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The Influence of Guided Inquiry Learning Model on Students' Learning Activities and Critical Thinking Skills

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Abstract: This research is motivated by the low learning activity and critical thinking skills of students in science learning in elementary schools. Students tend to be passive and lack understanding of the material presented. One effort that can be made is to apply the Guided Inquiry learning model. This study aims to determine the effect of the guided inquiry learning model on students' learning activities and critical thinking skills in science learning. The research conducted was a quantitative study using a quasi-experimental design involving two groups, namely the control group using conventional methods and the experimental group using the guided inquiry learning model. Data were collected through pretest and posttest. The results showed that the experimental group that applied the guided inquiry learning model experienced a significant increase compared to the control group using conventional learning. After being treated using the inquiry learning model, learning activities increased by 30.87% and critical thinking skills increased by 73.52%. The t-test showed a significant difference (p = 0.000) both in learning activities and critical thinking skills. For the correlation test, it was obtained as much as 0.832 and the percentage of the influence of the learning activity variable and critical thinking ability was 69.20%. Then in the N-gain analysis, the learning activity of the experimental group had an N-gain of 0.76 in the high category while the control group data was obtained as much as 0.45 which was in the medium category. The N-Gain analysis of critical thinking ability for the experimental group was 0.76 in the high category, while for the control class it was 0.4988 in the medium category.

Keywords: Critical thinking skills; Guided inquiry; Learning activities; Science

Introduction

Education is one of the fundamental factors in developing quality human resources. Education is an absolute necessity that must be fulfilled throughout life. Without education, it is impossible for a group of people to live and develop in line with their ideals towards progress, prosperity, and happiness, according to their concept of life outlook (Livingston et al., 2022). In Indonesia, basic education plays an important role in forming the foundation of students' knowledge, attitudes, and skills. In order for the achievement of educational goals to take place effectively, much depends on the learning process carried out (Fandos-Herrera et al., 2023; Chazan et al., 2022). This process helps individuals develop the abilities, attitudes, an.d skills needed to adapt and interact effectively with changes and challenges in their environment (Ediyanto et al., 2020; Walk, 2023).

In elementary education, science or Natural Sciences (IPA) learning has an important role in improving the quality of education, especially producing a quality generation, namely humans who are able to think critically, creatively, and logically

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(Hillary et al., 2023; Lestari & Wardani, 2022). However, the implementation of science learning in elementary schools is often faced with various challenges, both in terms of teaching models and the condition of students who tend to be passive and less interested in participating in learning. In the Independent Learning Curriculum (KMB), science learning is packaged in the form of IPAS (Natural and Social Sciences) subjects. The implementation of the Independent Learning Curriculum in Indonesia is in line with the industrial revolution 4.0 towards the Society 5.0 era, which requires teachers to be more responsive, creative, and innovative in carrying out the learning process (Riskiyah et al., 2024; Varlık et al., 2024).

The Independent Curriculum focuses more on the character and morals of students by implementing the Pancasila profile as regulated in Permendikbud No. 22 of 2022 concerning the strategic plan of the Ministry of Education and Culture for 2020-2024 (Anggini et al., 2024). In the context of science learning, the Independent Curriculum emphasizes the importance of a creative and hands-on experience-based approach to help students connect scientific concepts with everyday phenomena. Although the Independent Curriculum has introduced a more innovative and relevant approach, the implementation of science learning in elementary schools still faces various challenges. One of the problems that often arises in science learning in elementary schools is the low learning activity and the ability of teachers to apply learning models, resulting in low critical thinking skills in students.

As stated in research Achmad et al. (2023) and Mulyanti et al. (2023), the low critical thinking skills of students can be explained by several reasons, one of which is the low learning activities that occur in class. Teachers often use monotonous learning models, such as lectures and assignments, without utilizing innovative learning models. The learning models applied have not been able to help students process information optimally during the learning process. As a result, most students are only able to solve science problems at cognitive levels C1 and C2. In science learning, critical thinking skills play a very important role. Critical thinking involves the ability to analyze information, evaluate arguments, and draw conclusions based on existing data and evidence. The results of observations on August 23-27, 2024 showed that student learning activities in science subjects were relatively low. This can be seen from the lack of student activity in asking questions or expressing opinions after the material is delivered. Students tend to wait for direction from the teacher, and only a few are actively involved when there are practicums or group discussions. Passive students seem more dependent on their group mates than participating independently. Several factors that influence low student activity include a lack of understanding of the material presented, so they tend to be passive in the learning process.

Lack of self-confidence also prevents them from asking questions or expressing opinions, while a less supportive classroom atmosphere can be a barrier to student involvement. In addition, many students are more comfortable waiting for direction from the teacher than thinking for themselves or being actively involved in discussions. Teachers also still use traditional learning models, such as lectures in front of the class, followed by giving assignments which are then discussed together. Science learning is difficult to do with the lecture method because this subject involves thinking skills, working, scientific attitudes, and communication (Bayona & Durán, 2024). Furthermore, for critical thinking ability data taken from the analysis of questions on the results of the PTS exam in the odd semester of the 2024/2025 academic year, the questions tested still do not fully encourage students to think critically and hone their problem-solving skills. To develop students' critical thinking skills, questions are needed that encourage them to analyze, evaluate, and formulate new ideas. Critical thinking skills are high-level thinking skills used to solve problems, with the aim of training and developing human thinking power (Ma'rifah & Mawardi, 2022; Altun & Yildirim, 2023).

To overcome these problems, innovation is needed in learning models that can increase learning activities and stimulate students' critical thinking skills in science learning. Every teacher must have the ability to process learning as interestingly as possible (O'Reilly et al., 2022). Science learning is focused on student experience by implementing an independent learning system, namely finding answers to their own problems to increase understanding of concepts (Jundu et al., 2020). Science learning requires the right learning model so that it can be applied effectively in the teaching and learning process. One of the learning models that can help teachers in the learning process is the inquiry model. Inquiry learning will make a significant contribution to students' skills in thinking, working, and communicating, as well as improving scientific attitudes (Muhamad Dah et al., 2024; Hasmawati et al., 2023). Learning in the classroom requires varied treatments to ensure the quality of the student learning process. The inquiry learning model will provide a new learning experience for students, with teacher guidance and direction using the right procedures to improve the quality of learning.

Students cannot learn independently without teacher guidance and direction that guides them towards the ideal learning process (Darling-Hammond et al., 2024). Therefore, the right inquiry learning model is the guided inquiry learning model. The guided

inquiry learning model has become one of the approaches that has attracted the attention of many researchers in recent years. This model is known to be able to improve critical thinking skills, problem-solving skills, and student learning activities. Various previous studies (Stroebe, 2020), stated that there was a difference in the average scores of the two classes. Which shows that the implementation of the learning model, namely the class that uses the guided inquiry model, is more positive towards student activities and learning outcomes compared to the class that is given a direct learning model. This illustrates that there is a significant influence between the guided inquiry learning model on student learning outcomes and activities in science subjects. The popularity of this model can be seen from the many recent studies that continue to explore its effectiveness in various subjects.

Method

The research conducted is a quantitative research type. Data in quantitative research are in the form of numbers and analysis using statistics. The research method used is experimental research. This research was conducted in class IV SDIT Adzkia I Padang, academic year 2024/2025. This study used 2 samples, namely the experimental class sample and the control class sample. Sampling was carried out using the probability sampling technique, which is a sampling technique that provides an equal opportunity for each member of the population to be selected as a sample member (Ahmed, 2024). An instrument is a measuring tool for variables in research that are used to test the hypotheses proposed in the study. The variables in this study are learning activities and critical thinking skills. The instruments used in this study were questionnaires and test sheets. A questionnaire is a data collection technique that is carried out by giving a set of written questions or statements to respondents to answer. This questionnaire contains questions or statements that must be answered or responded to by respondents.

The test instrument as a data collection tool is a series of questions or problems that aim to measure the skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups. Data collection techniques in this study are observation, interviews, questionnaires, tests, and documentation. To collect initial data, researchers used data collection techniques through observation, interviews, and documentation activities. Data analysis techniques in this study are t-tests and correlation tests. This test is carried out after the prerequisite test, namely after the data is normal and homogeneous.

Result and Discussion

Description of Student Learning Activity Data

Students in the control and experimental classes were given a pretest to measure initial learning activities. Learning was carried out in two meetings; the control class used a direct learning model, while the experimental class used a guided inquiry model. After learning, students were given a posttest to see changes in learning activities. The research instrument was a science learning activity questionnaire consisting of 30 statements.

Table 1. Learning Activities of Students in the Control Class and Experimental Class

	Control		Experiment	
	Pre-test	Post-test	Pre-test	Post-test
Amount	1932.50	2685	2146	2808
Mean	71.53	87.71	71.53	93.61

Based on Table 1, the average pre-test of student learning activities in the control class was 71.53 and in the experimental class was 71.53, both of which were in the poor category, with the average learning activity in the experimental class being slightly lower than the control class. After the treatment was given, the average post-test in the experimental class increased significantly to 93.61 with a very good category, while in the control class it increased to 87.71 with a good category. This increase shows that student learning activities in the experimental class after treatment were higher than in the control class. The results of this study are in line with previous studies (Mursali et al., 2023; Aiman et al., 2020), which showed that the guided inquiry model was effective in increasing students' learning activities and critical thinking skills through an interactive and participatory learning atmosphere.

Description of Students' Critical Thinking Skills Data

The critical thinking ability test consists of 10 multiple-choice questions validated by two expert lecturers (content and language). Test result data were obtained from pre-test and post-test in control and experimental classes.

Table 2. Learning Activities of Students in the Control Class and Experimental Class

	Control		Experiment	
	Pre-test	Post-test	Pre-test	Post-test
Amount	1290	2080	1510	2620
Mean	44.48	71.72	50.33	87.33

Based on Table 2, the average pre-test of students' critical thinking skills in the control class was 44.84 and in the experimental class 50.33, both of which are low.

After learning, the post-test score in the control class increased to 71.72, and in the experimental class to 87.33. The increase in the experimental class was more significant than the control class, indicating that the guided inquiry learning model is effective in improving students' critical thinking skills. The application of the guided inquiry model has been proven to be effective in improving students' learning activities and critical thinking skills. Research Pedaste et al. (2015), that this model encourages students to actively ask questions, observe, experiment, and conclude. Somo et al. (2024), Tharayil et al. (2018), Wale et al. (2020), also stated that this model is effective in increasing learning activities, especially when combined with pictorial riddles. Salmon et al. (2021) and Fadhilah et al. (2024) emphasized the effectiveness of guided inquiry in increasing active involvement and critical thinking skills through systematic learning stages.

Hypothesis Testing

The first hypothesis tests the effect of guided inquiry model on students' learning activities. Independent sample t-test was conducted on the learning activity scores before and after learning in the control and experimental classes.

Table 3. Hypothesis Testing of Student Learning Activity t-Test

Stage	Sig. (2-tailed)	t	Mean Difference	Description
Preetest	0.22	1.23	2.00	There is no significant difference
Posttest	0.000	-6.414	-7.89	There is a significant difference

In table 3, the results of the independent samples t-test on the pre-test of learning activities show a significance value of 0.220 > 0.05, meaning that there is no significant difference between the control and experimental classes before learning. In the post-test, a significance value of 0.000 < 0.05 was obtained, meaning that there is a significant difference after learning. Thus, the alternative hypothesis (H_1) is accepted and the null hypothesis (H_0) is rejected, indicating that the guided inquiry model has a significant effect on student learning activities. The second hypothesis tests the effect of the guided inquiry model on students' critical thinking skills. The independent samples t-test was conducted on the critical thinking skills scores before and after learning in the control and experimental classes.

Table 4. Hypothesis Testing of Critical Thinking Ability T-Test

Stage	Sig. (2-tailed)	t	Mean Difference	Description
Pre-test	0.14	-1.48	5.85	There is no significant difference
Post-test	0.000	-5.08	18.27	There is a significant difference

In table 4, the results of the independent samples t-test on the pre-test of critical thinking skills show a significance value of 0.14 > 0.05, meaning that there is no significant difference between the control and experimental classes before learning. In the post-test, a significance value of 0.000 < 0.05 was obtained, indicating a significant difference after learning. Thus, the alternative hypothesis (H_1) is accepted and the null hypothesis (H_0) is rejected, which means that the guided inquiry model has a significant effect on students' critical thinking skills. This study conducted a correlation test to analyze the relationship between learning activities and students' critical thinking skills.

The results of the product moment correlation analysis showed a Pearson Correlation value of 0.832 with a significance of 0.000, which means that there is a strong and significant relationship between learning activities and students' critical thinking skills. The significance value of the linearity test of 0.000 also shows that the relationship between the two variables is linear. This means that the higher the students' learning activities, the higher their critical thinking skills in science learning with a guided inquiry model. The N-Gain test was conducted to determine the increase in students' learning activities before and after learning in the experimental and control classes. This measurement compares the pre-test and post-test values with a maximum score of 100. The greater the N-Gain value, the higher the increase in students' learning activities after treatment.

Table 5. Hypothesis Test T-Test Student Learning Activities

		Correlations	
		Activity	Critical thinking
Activity	Pearson Correlation	1	.832**
	Sig. (2-tailed)		.000
	N	30	30
Critical thinking	Pearson Correlation	.832**	1
	Sig. (2-tailed)	.000	
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6. Results of the N-Gain Test of Students' Learning Activities and Critical Thinking Skills

Class	N-Gain Learning Activities	Category	N-Gain Critical Thinking Skills	Category
Control	0.45	Medium	0.49	Medium
Experiment	0.76	High	0.76	High

Based on table 6, the average N-Gain of learning activities in the control class was 0.45 (moderate category) and in the experimental class 0.76 (high category). In critical thinking skills, the average N-Gain of the control class was 0.49 (moderate) and the experimental class 0.764 (high). These results indicate that the guided inquiry learning model is more effective in improving students' learning activities and critical thinking skills than the direct learning model, as indicated by the higher average N-Gain in the experimental class.

The Effect of the Guided Inquiry Learning Model on Students' Learning Activities and Critical Thinking Skills

Learning activities are the physical and mental involvement of students during the learning process. The more actively students are involved, the greater their chances of understanding the material and achieving optimal learning outcomes (Ramdhani et al., 2024; Alp Christ et al., 2022). In this study, learning activities were observed through 14 indicators, such as reading, comparing, asking, discussing, conducting experiments, and solving problems. Based on the results of the independent samples t-test, the post-test results showed a value of 0.000 <0.05, which means there is a significant difference after learning. The average learning activity in the control class increased from 71.53 to 87.71, while in the experimental class it increased from 71.53 to 93.61. The N-Gain value of the control class was 0.45 (medium category) and the experimental class was 0.76 (high category), proving that the guided inquiry model was more effective in improving students' learning activities. A similar thing can be seen in critical thinking skills (Zulmaulida et al., 2018).

The results of the independent samples t-test showed a significance value in the post-test obtained a value of 0.000 <0.05, indicating a significant difference after treatment. The average N-Gain of critical thinking skills in the control class was 0.49 (medium category) and in the experimental class 0.76 (high category). These results indicate that the application of the guided inquiry model is effective in improving students' learning activities and critical thinking skills compared to the direct learning model. This study is in line with the results of previous studies (Nisa et al., 2018), which state that the guided inquiry model can increase activeness and critical thinking skills. The difference is, this study presents novelty in the subjects of grade IV elementary school students, science material, and more complete learning activity instruments, namely 14 indicators, compared to previous studies which generally only used 4-8 indicators. Thus, this study not only proves the effectiveness of the guided inquiry model but also contributes to the development of learning activity observation instruments and their application in elementary schools.

Relationship between Student Learning Activities and Critical Thinking Skills

The results of the study show that the guided inquiry learning model has a significant effect on student learning activities. This increase in activity encourages student involvement in activities such as reading, asking questions, discussing, solving problems, and conducting experiments. In addition, high learning activities have a positive impact on students' critical thinking skills (Marnita et al., 2021). The linearity test shows a significance value of 0.000 <0.05, meaning that there is a significant relationship between learning activities and critical thinking skills. The data in Table 5 shows a positive relationship, where the higher the students' learning activities, the higher the critical thinking skills achieved. This finding is in line with research Hasannah et al. (2021) and Faizin et al. (2024), which states that learning activities contribute significantly to the development of critical thinking skills (Arthi & Gandhimathi, 2025; Golden, 2023). The more actively students are involved in learning, the better their ability to analyze, express opinions, and draw conclusions.

Conclusion

Based on the research that has been conducted, it can be concluded that the guided inquiry learning model has a significant effect on students' learning activities and critical thinking skills in science learning in grade IV of elementary school. This is evidenced by an increase in the average score of learning activities and critical thinking skills of students in the experimental group compared to the control group. The results of the hypothesis test also showed a significant difference between the two groups after the treatment was given. Thus, the guided inquiry learning model can be an innovative alternative in learning in elementary schools, especially for science subjects. This model encourages active student involvement through the stages of inquiry, such as observing, asking, experimenting, and concluding, which have proven effective in improving learning activities as well as students' critical thinking

skills. However, this study has limitations in the scope of the material which only focuses on science learning in one elementary school with a limited number of samples. Therefore, it is recommended that further research develop the application of the guided inquiry model in various other subjects and more diverse levels of education, in order to obtain a broader and deeper picture of the effectiveness of this learning model.

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