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IMPLEMENTATION OF GUIDED INQUIRY AND DISCOVERY LEARNING IN STIMULATING STUDENTS' COGNITIVE AND PSYCHOLOGICAL DEVELOPMENT

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Abstract

Critical thinking skills are essential abilities that need to be developed in elementary school students through active and meaningful learning. The Guided Inquiry-Discovery learning model provides opportunities for students to investigate, discover concepts, analyze information, and draw conclusions. This study aimed to examine the effect of the Guided Inquiry-Discovery learning model on the critical thinking skills of fifth-grade students at SDN Semanggi Lor, Surakarta City. The study employed a quantitative approach using a quasi-experimental method with a Nonequivalent Control Group Design. The sample consisted of 54 students, including 27 students from Grade V-A as the control group and 27 students from Grade V-B as the experimental group. Data were collected using critical thinking skills tests administered as pretests and posttests. Data were analyzed using descriptive statistics and Analysis of Covariance (ANCOVA), with pretest scores as the covariate. The results showed that the mean critical thinking score in the control group increased from 68 to 70, while the experimental group increased from 62 to 85. The ANCOVA results showed an F-value of 5.901 with a significance value of 0.018 ($p < 0.05$), indicating a significant difference between the experimental and control groups after controlling for students' initial abilities. The R-squared value of 0.497 indicated that the model explained 49.7% of the variance in posttest scores. Therefore, the Guided Inquiry-Discovery learning model had a significant effect on the critical thinking skills of fifth-grade elementary school students. The model can serve as an alternative instructional approach to encourage students' active engagement in investigation, discovery, analysis, problem-solving, and conclusion drawing.

Keywords Guided Inquiry-Discovery, critical thinking skills, elementary school students, quasi-experiment, ANCOVA**.**

INTRODUCTION

Cognitive development is an important aspect of child development during the school-age period because it is related to the ability to acquire, process, understand, and use information when dealing with various problems (Hassan et al., 2026; Laura-De La Cruz et al., 2026). At the elementary school level, cognitive development becomes increasingly evident through students' abilities to observe, ask questions, connect various pieces of information, analyze problems, solve problems, and draw conclusions (Anwar et al., 2026; Herita Warni et al., 2026). These abilities provide an important foundation for the development of critical thinking skills, which are necessary for students to understand learning materials and deal with various situations in everyday life. Therefore, the learning process in elementary schools needs to be designed not only to deliver knowledge but also to stimulate students' thinking processes in an active and meaningful manner (Olimsar et al., 2026; Panggabean et al., 2025).

Critical thinking skills are abilities that enable students to identify problems, analyze information, provide evidence-based reasoning, consider various alternatives, and draw logical conclusions. Among elementary school students, these skills develop through learning experiences that provide opportunities to observe, ask questions, explore, examine information, and identify relationships between concepts. Thus, the development of critical thinking skills is influenced not only by students' individual abilities but also by the learning environment, which provides opportunities for students to actively engage in the thinking process (Prahastiwi & Aorta, 2025; Untari & Danik, 2025).

However, learning practices in elementary schools still face challenges in providing learning experiences that can stimulate critical thinking skills (Trinindi Eriswan Fitri et al., 2025). Learning that remains predominantly oriented toward teacher-delivered instruction may result in students receiving more information than constructing knowledge through learning experiences. This condition can limit

students' opportunities to develop their abilities to identify problems, analyze information, provide reasoning, solve problems, and draw conclusions. (Bell, 2010; Dafit & Mustika, 2021) Therefore, a learning model is needed that positions students as active subjects and provides learning experiences through inquiry and discovery processes.

One learning model that is relevant to these needs is Guided Inquiry. The Guided Inquiry model provides students with opportunities to engage in the inquiry process through activities such as observing phenomena, identifying problems, asking questions, collecting and analyzing information, and drawing conclusions with teacher guidance (Rahayu, 2021; Wibowo, 2024). The teacher's role as a facilitator provides the structure and support needed by students throughout the inquiry process, while students are still given opportunities to develop their thinking abilities. This process can provide cognitive experiences that encourage students to use information, establish connections between concepts, evaluate findings, and formulate conclusions based on the results of their investigations.

In addition to Guided Inquiry, Discovery Learning provides students with extensive opportunities to construct knowledge through the process of discovery. In Discovery Learning, students are encouraged to identify information, process data, discover relationships, and acquire concepts based on their learning experiences (Pava-Ripoll et al., 2026; Permatasari & Herman, 2024). This discovery process can foster curiosity, learning independence, analytical abilities, and problem-solving skills. These characteristics are relevant to the cognitive development of elementary school students because students are given opportunities to become directly involved in the process of constructing knowledge rather than merely receiving concepts presented by the teacher (Decker, 2025; Nurafni Octavia et al., 2023).

The integration of the characteristics of Guided Inquiry and Discovery Learning in the Guided Inquiry-Discovery model has the potential to provide learning experiences that are both structured and conducive to students' discovery of concepts through inquiry processes. Guided Inquiry provides direction and scaffolding throughout the learning process, while Discovery Learning provides opportunities for students to explore information and construct understanding based on their experiences. The combination of these characteristics can create a learning environment that encourages students to observe, question, collect information, analyze, solve problems, and draw conclusions. These activities are closely related to the indicators of critical thinking skills among elementary school students.

Several studies have examined the use of inquiry and discovery models in learning and have demonstrated their potential to improve learning activities and students' thinking abilities. Nevertheless, research specifically examining the effect of the Guided Inquiry-Discovery model on the critical thinking skills of fifth-grade elementary school students remains limited. Such research is important because fifth-grade students are at a developmental stage that allows them to engage in more complex learning experiences through inquiry, analysis, and discovery activities. Therefore, research examining the effect of Guided Inquiry-Discovery (Dafit & Mustika, 2021; Millania, 2024) skills can provide empirical evidence regarding the contribution of this learning model to the development of elementary school students' thinking abilities (Judijanto, 2025; Yuniarti et al., 2024).

Based on the above discussion, this study aims to analyze the effect of the Guided Inquiry-Discovery learning model on the critical thinking skills of fifth-grade students at SDN Semanggi Lor, Surakarta City. This study is expected to provide empirical contributions to the development of elementary school learning, particularly in the implementation of learning models that provide students with opportunities to actively engage in inquiry and discovery processes. The findings are also expected to serve as a consideration for teachers in selecting learning models that support the development of students' critical thinking skills.

RESEARCH METHODS

This study employed a quantitative approach using a quasi-experimental research design. The study aimed to examine the effect of the Guided Inquiry-Discovery learning model on the critical thinking skills of fifth-grade elementary school students. The research was conducted at SDN Semanggi Lor, Surakarta City, with the research subjects consisting of 54 fifth-grade students. The participants were divided into two classes, namely Class V-A consisting of 27 students and Class V-B consisting of 27 students.

The sampling technique used in this study was purposive sampling, in which the research subjects were selected based on predetermined considerations, including the similarity of grade level, learning characteristics, and classroom conditions (Haki et al., 2024). One class was assigned as the experimental group and received learning using the Guided Inquiry-Discovery model, while the other class served as the control group and received conventional learning according to the learning practices commonly applied by the teacher (Creswell, 2016; Harjanto, 2024).

Data were collected using a critical thinking skills test administered before and after the learning intervention. The pretest was given to determine the students' initial critical thinking skills, while the posttest was administered after the learning process to identify changes in students' critical thinking skills. The test items were developed based on indicators of critical thinking, including identifying problems, analyzing information, providing logical reasons, evaluating information or arguments, solving problems, and drawing conclusions.

Before being used in the study, the research instrument was examined for validity and reliability to ensure that it was appropriate for measuring students' critical thinking skills. The validity test was conducted to determine the extent to which each test item measured the intended construct, while the reliability test was used to determine the consistency of the instrument.

The data analysis was conducted using descriptive and inferential statistics. Descriptive analysis was used to present the mean, standard deviation, minimum, and maximum scores of the pretest and posttest for each group. Before hypothesis testing, prerequisite tests were conducted, including tests of normality and homogeneity. The hypothesis was then tested using an appropriate inferential statistical test to determine whether there was a significant difference in critical thinking skills between students who received the Guided Inquiry-Discovery learning model and those who received conventional learning. The statistical analysis was conducted at a significance level of 0.05 (Prahastiwi et al., 2024).

The research procedure consisted of three main stages: preparation, implementation, and evaluation. In the preparation stage, the researchers prepared the learning materials, research instruments, and learning scenarios based on the Guided Inquiry-Discovery model. In the implementation stage, the experimental class participated in learning activities involving guided investigation and discovery, while the control class followed conventional learning. In the evaluation stage, the posttest was administered to both groups, followed by data analysis to determine the effect of the Guided Inquiry-Discovery model on students' critical thinking skills.

RESULTS AND FINDINGS

This study involved 54 fifth-grade students at SDN Semanggi Lor, Surakarta City, consisting of 27 students from Grade V-A as the control group and 27 students from Grade V-B as the experimental group. The experimental group received instruction using the Guided Inquiry-Discovery learning model, while the control group received conventional instruction.

The descriptive analysis showed that the mean pretest score of the control group was 68, while the experimental group obtained a mean pretest score of 62. After the learning intervention, the mean posttest score of the control group increased to 70, whereas the experimental group increased to 85.

Table 1. Description of Students' Critical Thinking Skills Scores

Group	N	Mean Pretest	Mean Posttest	Peningkatan
Control (V-A)	27	68	70	2
Eksperimen (V-B)	27	62	85	23

Table 1 shows that the experimental group experienced an average improvement of 23 points, whereas the control group experienced an improvement of only 2 points. Although the experimental group had a lower initial score than the control group, its posttest score showed a substantially greater improvement after receiving instruction using the Guided Inquiry-Discovery learning model.

Because there was a difference in the initial abilities of the two groups, further analysis was conducted using Analysis of Covariance (ANCOVA), with the pretest score treated as the covariate and the posttest score as the dependent variable. The results of the ANCOVA are presented in Table 2.

Table 2. Results of the ANCOVA Test

Tests of Between-Subjects Effects					
Dependent Variable: postest					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	748.341[a]	2	374.170	28.113	.000
Intercept	252.136	1	252.136	18.944	.000
Peretes	378.324	1	378.324	28.425	.000
Kelompok	78.539	1	78.539	5.901	.018
Error	758.642	49	13.310		
Total	369517.000	54			
Corrected Total	1506.983	59			
a. R Squared = .497 (Adjusted R Squared = .479)					

The ANCOVA results showed that the pretest score had a significant effect on the posttest score, with F = 28.425 and Sig. = 0.000. This finding indicates that students' initial abilities were significantly associated with their final performance.

For the group variable, the analysis produced F = 5.901 with a significance value of 0.018. Since the significance value of 0.018 is lower than 0.05, there was a statistically significant difference between the experimental and control groups after controlling for the effect of pretest scores. Therefore, the research hypothesis was accepted, indicating that the Guided Inquiry-Discovery learning model had a significant effect on the critical thinking skills of fifth-grade students at SDN Semanggi Lor, Surakarta City.

The R-squared value of 0.497 indicates that the model involving pretest scores and group membership explained 49.7% of the variance in students' posttest scores. The remaining 50.3% may be attributed to other factors not included in the present analysis

The findings demonstrate that the implementation of the Guided Inquiry-Discovery learning model had a significant effect on the critical thinking skills of fifth-grade students at SDN Semanggi Lor, Surakarta City. This finding is supported by the ANCOVA results, which produced an F-value of 5.901 and a significance value of 0.018. Since the significance value was lower than 0.05, the difference in posttest scores between the experimental and control groups was statistically significant after controlling for students' initial abilities.

This finding is particularly important because the two groups did not have identical initial abilities. The mean pretest score of the control group was 68, whereas the experimental group obtained a mean of 62. Thus, the experimental group began the learning process with a lower level of critical thinking skills. However, after receiving the Guided Inquiry-Discovery intervention, the mean score of the experimental group increased to 85. In contrast, the control group increased only from 68 to 70. This difference in improvement indicates that the development of critical thinking skills was substantially greater among students who participated in Guided Inquiry-Discovery learning.

The effect of Guided Inquiry-Discovery on students' critical thinking skills can be understood through the characteristics of the learning model, which provide students with opportunities to engage directly in inquiry and discovery processes. During learning activities, students do not merely receive information from the teacher but are guided to identify problems, formulate questions, collect information, conduct investigations, analyze findings, discover concepts, and draw conclusions.

These activities stimulate various aspects of critical thinking. When identifying a problem, students learn to understand information and determine the issues that need to be investigated. During the investigation process, students are encouraged to collect, evaluate, and analyze relevant information. Furthermore, discussion and conclusion-drawing activities provide opportunities for students to articulate their reasoning, evaluate information, and formulate conclusions based on the evidence they have obtained.

Guided Inquiry provides structure and guidance throughout the investigation process, so students are not expected to independently discover answers without instructional support. The teacher functions

as a facilitator by providing guiding questions, prompts, and assistance when students encounter difficulties. Such guidance enables students to engage in systematic thinking while still providing sufficient opportunities for exploration and independent discovery.

Meanwhile, the Discovery Learning component gives students opportunities to identify relationships and construct concepts based on their learning experiences. The discovery process encourages students to connect information, compare different possibilities, and construct understanding based on observations and investigations. Therefore, the combination of structured inquiry and discovery creates a learning environment that supports the development of critical thinking skills.

The findings also indicate that the improvement in the experimental group was not merely descriptive but remained statistically significant after pretest scores were controlled through ANCOVA. This strengthens the interpretation that the difference in posttest performance was not solely attributable to differences in students' initial abilities. The R-squared value of 0.497 further indicates that the analytical model accounted for 49.7% of the variance in posttest scores, while the remaining variance may have been influenced by other factors beyond the scope of this study.

Overall, Guided Inquiry-Discovery can be considered an alternative instructional model for developing critical thinking skills among elementary school students. The model provides learning experiences that position students as active participants through investigation, discovery, discussion, analysis, problem-solving, and conclusion-drawing activities. Such experiences are relevant to the developmental needs of elementary school students in developing more complex and reflective thinking abilitiessd.

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the research findings and data analysis, it can be concluded that the Guided Inquiry-Discovery learning model had a significant effect on the critical thinking skills of fifth-grade students at SDN Semanggi Lor, Surakarta City. This finding was demonstrated by the increase in the mean score of the experimental group from 62 in the pretest to 85 in the posttest, while the control group increased from 68 to 70. The ANCOVA results produced an F-value of 5.901 with a significance value of 0.018 ($p < 0.05$), indicating a significant difference between the experimental and control groups after controlling for students' initial abilities. The R-squared value of 0.497 indicated that the variables included in the analytical model explained 49.7% of the variance in posttest scores.

These findings indicate that Guided Inquiry-Discovery provides learning experiences that encourage students to actively identify problems, conduct investigations, discover information, analyze problems, solve problems, and draw conclusions. Therefore, the Guided Inquiry-Discovery learning model can be used as an alternative instructional model to support the development of critical thinking skills among elementary school students.

Suggestions

Based on the findings of this study, several suggestions can be proposed.

1. **For teachers**, the Guided Inquiry-Discovery learning model can be used as an alternative instructional approach to develop students' critical thinking skills. Teachers should provide appropriate guidance and stimulating questions to help students conduct investigations and discover concepts gradually.
2. **For schools**, the findings can serve as a consideration for promoting learning models that emphasize student activity, investigation, problem-solving, and the development of higher-order thinking skills.
3. **For future researchers**, further studies could involve a larger number of schools and participants, longer intervention periods, and additional variables that may influence students' critical thinking skills. Future research could also examine the effects of Guided Inquiry-Discovery on other learning outcomes, such as problem-solving skills, creativity, learning independence, and collaboration skills.

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