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Effect of Guided Inquiry Learning Model on Students Creative Thinking Skills in the Classification of Living Things Material

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Abstract: 21st-century skills include several important components, including creative thinking. One skill that needs to be developed through the learning process in schools is creative thinking, as it helps students find solutions to problems and independently construct conceptual understanding. This study aims to determine the effect of the guided inquiry learning model on students' creative thinking ability in the topic of classification of living organisms. This research is a quantitative study using a quasi-experimental design with a nonequivalent control group. The study population consisted of all seventh-grade students at SMP Negeri 17 Medan. The research sample was selected using a cluster sampling technique and consisted of two classes: class VII-7, the experimental class taught using the guided inquiry learning model, and class VII-9, the control class taught using direct instruction. The research instrument used was a test of creative thinking ability. The data were analyzed by testing the hypothesis using an Independent Samples t-test and normalized gain (N-Gain) analysis. The study's results indicate that the guided inquiry learning model affects students' creative thinking abilities. The experimental class obtained an average posttest score of 81.56 with an N-Gain value of 63.92, which falls into the quite effective category, while the control class obtained an average posttest score of 69.38 with an N-Gain value of 44.28, which falls into the quite effective category. These results indicate that students' creative thinking ability, when taught using the guided inquiry learning model, is better than that of students taught using conventional learning methods.

Keywords: Classification of Living Things; Creative Thinking; Guided Inquiry.

Introduction

In the 21st century, students are required to possess higher-order thinking skills, one of which is creative thinking ability [1]. Creative thinking has become an essential skill in facing global challenges and competition, as it enables individuals to generate new ideas or solutions in diverse and flexible ways [2]. In the academic context, creative thinking encompasses several key dimensions, including fluency in generating ideas, flexibility in shifting perspectives, elaboration in developing ideas, and originality in producing novel and authentic ideas. The development of these abilities requires a supportive learning ecosystem that encourages active student engagement [3].

Creative thinking ability plays a crucial role in science learning. Science is a field of study that examines natural phenomena and their relationships with everyday life, producing knowledge in the form of scientific concepts and facts [4]. However, in practice, science learning tends to be less interactive, as it often emphasizes lower-level cognitive aspects such as memorization and note-taking rather than the development of new ideas and problem-solving skills [5]. Furthermore, the abstract nature of many science concepts demands high-level thinking skills, causing many students to perceive science as a difficult, confusing, and less engaging subject [6].

Barriers to the development of creative thinking skills are not only found at the primary education level, but also remain a significant issue at the junior high school level [7]. Low levels of students' creative thinking ability are influenced by both internal and external factors. Internal factors include intrinsic motivation, cognitive styles, personality traits, and students' prior knowledge of learning materials [8]. In addition, low student participation during the learning process, such as a lack of confidence in asking questions or expressing opinions, further inhibits the development of creative thinking skills.

Students' learning processes also significantly impact the development of creative thinking abilities. Learning activities that are engaging, interactive, and provide opportunities for exploration have been shown to effectively stimulate students' creativity [9]. Students' responses to learning are an important aspect, as they reflect how students perceive, understand, and engage in learning activities aimed at developing creative thinking skills [10]. Based on the analysis of student response questionnaires using a Likert scale, the overall student response was categorized as moderate, with a percentage of 56%. More specifically, the learning method indicator reached 55%, while the student learning readiness indicator reached 53%, both of which were classified as moderate. These findings indicate that students have not yet demonstrated optimal enthusiasm, attention, or readiness to learn during the learning process. As a result, the learning stimuli provided have not been sufficient to foster active engagement and strong curiosity.

The results of pre-research interviews with science teachers at SMP Negeri 17 Medan revealed that the learning process has not optimally trained students' creative thinking

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abilities. Students are more frequently directed to memorize and record learning materials without being given adequate opportunities to explore ideas through experiments, discussions, or problem-solving activities. Classroom observations further indicated that when students were given tasks or questions requiring the generation of new ideas, most struggled, with only 2–3 students in each class demonstrating original ideas. Although teachers have attempted to encourage creativity through simple experimental activities, the outcomes have not been optimal due to limited instructional time, limited learning facilities, and the need to enhance teachers' competence in implementing innovative learning models. Moreover, tasks and assessment items specifically designed to develop creative thinking skills are still rarely provided, resulting in students not being accustomed to consistently practicing these skills.

Recent studies have reported that the guided inquiry learning model positively affects students' higher-order thinking skills, including creative thinking. However, several inconsistencies and limitations remain. Some studies show significant improvement, while others indicate moderate gains depending on learning context, student characteristics, and implementation quality. In addition, most previous studies focus on general science topics or different grade levels, with limited empirical evidence specifically addressing the classification of living organisms among seventh-grade students. Furthermore, classroom-based implementations in contexts similar to Indonesian junior high schools are still relatively underexplored, particularly those that explicitly measure all indicators of creative thinking (fluency, flexibility, originality, and elaboration). Therefore, there is a clear research gap regarding how guided inquiry learning can effectively enhance creative thinking skills in a specific topic, grade level, and local educational context. This study offers novelty by focusing on seventh-grade students, applying guided inquiry to the topic of classification of living organisms, and comprehensively analyzing students' creative thinking skills based on key indicators within the context of SMP Negeri 17 Medan.

One alternative solution to address these challenges is the implementation of the guided inquiry learning model, which aligns with constructivist learning theory in science education, where students construct their own knowledge through direct learning experiences [11]. In this model, teachers act as facilitators who provide guidance and direction, while students actively explore, observe, and independently discover concepts [12]. This learning process enables students not only to understand scientific concepts but also to develop creative thinking skills through reasoning, connecting information, and generating new ideas.

The stages of guided inquiry learning encourage students to develop creative thinking skills, starting from formulating questions and identifying problems to discovering solutions based on observations and experimental results [13]. This process directly stimulates fluency, flexibility, originality, and elaboration, which are the main indicators of creative thinking ability in science learning [14]. Previous studies have also shown that the use of guided inquiry learning significantly improves students' creative thinking abilities compared to conventional learning methods, due to the alignment between inquiry stages and creative thinking indicators, as well as the shift in learning focus from memorization to active problem-solving [15]. This approach is particularly relevant for learning materials closely related to everyday life, such as the classification of living organisms, which provides real-world contexts that enable students to engage creatively [16].

The topic of classification of living organisms is one of the important concepts in science learning that is highly suitable for the implementation of the guided inquiry learning model [17]. This topic requires students to conduct observations, compare characteristics, and classify living organisms based on similarities and differences in their traits [18]. Such activities have strong potential to stimulate creative thinking skills because they involve direct observation, analysis, and the formulation of generalizations based on empirical evidence. However, in classroom practice, this material is still often taught using conventional approaches without providing meaningful learning experiences for students.

Based on the above discussion, the guided inquiry learning model is believed to be an effective alternative for developing students' creative thinking abilities, particularly in learning the classification of living organisms.

Research Methods

This research was conducted at UPT SMP Negeri 17 Medan, located at Jalan Kapten M. Jamil Lubis No. 108, Bandar Selamat, Medan Tembung District, Medan City, North Sumatra, during the even semester of the 2025/2026 academic year. The study focused on science learning, specifically the classification of living organisms, for seventh-grade students. This study employed a quantitative, quasi-experimental design with a Pretest–Posttest Control Group Design to determine the effect of the guided inquiry learning model on students' creative thinking abilities by comparing their performance before and after the treatment.

The population of this research consisted of all seventh-grade students of SMP Negeri 17 Medan, totalling 343 students across 11 classes. The sampling technique used was cluster random sampling, in which two classes were randomly selected. Class VII-7, comprising 32 students, was assigned as the experimental class, while Class VII-9, comprising 31 students, served as the control class. The independent variable in this study was the guided inquiry learning model, defined as a student-centered learning approach involving stages of problem orientation, hypothesis formulation, experimentation, data analysis, and conclusion drawing with teacher guidance. Meanwhile, the dependent variable was students' creative thinking ability, defined as the ability to generate ideas characterized by fluency, flexibility, originality, and elaboration, as measured through essay test scores.

The treatment was conducted over four meetings (40 minutes). In the experimental class, the guided inquiry learning model was implemented through several stages, including problem orientation, formulating questions and hypotheses, conducting observations or experiments, analyzing data, drawing conclusions, and reflecting on the learning process. In contrast, the control class received instruction through the direct instruction model, which

emphasized explanation, demonstration, and assignment without inquiry-based exploration.

The research instrument used in this study was an essay test consisting of five questions, designed to assess creative thinking indicators: fluency, flexibility, originality, and elaboration. Each item was constructed to measure specific aspects of creative thinking, with one item integrating multiple indicators. The scoring rubric ranged from 0 to 4, where 0 indicated no or irrelevant response, and 4 indicated a highly relevant, detailed, and original response.

The instrument was validated through expert judgment to ensure content validity and alignment with learning objectives and creative thinking indicators. Empirical validity was tested using product-moment correlation, and all items were declared valid. The reliability test using Cronbach's Alpha showed a coefficient greater than 0.70, indicating that the instrument was reliable. Data were collected through pretest and posttest, administered before and after the treatment to measure students' initial ability and improvement in creative thinking.

Data analysis was conducted using IBM SPSS Statistics version 26 with a significance level of 0.05. The analysis techniques included the Shapiro–Wilk test to examine data normality, Levene's test to assess homogeneity of variance, and the Independent Samples T-Test to determine differences in creative thinking ability between the experimental and control classes. In addition, the N-Gain test was used to assess the effectiveness of the guided inquiry learning model in improving students' creative thinking.

Results and Discussion

Students' creative thinking ability was measured using a pretest and a posttest, both administered as five essay questions. The pretest was conducted to assess students' initial creative thinking ability before the implementation of the learning treatment, while the posttest was used to measure students' creative thinking ability after the learning process. The pretest results showed that students in both the experimental and control classes had relatively equivalent initial abilities and had not yet met the minimum mastery criteria.

Table 1. Mean and Standard Deviation of Students' Creative Thinking Ability

No.	Class	Pre-test Mean	SD	Post-test Mean	SD
1	Control	43.5	10.72	69.3	9.05
2	Experiment	47.9	10.69	81.5	8.65

Based on Table 1, the mean pretest score of the experimental class was 47.97, while that of the control class was 43.59, indicating that students' initial creative thinking abilities in both classes were low and relatively comparable. After the learning intervention, the experimental class showed a substantial improvement with a posttest mean score of 81.56, whereas the control class achieved a mean score of 69.38. These results indicate that the guided inquiry learning model produced a greater improvement in students' creative thinking ability than the direct instruction model.

The homogeneity test was conducted to determine whether the variances of the experimental and control classes were equal. Levene's Test was applied with a significance level of 0.05. The results of the homogeneity test are presented in Table 2.

Table 2. Homogeneity Test Results

Data	Lavene Statistic	Sig.
Pretest	.023	.879
Posttest	.323	.571

Based on Table 2, the significance value of the pretest data was 0.879, and the posttest data was 0.571. Since both values are greater than 0.05, it can be concluded that the variances of the experimental and control classes were homogeneous. Therefore, the homogeneity assumption was fulfilled, and the data were appropriate for further parametric statistical testing.

Hypothesis testing was conducted using an independent-samples t-test on posttest scores to determine the effect of the guided inquiry learning model on students' creative thinking ability.

Table 3. Independent Sample T-Test Results

Class	N	Sig. (2-Tailed)
Control	32	0.000
Experimental	32	

The analysis showed a significance value of 0.000, which is lower than the significance level of 0.05. Therefore, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_a) was accepted. This result indicates that the guided inquiry learning model had a significant effect on students' creative thinking ability in the topic of classification of living organisms. The effectiveness of the guided inquiry learning model in improving students' creative thinking ability was measured using the N-Gain test, which compares pretest and posttest scores.

Table 4. N-Gain Test Results

Class	N-Gain (%)	Interpretation
Experimental	63.92	Quite Effective
Control	44.28	Quite Effective

The N-Gain results indicate that the experimental class achieved greater improvement than the control class. The experimental class obtained an N-Gain score of 63.92%, categorized as quite effective, while the control class obtained 44.28%, categorized as quite effective. This categorization has been standardized to avoid inconsistencies in terminology. Although both classes showed improvement, the experimental class consistently achieved higher posttest scores and N-Gain values. These findings indicate that the guided inquiry learning model is more effective than direct instruction in improving students' creative thinking skills in the classification of living organisms.

The results of this study indicate that the guided inquiry learning model has a significant effect on students' creative thinking ability. However, beyond statistical significance, it is important to interpret how and why this improvement occurred. The findings suggest that the increase in students' creative thinking ability is closely related to the structured learning experiences provided through the guided inquiry stages, which actively engage students in constructing knowledge.

In this study, the implementation of guided inquiry learning followed systematic stages aligned with the method section, namely: problem orientation, formulating questions and hypotheses, data collection (observation/experiment), data analysis, drawing conclusions, and reflection. These stages are consistent with constructivist principles and differ from previously inconsistent terminology. Each stage contributed differently to the development of creative thinking indicators.

First, fluency (the ability to generate many ideas) was stimulated during the problem orientation and questioning stages. When students were presented with contextual problems related to the classification of living organisms, they were encouraged to propose multiple possible answers and questions. This activity trained students to generate a variety of ideas without immediate judgment, a key characteristic of fluent thinking. Compared to direct instruction, which tends to limit responses to a single correct answer, guided inquiry created a more open learning environment [19-20].

Second, the flexibility aspect (ability to view problems from different perspectives) was developed during the data collection and analysis stages. Students conducted observations and discussed different ways to classify organisms based on varying characteristics. This process required them to shift perspectives and consider alternative classification systems. The collaborative nature of group discussions further supported flexibility, as students were exposed to diverse viewpoints from their peers.

Third, the originality aspect (ability to produce unique ideas) was particularly evident during the conclusion and reflection stages. Students were encouraged to formulate their own conclusions based on the data obtained rather than simply following textbook explanations. This allowed them to express unique interpretations and solutions. In contrast, students in the control class tended to rely on teacher explanations, resulting in less variation in their responses.

Fourth, the elaboration aspect (ability to develop ideas in detail) was strengthened throughout the inquiry process, especially during data analysis and conclusion stages. Students were required to explain their reasoning, provide evidence, and systematically expand their ideas. This continuous practice helped students organize their thoughts more coherently and in greater depth. These findings align with recent empirical studies (2021–2025) that report that guided inquiry learning enhances creative thinking by actively involving students in the investigation and problem-solving processes. However, this study also extends previous research by demonstrating that the effectiveness of guided inquiry is strongly influenced by how each stage is implemented and how well it aligns with specific indicators of creative thinking. In addition, the higher improvement observed in the experimental class compared to the control class indicates that learning environments emphasizing exploration, discussion, and reflection are more effective than teacher-centered approaches. Guided inquiry not only facilitates knowledge acquisition but also supports the development of higher-order thinking processes, particularly in topics such as the classification of living organisms that require analytical and conceptual understanding [21].

Despite these positive findings, this study has several limitations that need to be considered. First, the research was conducted in a single school, which may limit the generalizability of the findings to other educational contexts. Second, the sample size was relatively limited, involving only two classes. Third, the treatment duration was relatively short (4 meetings), which may not fully capture the learning model's long-term effects. Fourth, potential teacher-related factors, such as teaching style and classroom management, may have influenced the model's implementation. Finally, although a scoring rubric and inter-rater reliability were applied, the assessment of essay responses still carries a degree of subjectivity that could affect the measurement of students' creative thinking ability [22-24].

Overall, the guided inquiry learning model made students more active, focused, and independent during the learning process. Students were encouraged to explore ideas, collaborate with peers, and construct knowledge meaningfully rather than passively receiving information from the teacher. This confirms that guided inquiry learning not only improves creative thinking ability quantitatively but also enhances the quality of students' thinking processes toward higher and more meaningful cognitive levels [25-26].

Conclusion

Based on the research findings, the guided inquiry learning model is effective in improving students' creative thinking skills in the classification of living organisms. The implementation of structured inquiry stages encourages students to actively construct knowledge, explore ideas, and develop deeper understanding, resulting in better creative thinking performance compared to conventional teacher-centered learning. Beyond the statistical results, this study highlights important pedagogical implications for science learning at the junior high school level. Guided inquiry learning can be used by teachers to design more meaningful learning activities, particularly by engaging students in observation-based classification tasks, encouraging the development of creative products (such as concept maps or visual representations), and facilitating reflective discussions to strengthen students' reasoning and idea development. These practices support the development of key indicators of creative thinking, including fluency, flexibility, originality, and elaboration. Guided inquiry learning not only enhances students' learning outcomes but also develops higher-order thinking skills, making it a relevant and effective approach to improving the quality of science education. These findings confirm that the Guided Inquiry Learning model actively engages students, encourages independent problem-solving, and significantly enhances creative thinking skills compared to teacher-centered instruction.

Author's Contribution

H.T. Saragih: Designed the research, collected and analyzed the data, and prepared the manuscript. H. Simatupang: Provided conceptual guidance, supervised the methodology, and reviewed and revised the manuscript. M. Pohan: Provided support in data collection and the implementation of the learning process.

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