiry learning integrated with scientific literacy improved students' critical thinking skills, while Pahrudin et al. (2021) demonstrated that science, technology, engineering, and mathematics inquiry learning had a positive impact on students' critical thinking within the Indonesian curriculum. Similar findings were reported in context-based inquiry learning, guided inquiry, and reflective inquiry models, where students' reasoning improved when learning activities required them to connect concepts with evidence and real-world problems (Pursitasari et al., 2020; Verawati & Prayogi, 2020; Verawati et al., 2021). Meta-analytic evidence also supports this trend by indicating that inquiry-based learning generally produces positive effects on students' critical thinking in science education (Arifin et al., 2025; Dewi et al., 2025). These findings suggest that inquiry learning has a strong empirical foundation, particularly in domains where students are required to investigate phenomena and justify conclusions.

Another group of studies has examined inquiry learning through the lens of collaboration, technology, and learner engagement. This literature shows that inquiry-based learning becomes more effective when students engage in collaborative reasoning, digital exploration, or structured questioning. Wale and Bishaw (2020) found that inquiry-based learning improved critical thinking in English as a foreign language learning, indicating that inquiry is not limited to science-

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related disciplines. Sari et al. (2021) reported that inquiry mind mapping improved both critical thinking and learning motivation, while Ay and Dağhan (2023) found that a community of inquiry design supported students' critical thinking strategies in technology-enhanced learning environments. Other studies have incorporated mobile-blended learning, augmented reality, electronic books, and digital platforms to scaffold inquiry processes and strengthen students' analytical engagement (Adam et al., 2026; Agbi & Yuangsoi, 2022; Hayat et al., 2026; Prayogi et al., 2023; Yasa et al., 2024). This body of research indicates that inquiry learning has evolved beyond a single classroom model into a flexible pedagogical framework that can be combined with digital tools, collaborative tasks, and multimodal learning resources.

A further development in the literature concerns the integration of inquiry learning with cultural, ethical, and socio-scientific contexts. Researchers have increasingly argued that critical thinking develops more deeply when students examine problems embedded in social, cultural, or moral situations. Inquiry learning integrated with ethnoscience, local wisdom, socio-scientific issues, and culturally sustaining pedagogy has been shown to improve students' critical thinking because learners are invited to interpret problems from multiple perspectives and relate knowledge to lived experience (Arifin & Saputro, 2025; Harjono et al., 2025; Kurniawan et al., 2021; Prayogi et al., 2022; Putu Verawati et al., 2022; Suwandi, 2023). This theme is highly relevant to Pancasila Education because civic and moral learning requires students to evaluate social realities, understand diversity, and make responsible judgments. The shift from purely content-based inquiry toward culturally and socially grounded inquiry provides a theoretical basis for applying inquiry learning in value-based subjects, including Pancasila Education.

In parallel, research on Pancasila Education and Pancasila values has emphasized the importance of character formation, national identity, civic awareness, and moral reasoning. Pancasila is positioned as a philosophical, legal, and ethical foundation of Indonesian national life, shaping the orientation of citizenship, justice, social responsibility, and unity in diversity (Kameo & Prasetyo, 2021; Rani et al., 2020; Winarni, 2020). Educational studies have shown that Pancasila values can be strengthened through school culture, digital media, local wisdom, teaching modules, and value-based learning models (Komalasari et al., 2024; Maisyaroh, 2023; Nurizka et al., 2020; Wulandari et al., 2023). Other studies have connected Pancasila values with character education, multicultural competence, civic identity, and student engagement (Faaza, 2022; Jamaludin et al., 2025; Patras et al., 2025; Subiyantoro et al., 2023). This literature confirms that Pancasila Education is not only concerned with transmitting ideological knowledge but also with cultivating students' capacity to reason, evaluate social conduct, and internalize civic values in everyday life.

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The relationship between critical thinking and character education has also become an important theme in recent educational research. Critical thinking is increasingly understood as a competency that supports character development because it enables learners to make reflective, ethical, and socially responsible decisions. Rahardhian (2022) emphasized the philosophical importance of critical thinking, while Dermawan and Maulana (2023) identified the need to strengthen critical thinking in elementary civic learning. Studies on character-based learning have further demonstrated that critical thinking can be developed alongside curiosity, social skills, metacognition, and moral awareness when students are engaged in meaningful learning experiences (Amin et al., 2022; Axtell, 2024; Lestari et al., 2021; Suhirman et al., 2021; Susanto et al., 2022). This synthesis suggests that critical thinking should not be treated as a purely cognitive skill separated from civic and moral learning. Instead, in Pancasila Education, critical thinking functions as a bridge between knowledge of values and the ability to apply those values reflectively in social life.

Although the literature generally supports the positive effect of inquiry learning, several issues remain unclear and continue to be debated. One unresolved issue concerns whether the effectiveness of inquiry learning is produced by the inquiry model itself or by additional instructional supports such as reflection, collaboration, technology, local wisdom, or teacher scaffolding. For example, Verawati and Prayogi (2020) and Verawati et al. (2021) highlighted the role of reflective processes, while Agbi and Yuangsoi (2022), Ay and Dağhan (2023), and Yasa et al. (2024) emphasized technology-supported inquiry environments. Another issue concerns the level of learner autonomy. Open inquiry may encourage independence, but younger learners often require guided questioning and structured facilitation to prevent cognitive overload. This point is especially important for elementary students, whose critical thinking skills are still developing. Therefore, inquiry learning in elementary education cannot simply be transferred from secondary or higher education contexts; it must be adapted to students' cognitive level, classroom culture, and subject characteristics.

The literature also shows a methodological and contextual imbalance. Most inquiry-based learning studies have been conducted in science, biology, chemistry, mathematics, language learning, or higher education contexts (Irwanto, 2023; Lestari et al., 2024; Mueller et al., 2020; Sapriati et al., 2024; Wale & Bishaw, 2020). Studies involving elementary students exist, but many of them focus on science literacy, mathematics, cultural values, or general character development rather than Pancasila Education as a specific civic subject (Aiman & Hasyda, 2020; Kurniawan et al., 2021; Nugraheni et al., 2022; Susanto et al., 2022). In the more specific field of Pancasila and Citizenship Education, Firdaus and Irianto (2024) and Khoirudin et al. (2023) have provided relevant evidence that inquiry learning can improve students' critical thinking.

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However, the number of empirical studies remains limited, particularly at the elementary school level and in relation to fourth-grade students. This indicates that the effectiveness of inquiry learning in Pancasila Education has not been examined as extensively as in science-related subjects.

A clear research gap can therefore be identified. Existing studies have established that inquiry-based learning is effective in strengthening critical thinking, but they have not sufficiently explained its application in elementary Pancasila Education, especially among fourth-grade students in specific school contexts. Previous research has largely emphasized science, technology-supported learning, ethnoscience, or secondary and higher education, while the civic-value dimension of inquiry learning in elementary Pancasila Education remains underexplored. Moreover, limited attention has been given to how inquiry learning affects students' critical thinking when the learning content focuses on maintaining national unity, preserving the Republic of Indonesia, and reasoning about social values. The gap is not merely the absence of studies on inquiry learning, but the limited empirical evidence on inquiry learning as a pedagogical strategy for developing critical civic thinking in young learners within Pancasila Education.

This study is positioned to address that gap by examining the effect of inquiry-based learning on fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. Unlike many previous studies that investigated inquiry learning in science, mathematics, or higher education settings, this study applies inquiry learning to an elementary civic education context where critical thinking is connected to Pancasila values and everyday social issues. The study also differs from broader character education research by focusing specifically on measurable critical thinking skills through essay-based assessment indicators, including interpretation, analysis, evaluation, inference, explanation, and self-regulation. Accordingly, this research contributes to the literature by extending the application of inquiry-based learning to elementary Pancasila Education and by providing empirical evidence on how inquiry-oriented pedagogy can support critical thinking in early civic learning.

RESEARCH METHODS

This study employed a quantitative approach using a pre-experimental research method with a one-group pretest-posttest design. The quantitative approach was selected because the study examined the effect of a specific instructional treatment on measurable student learning outcomes through numerical data and statistical procedures. Quantitative research is appropriate for testing hypotheses and identifying changes in variables based on empirical measurement, objective scoring, and inferential analysis (Sugiyono, 2019). In this study, the independent variable was inquiry-based learning, while the dependent variable was students' critical thinking

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skills in Pancasila Education. The pre-experimental method was considered suitable because the study was conducted in a natural classroom setting where the researcher aimed to measure students' critical thinking before and after the implementation of inquiry-based learning. Although this design did not involve a control group, it enabled a systematic comparison between initial and final student performance after instructional intervention.

The one-group pretest-posttest design was implemented by administering an initial test, applying the instructional treatment, and administering a final test to the same group of students. This design allowed the researcher to identify changes in students' critical thinking skills after the inquiry-based learning model was applied. The design can be represented as O_1 X O_2, where O_1 refers to the pretest, X refers to the implementation of inquiry-based learning, and O_2 refers to the posttest. The difference between pretest and posttest scores was used as the empirical basis for determining the effect of the treatment. This design was aligned with the objective of the study, which was to determine whether inquiry-based learning significantly affected fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. Previous studies have used comparable experimental or quasi-experimental logic to examine the impact of inquiry-based learning on critical thinking, particularly because this model requires students to engage in questioning, investigation, evidence evaluation, and conclusion-making (Maryam et al., 2020; Pahrudin et al., 2021; Sutiani et al., 2021; Wale & Bishaw, 2020).

The research was conducted at SD Negeri 20 Palu, involving fourth-grade students as the research participants. The population consisted of all students in the fourth-grade class who participated in Pancasila Education learning during the research period. The sample consisted of 26 students selected using a saturated sampling technique. Saturated sampling was applied because the population size was relatively small, allowing all members of the population to be included as research participants. Arikunto (2020) stated that saturated sampling is appropriate when the number of subjects is limited and all members of the population can be involved in the study. The selection of fourth-grade students was based on the consideration that students at this developmental stage have begun to demonstrate basic analytical and reflective reasoning that can be measured through critical thinking indicators. The school was selected because preliminary observations indicated that students' critical thinking skills in Pancasila Education still required improvement, particularly in activities requiring interpretation, analysis, argumentation, evaluation, and conclusion-making.

The instructional treatment used in this study was inquiry-based learning in Pancasila Education. Inquiry-based learning was selected because it provides students with opportunities to construct understanding through active investigation and reflective learning. Gulo (2017) described inquiry learning as a model that involves students directly in discovering concepts

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through systematic and analytical thinking processes. This model is also supported by studies showing that inquiry-based learning can strengthen students' critical thinking because it encourages learners to identify problems, formulate questions, examine evidence, discuss findings, and draw conclusions (Prasetiyo & Rosy, 2021; Sa & Aini, 2022; Verawati & Prayogi, 2020). In the context of this study, inquiry-based learning was applied to Pancasila Education material concerning the maintenance and preservation of the unity of the Republic of Indonesia. The learning activities were designed to connect Pancasila values with contextual issues in students' daily lives so that students could analyze social problems, discuss civic responsibilities, and formulate reasoned conclusions.

The research procedure was carried out through preparation, instrument testing, pretest administration, treatment implementation, posttest administration, and data analysis. In the preparation stage, the researcher developed teaching modules, learning materials, student worksheets, essay test instruments, and documentation sheets. The teaching materials were designed to support inquiry-based activities in Pancasila Education by presenting contextual problems related to unity, cooperation, tolerance, responsibility, and national values. Before being used in the main study, the essay test instrument was tried out on fourth-grade students at SD Negeri 4 Palu. The trial class was selected because its student characteristics were considered relatively similar to those of the research participants at SD Negeri 20 Palu. The purpose of the instrument trial was to examine item validity and reliability before the instrument was used in the actual research setting. After the instrument met the validity and reliability criteria, the researcher administered the pretest to measure students' initial critical thinking skills.

During the treatment stage, inquiry-based learning was implemented in Pancasila Education lessons through structured classroom activities. The learning process began with orientation, in which students were introduced to contextual civic problems related to Pancasila values. Students were then guided to formulate problems, propose possible explanations, collect relevant information from learning materials, analyze the information through discussion, and draw conclusions based on evidence and reasoning. This sequence reflected the inquiry process and supported students' involvement in active learning. The teacher functioned as a facilitator who guided questioning, encouraged participation, clarified misconceptions, and supported students in developing arguments. Such facilitation is important because inquiry-based learning among elementary students requires appropriate scaffolding to ensure that learners can engage in investigation without losing conceptual direction. Prior studies have shown that inquiry learning becomes more effective when supported by collaboration, reflection, and meaningful learning contexts (Aiman & Hasyda, 2020; Kurniawan et al., 2021; Sari et al., 2021).

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The research instruments consisted of essay-based critical thinking tests and documentation sheets. Essay tests were used because they allowed students to express reasoning, analyze problems, provide arguments, evaluate information, and formulate conclusions in written form. The test items were developed based on critical thinking indicators, including interpretation, analysis, evaluation, inference, explanation, and self-regulation. Initially, eight essay items were developed and tested for validity. Based on the validity test results, four items were declared valid and retained as the final research instrument, while the remaining items were excluded because they did not adequately measure the intended critical thinking indicators. The documentation sheets were used to collect supporting data related to the implementation of inquiry-based learning, including classroom activities, teaching modules, lesson plans, student worksheets, photographs, and records of student participation during learning. Documentation was used to strengthen the description of the research process and provide contextual evidence regarding classroom implementation.

Data were collected using test and non-test techniques. The test technique consisted of pretest and posttest administration. The pretest was administered before the inquiry-based learning treatment to identify students' initial critical thinking skills, while the posttest was administered after the treatment to measure changes in students' performance. The same critical thinking indicators were used in both tests to ensure consistency between initial and final measurement. The non-test technique was conducted through documentation of the learning process. During the treatment, students participated in group discussion, problem analysis, information gathering, presentation, and conclusion-making activities. These activities were recorded as supporting evidence to describe how inquiry-based learning was implemented in the classroom. The use of both test and documentation data was intended to provide a more complete representation of the intervention process and learning outcomes.

Instrument validity was examined to ensure that the test items measured students' critical thinking skills appropriately. Arikunto (2018) stated that validity refers to the extent to which an instrument measures what it is intended to measure. Item validity was tested using the Product Moment correlation formula with the assistance of SPSS version 25. An item was considered valid when the calculated correlation coefficient exceeded the r-table value at the 0.05 significance level. The validity testing showed that four essay items met the required criteria and were therefore used as the final instrument. Reliability testing was then conducted using Cronbach's Alpha to determine the internal consistency of the instrument. Sugiyono (2019) explained that a reliable instrument produces stable and consistent measurement results under similar conditions. The reliability test produced a Cronbach's Alpha value of 0.811, indicating

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that the instrument had a very high level of reliability and was appropriate for measuring students' critical thinking skills.

Data analysis involved descriptive and inferential statistical procedures. Descriptive statistics were used to present the minimum score, maximum score, mean score, and standard deviation of students' pretest and posttest results. Inferential statistics were used to test the research hypothesis. Before hypothesis testing, the normality of the data was examined using the Shapiro-Wilk test because the number of participants was fewer than 30 students. Quraisy (2020) stated that the Shapiro-Wilk test is suitable for examining normality in small samples. The significance level was set at 0.05. The normality test showed that the pretest data had a significance value of 0.009, while the posttest data had a significance value of 0.507. Because the pretest data were not normally distributed, the hypothesis was tested using the Wilcoxon Signed-Rank Test as a non-parametric procedure for paired data. The Wilcoxon test was used to determine whether there was a significant difference between pretest and posttest scores after the implementation of inquiry-based learning. A significance value lower than 0.05 indicated that the null hypothesis was rejected and the alternative hypothesis was accepted. The statistical analysis was conducted using SPSS version 25 to ensure systematic, accurate, and transparent data processing.

RESULT

This study investigated the effect of inquiry-based learning on fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. The results are presented according to the empirical sequence of quantitative analysis, beginning with instrument validity testing, followed by reliability testing, descriptive analysis of pretest and posttest scores, normality testing, and hypothesis testing using the Wilcoxon Signed-Rank Test. This sequence was used to ensure that the reported findings were based on valid, reliable, and statistically appropriate procedures. In quantitative educational research, the quality of measurement instruments is central to the credibility of findings because conclusions regarding instructional effectiveness must be supported by instruments that accurately and consistently measure the intended construct (Arikunto, 2018; Sugiyono, 2019). Therefore, before evaluating the effect of inquiry-based learning, the essay test instrument was first examined to determine its validity and reliability.

The validity test was conducted on fourth-grade students at SD Negeri 4 Palu as the pilot-testing class. The initial instrument consisted of eight essay questions developed based on critical thinking indicators, namely interpretation, analysis, evaluation, inference, explanation, and self-regulation. Essay-based assessment was selected because critical thinking requires students to

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construct explanations, provide reasons, analyze problems, and formulate conclusions rather than merely select predetermined answers. This form of assessment is consistent with the view that critical thinking should be measured through tasks that require reasoning, justification, and reflective judgment (Mueller et al., 2020; Rahardhian, 2022). The validity analysis was conducted using the Product Moment correlation with the assistance of SPSS version 25. The results of the item validity test are presented in Table 1.

Table 1. Results of Instrument Validity Test

Item Number	r-count	r-table	Criteria
1	0.721	0.388	Valid
2	0.684	0.388	Valid
3	0.745	0.388	Valid
4	0.698	0.388	Valid
5	0.241	0.388	Invalid
6	0.276	0.388	Invalid
7	0.198	0.388	Invalid
8	0.312	0.388	Invalid

Table 1 shows that four of the eight essay items fulfilled the validity criteria. Items 1, 2, 3, and 4 obtained r-count values of 0.721, 0.684, 0.745, and 0.698, respectively, all of which exceeded the r-table value of 0.388 at the 0.05 significance level. These items were therefore categorized as valid and retained as the final test instrument. Conversely, items 5, 6, 7, and 8 obtained r-count values lower than the r-table value, namely 0.241, 0.276, 0.198, and 0.312. These items were categorized as invalid and were excluded from the final instrument. The validity results indicate that the retained items were sufficiently aligned with the intended critical thinking indicators and were appropriate for measuring students' ability to interpret Pancasila-related problems, analyze contextual situations, evaluate information, draw conclusions, and explain reasoning in written form.

After the validity test, reliability analysis was conducted using Cronbach's Alpha to examine the internal consistency of the retained instrument. Reliability testing was necessary because a valid instrument must also produce consistent measurement results when used to assess the same construct. In educational measurement, reliability is a prerequisite for ensuring that score differences reflect actual differences in student performance rather than measurement instability (Rahmayanti et al., 2024; Sugiyono, 2019). The reliability test was conducted using the four valid items obtained from the validity analysis. The results are presented in Table 2.

Table 2. Results of Reliability Test

Cronbach's Alpha	Number of Items	Reliability Category
0.811	4	Very High

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Table 2 shows that the Cronbach's Alpha coefficient was 0.811 for the four retained essay items. This value indicates that the instrument had very high reliability and was suitable for use in the main research. The coefficient exceeded the commonly accepted minimum reliability threshold of 0.70, suggesting that the items demonstrated strong internal consistency. This result means that the instrument consistently measured students' critical thinking skills across the retained items. Therefore, the essay test could be used to collect pretest and posttest data in the main study. The validity and reliability results also confirmed that the empirical findings regarding students' critical thinking improvement were supported by an instrument that met acceptable psychometric standards.

After the instrument had been confirmed as valid and reliable, the pretest was administered to 26 fourth-grade students at SD Negeri 20 Palu to identify their initial critical thinking skills before the implementation of inquiry-based learning. The pretest measured students' ability to interpret problems, analyze information, evaluate situations, make inferences, explain arguments, and regulate reasoning in relation to Pancasila Education content. After the pretest, students participated in inquiry-based learning activities that required them to identify contextual civic problems, discuss ideas, collect relevant information, analyze evidence, and formulate conclusions. Inquiry-based learning has been widely reported as an instructional model that promotes critical thinking because it engages students in active investigation and reflective reasoning (Maryam et al., 2020; Pahrudin et al., 2021; Sutiani et al., 2021; Verawati & Prayogi, 2020). After the treatment, a posttest was administered to measure changes in students' critical thinking skills.

Descriptive statistical analysis was conducted to compare students' pretest and posttest scores. The analysis included the number of participants, minimum score, maximum score, mean score, and standard deviation. These descriptive statistics provide an initial empirical picture of students' performance before and after the implementation of inquiry-based learning. The results are presented in Table 3.

Table 3. Descriptive Statistics of Pretest and Posttest Scores

Test	N	Minimum	Maximum	Mean	Standard Deviation
Pretest	26	40	75	56.15	9.214
Posttest	26	70	95	84.23	6.487

Table 3 shows a substantial increase in students' critical thinking scores after the implementation of inquiry-based learning. The mean pretest score was 56.15, while the mean posttest score increased to 84.23. This indicates a mean score increase of 28.08 points. The minimum score also improved from 40 in the pretest to 70 in the posttest, while the maximum score increased from 75 to 95. These results indicate that improvement occurred not only in the

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average score but also across the lower and upper score ranges. The increase in the minimum score is particularly important because it suggests that students who initially demonstrated weaker critical thinking performance also benefited from the inquiry-based learning process. This pattern is consistent with previous studies showing that inquiry-based learning can support students with varied ability levels by providing structured opportunities for questioning, collaborative discussion, and guided reasoning (Aiman & Hasyda, 2020; Sari et al., 2021; Wale & Bishaw, 2020).

The standard deviation decreased from 9.214 in the pretest to 6.487 in the posttest. This decrease indicates that students' posttest scores became more homogeneous after the implementation of inquiry-based learning. In other words, the students' critical thinking performance was not only higher after the treatment but also more consistent across participants. This pattern suggests that inquiry-based learning may have contributed to reducing performance variation among students by providing a shared learning structure that supported active participation, group reasoning, and guided conclusion-making. Studies on inquiry-based learning have similarly reported that structured inquiry activities can improve students' reasoning processes because learners are required to work through comparable stages of problem formulation, evidence analysis, and reflective explanation (Adnan et al., 2021; Pursitasari et al., 2020; Ramlawati et al., 2025).

The improvement in students' mean scores is visually represented in Figure 1. The figure presents a comparison between the pretest and posttest mean scores and highlights the increase in critical thinking performance after students participated in inquiry-based learning. The visual pattern supports the descriptive statistical finding that students performed better after the instructional treatment.

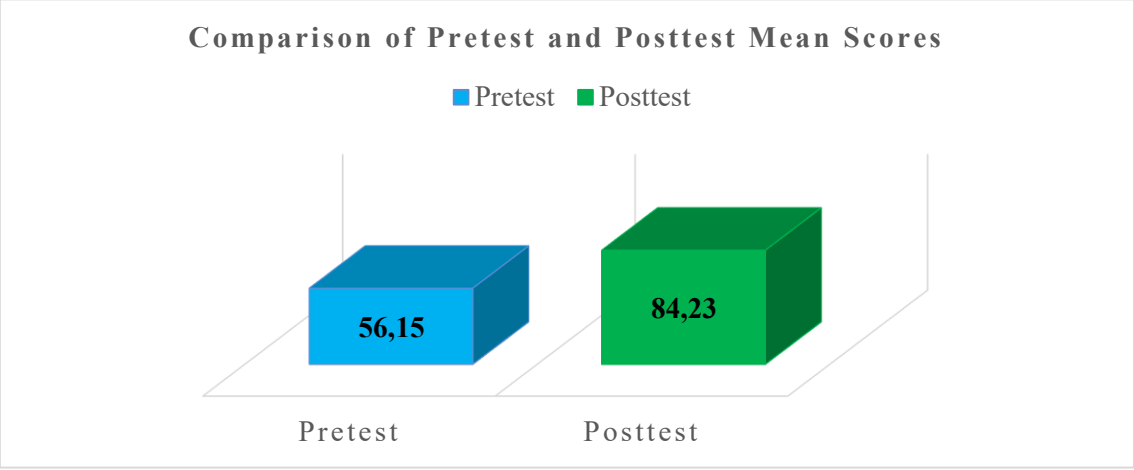

Figure 1. Comparison of Pretest and Posttest Mean Scores

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Figure 1 shows that the posttest mean score was markedly higher than the pretest mean score. The increase from 56.15 to 84.23 indicates that students demonstrated stronger performance in answering essay questions requiring interpretation, analysis, evaluation, inference, explanation, and self-regulation. This improvement is consistent with the expected learning outcomes of inquiry-based learning, which positions students as active participants in constructing knowledge. During the treatment, students were not limited to memorizing Pancasila concepts but were required to examine contextual issues, discuss possible solutions, and provide reasoned conclusions. This pattern aligns with findings from Maryam et al. (2020), Firdaus and Irianto (2024), and Khoirudin et al. (2023), who reported that inquiry learning can improve students' critical thinking by increasing their involvement in problem-solving and classroom discussion.

Before hypothesis testing was conducted, the normality of the pretest and posttest data was examined using the Shapiro-Wilk test. The Shapiro-Wilk test was selected because the sample consisted of 26 students, which is below 30 participants. For small samples, the Shapiro-Wilk test is commonly considered appropriate for determining whether data meet the assumption of normality (Quraisy, 2020). The significance level used in this study was 0.05. Data were considered normally distributed when the significance value was greater than 0.05 and not normally distributed when the significance value was lower than 0.05. The results of the normality test are presented in Table 4.

Table 4. Results of Normality Test

Data	Shapiro-Wilk Sig.	Criteria
Pretest	0.009	Not Normal
Posttest	0.507	Normal

Table 4 indicates that the pretest data had a significance value of 0.009, which was lower than 0.05. Therefore, the pretest data were not normally distributed. Meanwhile, the posttest data had a significance value of 0.507, which was higher than 0.05, indicating that the posttest data were normally distributed. Since one of the paired datasets did not meet the assumption of normality, hypothesis testing was continued using a non-parametric statistical procedure. This decision was methodologically appropriate because paired data that violate normality assumptions should be analyzed using a test that does not require normal distribution. Accordingly, the Wilcoxon Signed-Rank Test was used to determine whether the difference between pretest and posttest scores was statistically significant.

The Wilcoxon Signed-Rank Test was conducted to test the research hypothesis regarding the effect of inquiry-based learning on students' critical thinking skills. The null hypothesis stated that there was no significant difference between students' pretest and posttest scores, while the

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alternative hypothesis stated that there was a significant difference after the implementation of inquiry-based learning. The results are presented in Table 5.

Table 5. Results of Wilcoxon Signed-Rank Test

Test	Asymp. Sig. (2-tailed)	Decision
Pretest-Posttest	0.000	H_0 Rejected

Table 5 shows that the Asymp. Sig. (2-tailed) value was 0.000. Because this value was lower than the significance level of 0.05, the null hypothesis was rejected and the alternative hypothesis was accepted. This result indicates a statistically significant difference between students' pretest and posttest scores after the implementation of inquiry-based learning. Therefore, the statistical evidence confirms that inquiry-based learning had a significant effect on fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. The finding is consistent with previous research showing that inquiry-based learning improves critical thinking because students are actively involved in asking questions, investigating problems, evaluating information, and constructing evidence-based conclusions (Arifin et al., 2025; Dewi et al., 2025; Maryam et al., 2020; Sutiani et al., 2021).

In addition to the statistical results, documentation data collected during the research process showed positive changes in classroom participation. During inquiry-based learning, students were more actively involved in group discussions, problem analysis, questioning, opinion sharing, and presentation of investigation results. Students showed greater confidence in explaining ideas and responding to questions related to Pancasila values and contextual social issues. These classroom observations support the quantitative findings because increased participation is closely related to the learning mechanisms promoted by inquiry-based instruction. Inquiry-based learning provides opportunities for students to engage in collaborative reasoning, which has been identified in previous studies as an important factor in developing critical thinking and reflective judgment (Agbi & Yuangsoi, 2022; Irwanto, 2023; Muvid et al., 2022).

The documentation data also revealed that inquiry-based learning encouraged students to connect Pancasila Education material with everyday social experiences. Students worked collaboratively to analyze problems related to unity, cooperation, tolerance, and responsibility. They gathered information from learning materials, exchanged ideas in groups, and formulated conclusions based on their discussion results. This classroom pattern indicates that the inquiry process supported both cognitive and civic dimensions of learning. In the context of Pancasila Education, this is important because students are expected not only to understand national values but also to reason about how those values can be applied in real-life situations. Research on Pancasila-based education similarly emphasizes that meaningful civic learning should involve

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contextual activities that strengthen students' character, social awareness, and value internalization (Komalasari et al., 2024; Nurizka et al., 2020; Wulandari et al., 2023).

Overall, the empirical findings show that inquiry-based learning was successfully implemented in fourth-grade Pancasila Education at SD Negeri 20 Palu. The instrument validity and reliability tests confirmed that the measurement tool was appropriate for assessing students' critical thinking skills. The descriptive statistics showed a substantial increase in students' mean score from 56.15 to 84.23, accompanied by an improvement in minimum and maximum scores and a decrease in score variation. The normality test justified the use of a non-parametric hypothesis test, and the Wilcoxon Signed-Rank Test confirmed a statistically significant difference between pretest and posttest scores. The documentation data further supported these findings by showing increased student participation, collaboration, confidence, and engagement in inquiry-oriented classroom activities. These results indicate that inquiry-based learning contributed positively to the improvement of students' critical thinking skills in Pancasila Education.

DISCUSSION

The findings of this study indicate that inquiry-based learning significantly improved fourth-grade students' critical thinking skills in Pancasila Education at SD Negeri 20 Palu. This is evidenced by the increase in students' mean score from 56.15 in the pretest to 84.23 in the posttest, as presented in Table 3 and Figure 1. The Wilcoxon Signed-Rank Test in Table 5 further confirmed that the difference between pretest and posttest scores was statistically significant, with an Asymp. Sig. value of 0.000. These findings show that students' critical thinking performance improved after they participated in learning activities that emphasized problem identification, information gathering, discussion, analysis, and conclusion-making. This result supports the assumption that critical thinking develops more effectively when students are placed in learning situations that require them to reason actively rather than merely receive information passively.

From a theoretical perspective, the findings are strongly aligned with constructivist learning theory, which views knowledge as something actively constructed through interaction with learning experiences. Inquiry-based learning reflects this theoretical orientation because students are encouraged to investigate problems, propose ideas, evaluate information, and construct conclusions through guided learning activities. Gulo (2017) explained that inquiry learning involves students directly in discovering concepts through systematic and analytical thinking processes. The increase in students' posttest scores suggests that the inquiry process provided meaningful cognitive engagement, allowing students to move from simple recall of Pancasila concepts toward deeper interpretation and evaluation of civic problems. This finding also supports

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Prasetiyo and Rosy's (2021) argument that inquiry learning is a relevant strategy for developing critical thinking because it requires learners to formulate questions, examine evidence, and justify conclusions.

The improvement shown in Table 3 is particularly important because the increase occurred not only in the mean score but also in the minimum and maximum scores. The minimum score increased from 40 to 70, while the maximum score increased from 75 to 95. This pattern suggests that inquiry-based learning benefited students across different initial ability levels. Students who initially had weaker critical thinking performance were able to improve after being exposed to structured inquiry activities. The decrease in standard deviation from 9.214 to 6.487 also indicates that students' posttest scores became more consistent after the treatment. This result may be interpreted as evidence that inquiry-based learning provided a shared structure of reasoning that helped students engage in similar stages of thinking, including interpreting problems, discussing alternatives, evaluating ideas, and drawing conclusions. Comparable findings have been reported by Aiman and Hasyda (2020), Sari et al. (2021), and Ramlawati et al. (2025), who found that guided inquiry processes could improve critical thinking among learners with diverse levels of readiness.

The findings also confirm that critical thinking can be developed at the elementary school level when instructional activities are designed appropriately. Critical thinking is often regarded as a higher-order competency associated with older students; however, the present study demonstrates that fourth-grade learners are capable of engaging in analytical and reflective reasoning when learning tasks are contextualized and supported by teacher facilitation. Rahardhian (2022) emphasized that critical thinking involves reflective judgment, while Dermawan and Maulana (2023) highlighted the need to strengthen critical thinking in elementary civic learning. In this study, students were able to analyze problems related to unity, cooperation, responsibility, and Pancasila values when the learning process encouraged them to discuss and investigate contextual issues. This supports the view that critical thinking should not be postponed until secondary education but should be gradually developed from the elementary level through inquiry-oriented learning activities.

The results are consistent with previous studies that reported positive effects of inquiry-based learning on students' critical thinking. Maryam et al. (2020) found that inquiry learning improved students' critical thinking because learners were directly involved in investigation and collaborative learning. Sutiani et al. (2021) also showed that inquiry learning integrated with scientific literacy improved students' critical thinking skills, while Pahrudin et al. (2021) demonstrated that inquiry-based learning within the Indonesian curriculum enhanced students' analytical performance. Similar evidence was reported by Wale and Bishaw (2020), who found

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that inquiry-based learning improved critical thinking in language learning, indicating that inquiry learning is not limited to science subjects. Meta-analytic studies have also strengthened this evidence by showing that inquiry-based learning generally has a positive effect on critical thinking development (Arifin et al., 2025; Dewi et al., 2025). The present study extends these findings by demonstrating that inquiry-based learning is also effective in elementary Pancasila Education, a value-based civic subject that has received less attention in inquiry learning research.

The relevance of inquiry-based learning to Pancasila Education lies in the nature of the subject itself. Pancasila Education does not merely require students to memorize civic concepts, but also to understand, evaluate, and apply values in everyday life. Pancasila functions as a philosophical and ethical foundation of Indonesian national life, shaping civic responsibility, social justice, unity, and respect for diversity (Kameo & Prasetyo, 2021; Rani et al., 2020; Winarni, 2020). Therefore, learning Pancasila requires instructional strategies that enable students to reason about moral and social problems. In this study, inquiry-based learning provided opportunities for students to analyze contextual issues related to maintaining the unity of the Republic of Indonesia, discuss different perspectives, and formulate reasoned conclusions. This process strengthened the connection between conceptual understanding and practical civic reasoning.

The finding also supports studies specifically related to Pancasila and Citizenship Education. Firdaus and Irianto (2024) found that inquiry-based learning positively influenced students' critical thinking skills in Pancasila Education, particularly when students were engaged in meaningful problem-solving activities. Khoirudin et al. (2023) similarly reported that inquiry learning improved students' critical thinking in Pancasila and Citizenship Education by encouraging active participation and analytical discussion. The present study aligns with these findings but contributes a more specific context by focusing on fourth-grade students at SD Negeri 20 Palu. This context is important because elementary students require learning models that are not only cognitively stimulating but also developmentally appropriate. The results show that inquiry-based learning can be adapted to young learners when the teacher provides structured guidance, contextual problems, and collaborative discussion opportunities.

The documentation data further strengthen the statistical findings by showing that students became more active during classroom learning. Students participated in group discussions, asked questions, shared opinions, analyzed information, and presented investigation results. These observed changes are consistent with the central mechanism of inquiry learning, which transforms students from passive recipients into active participants. Irwanto (2023) and Muvid et al. (2022) emphasized that collaborative inquiry supports critical thinking because students must negotiate ideas, evaluate peer arguments, and construct shared explanations. In this study, collaborative

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inquiry encouraged students to express their reasoning more confidently and respond to questions related to Pancasila values. This indicates that the improvement in test scores was supported by observable changes in classroom engagement and intellectual participation.

The author's position is that inquiry-based learning should be understood not merely as an alternative teaching technique but as a necessary pedagogical orientation for Pancasila Education. Teacher-centered instruction may be insufficient for developing critical civic reasoning because it tends to emphasize concept transmission and memorization. In contrast, inquiry-based learning encourages students to examine problems, search for explanations, evaluate evidence, and make responsible judgments. This orientation is particularly important in Pancasila Education because students must learn to connect national values with real social situations. Studies on Pancasila-based education have emphasized that value internalization requires contextual, participatory, and reflective learning experiences (Komalasari et al., 2024; Maisyaroh, 2023; Nurizka et al., 2020; Wulandari et al., 2023). Therefore, inquiry-based learning offers a strong pedagogical pathway for integrating critical thinking with civic and moral education.

Nevertheless, the implementation of inquiry-based learning in elementary classrooms requires careful instructional design. Young learners may not immediately be able to conduct inquiry independently, especially if they are accustomed to teacher-centered learning. The success of inquiry learning depends on the teacher's ability to provide scaffolding, formulate accessible questions, organize group interaction, and guide students toward evidence-based conclusions. Verawati and Prayogi (2020) and Verawati et al. (2021) showed that inquiry learning becomes more effective when supported by reflective processes, while Aiman and Hasyda (2020) demonstrated the importance of guided inquiry for primary school learners. In the present study, teacher facilitation helped students follow the stages of inquiry and prevented learning activities from becoming unfocused. This indicates that inquiry learning should be implemented gradually, beginning with guided inquiry before moving toward more independent investigation.

The findings also imply that assessment practices in Pancasila Education should be improved to capture students' reasoning processes more accurately. Since critical thinking involves interpretation, analysis, evaluation, inference, explanation, and self-regulation, assessment should not rely solely on factual recall or multiple-choice items. The use of essay-based instruments in this study enabled students to express arguments, explain reasoning, and formulate conclusions. This approach is consistent with Mueller et al. (2020), who emphasized that critical thinking assessment should measure reasoning and inquiry-related competencies. Teachers are therefore encouraged to use contextual essay questions, reflective tasks, civic problem scenarios, and discussion-based assessments to evaluate students' critical thinking development in Pancasila Education.

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A practical solution emerging from this study is the integration of inquiry-based activities into regular Pancasila Education lessons through contextual civic problems. Teachers can design learning activities around issues such as cooperation in school, respect for diversity, responsibility in the classroom, fairness in peer interaction, and maintaining unity in daily life. These issues are close to students' experiences and can stimulate questioning, discussion, and moral reasoning. Inquiry learning can also be combined with local wisdom, digital media, or culturally relevant cases to make Pancasila values more concrete and meaningful. Research by Kurniawan et al. (2021), Suwandi (2023), Harjono et al. (2025), and Patras et al. (2025) supports the use of culturally grounded and contextual learning approaches to strengthen critical thinking and value-based learning. In elementary Pancasila Education, such integration can help students understand that civic values are not abstract concepts but principles that guide everyday decisions and social behavior.

CONCLUSION

This study confirms that inquiry-based learning provides a meaningful pedagogical pathway for strengthening fourth-grade students' critical thinking skills in Pancasila Education. In line with the research objective, the main finding shows that students demonstrated improved ability to interpret civic problems, analyze information, evaluate ideas, construct arguments, and formulate reasoned conclusions after participating in inquiry-oriented learning activities. This improvement indicates that critical thinking in elementary Pancasila Education can be developed when students are given structured opportunities to question, investigate, discuss, and reflect on contextual issues related to civic values.

The findings imply that Pancasila Education should not be limited to value transmission or conceptual memorization. Instead, it should be organized as an active learning space where students examine real-life social situations and connect Pancasila values with responsible decision-making. This study contributes to the body of knowledge by extending evidence on the effectiveness of inquiry-based learning to elementary civic and value education, an area that remains less explored than science and mathematics learning. Practically, the study offers teachers an instructional alternative for integrating critical thinking with character formation and civic understanding.

Future research should examine inquiry-based learning in broader school contexts, involve larger and more diverse samples, and apply experimental or quasi-experimental designs with comparison groups. Further studies may also explore how digital media, local wisdom, or culturally responsive learning resources can strengthen inquiry-based Pancasila Education.

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