



## The Impact of the Treffinger Model on Students' Mathematical Creative Thinking Ability: A Systematic Literature Review

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A B S T R A K	A R T I C L E I N F O
<p><i>Kemampuan berpikir kreatif matematis merupakan kompetensi penting yang perlu dikembangkan dalam pembelajaran matematika, namun praktik pembelajaran di Indonesia masih belum optimal dalam mengembangkan kemampuan tersebut. Model pembelajaran Treffinger dipandang sebagai alternatif yang potensial untuk meningkatkan kemampuan berpikir kreatif matematis siswa. Penelitian ini bertujuan untuk mengkaji secara sistematis dampak model pembelajaran Treffinger terhadap kemampuan berpikir kreatif matematis siswa SMP berdasarkan publikasi tahun 2020-2025. Penelitian menggunakan metode Systematic Literature Review (SLR) dengan mengikuti tahapan research question, research strategy, selection criteria, select studies, quality of studies, dan synthesis results. Pencarian literatur dilakukan melalui Google Scholar menggunakan software Publish or Perish dengan kata kunci "Model Treffinger". Dari 35 artikel yang teridentifikasi, sebanyak 5 artikel memenuhi kriteria inklusi dan dianalisis secara mendalam. Analisis menunjukkan bahwa seluruh penelitian menunjukkan dampak positif dari penerapan model pembelajaran Treffinger terhadap kemampuan berpikir kreatif matematis siswa SMP. Model Treffinger terbukti lebih efektif dibandingkan pembelajaran konvensional dalam meningkatkan empat indikator berpikir kreatif matematis, yaitu fluency (kelancaran), flexibility (keluwesan), originality (keaslian), dan elaboration (elaborasi). Model ini dapat dijadikan alternatif pembelajaran inovatif untuk mengoptimalkan pengembangan kemampuan berpikir kreatif matematis siswa.</i></p>	<p><b>Article History:</b>  <i>Received: 2026-05-19</i>  <i>Revision: 2026-05-28</i>  <i>Accepted: 2026-05-31</i>  <i>Published: 2026-05-31</i></p> <p><b>Kata Kunci:</b>  <i>Model pembelajaran Treffinger</i>  <i>Kemampuan berpikir kreatif matematis</i>  <i>Siswa SMP</i>  <i>Systematic literature review</i></p>
<p><b>A B S T R A C T</b></p> <p><i>Mathematical creative thinking ability is an important competency that needs to be developed in mathematics learning, but learning practices in Indonesia are still not optimal in developing this ability. The Treffinger learning model is considered a potential alternative for improving students' mathematical creative thinking abilities. This study aims to systematically examine the impact of the Treffinger learning model on</i></p>	<p><b>Keywords:</b>  <i>Treffinger learning model</i>  <i>Mathematical creative thinking ability</i>  <i>Junior high school students</i>  <i>Systematic literature review</i></p>

*middle school students' mathematical creative thinking abilities based on publications from 2020–2025. The research used the Systematic Literature Review (SLR) method, following the stages of research question, research strategy, selection criteria, select studies, quality of studies, and synthesis results. Literature searches were conducted through Google Scholar using the Publish or Perish software with the keyword "Treffinger Model." Of the 35 articles identified, 5 met the inclusion criteria and were analyzed in depth. The analysis shows that all studies indicate a positive impact of implementing the Treffinger learning model on junior high school students' mathematical creative thinking abilities. The Treffinger model is proven to be more effective than conventional learning in improving four indicators of mathematical creative thinking: fluency, flexibility, originality, and elaboration. This model can serve as an innovative learning alternative to optimize the development of students' mathematical creative thinking abilities.*

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## 1. INTRODUCTION

Creative thinking ability is a component that needs to be fostered in students (Ersoy & Kara, 2026). In addition, a problem also requires thinking skills in the effort to solve it (Khotimah et al., 2025). However, several studies indicate that mathematics learning in Indonesia has still not achieved optimal results in improving students' mathematical creative thinking abilities (Putri et al., 2024; Aminah, 2024). Rosmayadi et al. (2024) in their research revealed observation results showing that teachers teach through direct instruction that still uses lecture methods, question and answer sessions, and assignments and practice exercises, causing students to become quickly bored and find it difficult to understand. Romdonah and Rusdian (2020) added that students still have low mathematical creative thinking abilities, which can be seen from students' test results that have not yet reached the Minimum Mastery Criteria (KKM). This shows the need for innovation in mathematics learning to optimally improve students' mathematical abilities and actively involve students (Fuadi et al., 2021). Therefore, strategies are needed in learning, one of which is the selection of a learning model that can improve students' mathematical creative thinking abilities.

One learning model that is suitable for this problem is the Treffinger learning model. Huda in Kurniati et al. (2021) stated that the Treffinger learning model consists of three important components, namely understanding challenge, generating ideas, and preparing for action. In its development, the Treffinger learning model has been widely implemented and studied for its effectiveness in mathematics learning at various educational levels, ranging from elementary school to higher education. Various studies have shown positive results regarding the implementation of the Treffinger model in improving students' mathematical creative thinking abilities (Kusuma et al., 2020; Hidayati et al., 2021; Abbas et al., 2025).

For example, research conducted by Yuliana et al. (2025) showed that the Treffinger learning model can improve junior high school students' mathematical creative thinking abilities. Rosmayadi et al. (2024) also found that learning using the Treffinger model is effective in improving mathematical creative thinking abilities in achieving students' individual mastery completion. The Treffinger learning model is closely related to creative thinking ability, as the structure of the stages in the Treffinger model clearly facilitates the development of all indicators of creative thinking, ranging from fluency, flexibility, originality, to the ability to elaborate ideas. Therefore, the implementation of the Treffinger learning model is considered effective in improving students' creative thinking abilities in the learning process.

Although numerous studies have reported the effectiveness of the Treffinger model on students' mathematical creative thinking ability, no systematic review has specifically synthesized these findings at the junior high school level within the last five years (2020–2025). Hence, the novelty of this article lies in providing a literature synthesis focused on the context of mathematics education in junior high schools, considering subject characteristics, learning contexts, and indicators of creative thinking as its primary analytical framework.

Despite numerous individual studies, findings on which specific creative thinking indicators (fluency, flexibility, originality, elaboration) are most influenced by the Treffinger model in junior high mathematics remain fragmented. (Zega et al., 2022) found Treffinger excels in fluency, flexibility, and elaboration, while (Yuliana et al., 2025) reported improvements across all indicators. Moreover, existing reviews have focused on general learning outcomes or aggregated across educational levels, overlooking contextual nuances unique to junior high schools such as mathematical topics and grouping strategies. A recent

review by (Fadlurrohman, 2025) confirmed that although junior high is the most studied level (14 of 18 studies), no synthesis has specifically examined how contextual factors affect different creative thinking indicators. This gap is critical because junior high is a pivotal period for developing formal reasoning, and strategies effective at other levels may not transfer directly (NCTM, 2020). Thus, a systematic synthesis is urgently needed to identify patterns and inconsistencies beyond what individual studies can address (Page et al., 2021). Without it, educators lack evidence-based guidance on the conditions for optimal Treffinger implementation (Hasan et al., 2026)

This article aims to systematically examine research findings published during the 2020–2025 period regarding the impact of the Treffinger model on junior high school students' mathematical creative thinking abilities. The focus of the study will be directed toward identifying research based on subject characteristics and learning contexts, as well as creative thinking abilities. Through this systematic review, also known as Systematic Literature Review (SLR) research, it is expected that a deeper understanding can be obtained regarding the impact of the Treffinger learning model in improving the mathematical creative thinking abilities of junior high school students.

## 2. METHOD

This research method adapts the study conducted by Syaputra et al. (2024), using the Systematic Literature Review (SLR) method. This study was conducted by searching for references relevant to issues related to the impact of implementing the Treffinger model in improving creative thinking skills at the junior high school level. Creswell (in Nursamira et al., 2022) states that a systematic review is a written summary of articles sourced from journals, books, and other documents in the form of theoretical descriptions or information from various required sources.

The procedures in this study are based on (Zawacki-Richter & Kerres, 2020)Zawacki Richter, which are divided into several stages, namely research question, research strategy, selection criteria, select studies, the quality of studies, and synthesis result (O. et al., 2020; Nabilla & Fitriyana, 2022). Here is a more detailed explanation of each stage.

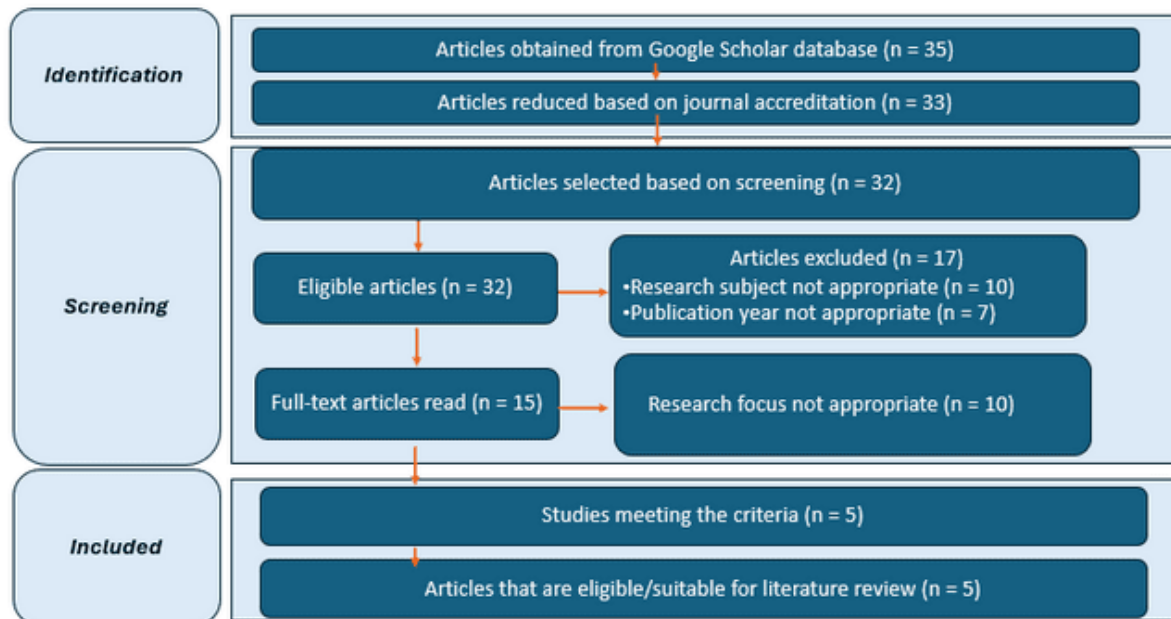
### Research Question

There are two research questions proposed in this study:

*RQ. (1) What are the characteristics of research on the impact of the Treffinger model on students' mathematical creative thinking abilities viewed from the publication years within the 2020–2025?*

*RQ. (2) What is the impact of implementing the Treffinger model on students' mathematical creative thinking abilities?*

### Research Strategy



**Figure 1.** PRISMA Study of the Treffinger Model on Improving Junior High School Students' Mathematical Creative Thinking Ability

This stage is used to obtain data that matches the research questions. The research strategy was carried out using the Publish or Perish software, which uses the Google Scholar database by searching for articles using the keyword “Treffinger Model” in accordance with the topic to be discussed. Based on the search results, 35 articles were obtained regarding the impact of the Treffinger model, with 5 of them conducting research on mathematical creative thinking abilities in junior high school students. This study will analyze research conducted with qualitative and quantitative approaches (PRISMA diagram written in Indonesian).

Based on the PRISMA diagram, at the identification stage, 35 articles were obtained from the Google Scholar database, which were then reduced based on journal accreditation to 33 articles. Furthermore, at the screening stage, selection was carried out based on certain criteria, resulting in 32 articles, with 17 articles removed due to subject incompatibility and publication year. A total of 15 articles were analyzed thoroughly, and 10 articles were excluded because the research focus was not relevant to the Treffinger model in improving mathematical creative thinking ability, resulting in 5 articles that met the criteria and were used in the literature study.

### Selection Criteria

To obtain data aligned with the research objectives, inclusion criteria were required. The inclusion criteria used in this study are as follows: (1) Research discussing the implementation of the Treffinger model in mathematics learning; (2) Articles examining mathematical creative thinking ability as the main variable or one of the research variables; (3) The research subjects are junior high school students; (4) Articles published within the 2020–2025 period; (5) Articles written in Indonesian or English.

Articles that did not meet the inclusion criteria were subsequently classified into exclusion criteria, namely: (1) Articles that do not discuss the Treffinger model in mathematics learning,

especially regarding students' mathematical creative thinking abilities; (2) Research subjects outside junior high school students; (3) Articles published outside the 2020–2025 period.

### Select Studies

The select studies stage was conducted through a gradual article screening process based on the predetermined inclusion and exclusion criteria. The selection process began with reviewing titles and abstracts to identify the suitability of the research topic, followed by reading the full text to ensure the compatibility of the research focus, subjects, variables, and learning context with the research objectives.

### Quality of Studies

This stage aimed to assess the methodological quality of the articles that had passed the selection stage. Quality assessment was conducted by considering the clarity of the research objectives, the suitability of the research design and methods, and the clarity of data collection and analysis procedures. Articles meeting these criteria were retained for the next stage of analysis.

### Synthesis Results

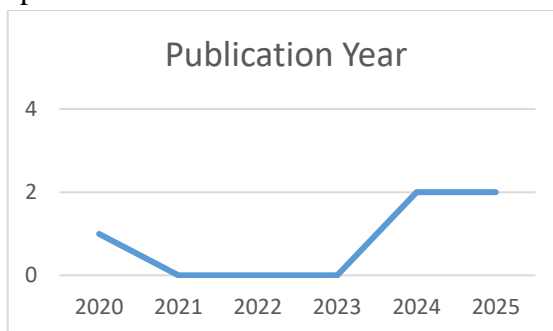
Synthesis results were conducted by summarizing the main findings from articles that had met the selection and quality criteria. The synthesis was carried out descriptively-qualitatively by grouping research results based on relevant aspects, such as the impact of implementing the Treffinger model, its influence on mathematical creative thinking abilities, and research characteristics, thereby obtaining a comprehensive overview of the reviewed research findings.

## 3. RESULT AND DISCUSSION

This study is directed at presenting and analyzing the results based on the formulated research questions. Each research question is analyzed systematically by referring to the main findings from the selected studies reviewed, in order to obtain a comprehensive understanding of the implementation of the Treffinger model on junior high school students' mathematical creative thinking abilities.

### RQ (1): What are the characteristics of research on the impact of the Treffinger model on students' mathematical creative thinking abilities in terms of publication year within the 2020–2025?

The discussion based on publication year was conducted to identify the development of research related to the impact of the Treffinger model on junior high school students' mathematical creative thinking abilities within the 2020–2025 period. This analysis aims to describe the distribution of publications from year to year as well as the pattern of development in research focus during that period.



**Figure 2.** Research Data on the Treffinger Model on Junior High School Students' Mathematical Creative Thinking Ability Based on Publication Year

The image above shows that there have been changes related to the number of studies on the impact of the Treffinger model on junior high school students' mathematical creative thinking abilities published within the last 5 years, namely from 2020–2025. This indicates that there has been variation in the number of publications from year to year. In 2020 and 2021, 1 research publication discussing the topic was found. Furthermore, in 2022, no studies on relevant topics were found. However, in the period from 2023 to 2025, 4 research publications were found. These findings indicate that the research focus on the Treffinger model in the context of junior high school students' mathematical creative thinking abilities tended to strengthen in 2024, but has not yet shown stable continuity.

**RQ (2): What is the impact of implementing the Treffinger model on students' mathematical creative thinking abilities?**

The studies were summarized based on the focus of the study, as well as the main findings related to the impact of implementing the Treffinger model on students' mathematical creative thinking abilities at the junior high school level. A total of 5 articles conducting research in accordance with the topic studied were found. The presentation is made in table form with the aim of providing a comprehensive overview of the contribution of each study and facilitating the tracing of relevant research results.

**Table 1.** Research on the Impact of the Treffinger Model on Junior High School Students' Mathematical Creative Thinking Ability

No	Title	Author (Year)	Research Results
1	Pengaruh Model Pembelajaran <i>Treffinger</i> terhadap Kemampuan Berpikir Kreatif Matematis Siswa	(Saripudin et al., 2024)	The Treffinger learning model has a positive impact on improving junior high school students' mathematical creative thinking skills, which can be seen from the difference in the average scores of students' mathematical creative thinking abilities.
2	Efektivitas Model Pembelajaran <i>Treffinger</i> terhadap Kemampuan Berpikir Kreatif Matematis Siswa	(Rosmayadi et al., 2024)	Based on the data analysis that has been carried out, it can be seen that $t_{count} = 2.5 > t_{table} = 1.68$ , so the mathematical creative thinking ability of junior high school students on the topic of systems of linear equations in two variables taught using the Treffinger learning model has achieved mastery, which is also supported by the N-gain calculation result of 0.35, which falls into the medium category.
3	<i>Application Of Treffinger Learning Model Towards Mathematical Creative Thinking Ability Of Junior High School Students</i>	(Yani & Yuzar, 2025)	Based on the results of the data analysis, it can be concluded that there is a difference, in which students' mathematical creative thinking abilities taught using the Treffinger model are better than those of students who receive conventional instruction.
4	Pengaruh Model Pembelajaran	(Yuliana et al., 2025)	The Treffinger learning model has a positive impact on improving students'

No	Title	Author (Year)	Research Results
	<i>Treffinger terhadap Kemampuan Berpikir Kreatif</i>		mathematical creative thinking skills, which can be seen from the creative thinking ability scores obtained by grade IX students of SMP Negeri 1 Segeri.
5	<i>Application of Treffinger Learning Model to Improve Creative Reasoning and Mathematical Problem Solving Skills as Well as Student Learning Interests</i>	(Kusuma et al., 2020)	The improvement in creative thinking skills and mathematical creative thinking among junior high school students who receive the Treffinger learning model is better compared to students who follow regular or conventional learning.

The findings of this study indicate that the Treffinger model has a positive impact on students' mathematical creative thinking ability across various educational levels and mathematical topics. The implementation of the Treffinger model provides students with opportunities to actively construct knowledge, explore multiple problem-solving strategies, and express ideas more openly during the learning process. This condition supports the development of creative thinking indicators, namely fluency, flexibility, originality, and elaboration (Kadir et al., 2022). Students become more capable of generating numerous ideas, applying different solution methods, producing unique responses, and explaining their reasoning in greater detail when compared to students who experience conventional learning approaches (Saripudin et al., 2024).

The treffinger model encourages students to build knowledge through structured learning experiences with an emphasis on the process of creative thinking in stages. This learning is carried out in three stages, namely basic tools, practice with process, and working with real problem (Treffinger et al., 2006). The Treffinger model, developed within the framework of Creative Problem Solving (CPS), comprises two complementary dimensions: the component dimension and the stage dimension. The component dimension consists of three primary elements, namely understanding challenge, generating ideas, and preparing for action, which collectively represent the essential cognitive cycle in creative problem solving (Treffinger & Isaksen, 2013), (Isaksen et al., 2011). Meanwhile, the stage dimension, as proposed by (Treffinger et al., 2006), includes basic tools, practice with process, and working with real problems, which represent the levels of complexity and student independence in applying creative thinking skills (Treffinger et al., 2006). These two dimensions are not antagonistic but rather hierarchical and integrative, wherein the component dimension functions as the core content to be learned, while the stage dimension functions as the implementation scaffold that determines the extent to which students internalize and apply the three components progressively (Nisa et al., 2011)

At the basic tools stage, students are introduced to fundamental techniques such as brainstorming, SCAMPER, and force-field analysis, which serve as initial provisions to actualize the three components separately (Treffinger & Isaksen, 2013). Subsequently, the practice with process stage requires students to apply the three components sequentially and

structurally (understanding challenge → generating ideas → preparing for action) within a problem-solving cycle facilitated by the teacher, thereby reinforcing procedural mastery of each component (Treffinger et al., 2006). At the highest stage, namely working with real problems, students are expected to independently and integratively apply the three components when confronting authentic, complex, and ill-structured problems, thus reflecting a high level of creative thinking proficiency. Consequently, the Treffinger model provides a systematic learning trajectory ranging from the mastery of basic thinking tools to independence in solving real-world problems, simultaneously building students' competence across all three core components.

In the basic tools stage, students are encouraged to develop divergent thinking through brainstorming activities, idea exploration, and open-ended questioning. This stage contributes significantly to the fluency and originality indicators because students are trained to generate many possible solutions without being limited to a single procedure. Furthermore, the practice with process stage facilitates students in organizing and evaluating ideas systematically, which supports the development of flexibility in solving mathematical problems from different perspectives. Finally, the working with real problem stage allows students to apply their creative ideas to contextual and non-routine mathematical situations, thereby strengthening elaboration skills through detailed reasoning and solution development.

These findings are consistent with recent studies emphasizing that student-centered and problem-oriented learning models significantly enhance mathematical creative thinking ability. Creative mathematical thinking is not merely related to obtaining correct answers, but also to students' capacity to construct innovative and meaningful strategies in solving problems (Putri et al., 2024). This aligns with a study by OECD (2023) highlighted that creative thinking has become one of the essential competencies in 21st-century education, particularly in mathematics learning where students are expected to think critically, adaptively, and innovatively in dealing with complex real-world problems. Furthermore, students who receive Treffinger learning show better results in terms of creative thinking compared to students who receive conventional learning (Saripudin et al., 2024).

#### 4. CONCLUSION

Based on a systematic literature review of 5 research articles that met the selection criteria within the 2020–2025 range, it can be concluded that the Treffinger learning model has a positive and significant impact on improving junior high school students' mathematical creative thinking skills. All of the studies reviewed show that students who received instruction using the Treffinger model demonstrated better mathematical creative thinking skills compared to students who received conventional instruction.

The improvement in students' mathematical creative thinking skills is seen in four main indicators, namely fluency, flexibility, originality, and elaboration. The three stages in the Treffinger model, namely basic tools, practice with process, and working with real problems, systematically facilitate the development of each of these indicators of mathematical creative thinking ability. These stages encourage students to build knowledge through structured learning experiences by emphasizing the creative thinking process in stages.

The findings from the reviewed studies also show that the Treffinger learning model is effective in achieving student learning mastery. Although this study shows a positive trend, the number of publications within the 2020–2025 range is still limited and has not shown stable

continuity. This opens opportunities for further research to explore the application of the Treffinger model in greater depth across various learning materials and student characteristics.

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