



# Bibliometric Analysis: Research Trends of Guided Inquiry Learning Models in Improving Scientific Attitudes (2015-2024)

Baiq Wini Januarni<sup>1\*</sup>

<sup>1</sup> Master of Sciences Education Study Program, Pascasarjana University of Mataram, Mataram, Indonesia.

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Corresponding Author:

Baiq Wini Januarni

[baiqwini84@gmail.com](mailto:baiqwini84@gmail.com)

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**Abstract:** This research analyzes the trend of using the guided inquiry model in improving student's scientific attitudes in the period 2015-2024. Using bibliometric methods with the VOS viewer tool, this research evaluates 200 articles obtained from Google Scholar via Publish or Perish and Dimension AI. The results of the analysis show that the guided inquiry model is an effective approach in scientific learning, because it can increase student's active involvement, curiosity, and problem-solving abilities. Publications on this topic have fluctuated, with the highest peak in 2021 (15 publications). This bibliometric analysis provides insight into author productivity, keyword trends, and concept relevance, and shows the potential for further research in this area. The findings are expected to become the basis for developing more innovative and relevant inquiry-based science learning.

**Keywords:** Bibliometric; Guided inquiry; Scientific attitudes

## Introduction

Science is a science that studies nature that is inseparable from human life, but the theory is based on observations, experiments on natural phenomena (Diniati et al., 2022). Students who study science actively participate in the development of their knowledge, experience and process abilities and are directed in science learning activities that teach them how to understand learning through scientific activities (Hamadi, 2018).

Through scientific activities, students' scientific attitudes can be improved. However, in reality many students still have a low scientific attitude. This can be seen when the teacher gives a problem, students cannot solve the problem themselves, have low curiosity, are less able to accept other people's opinions during class discussions and students' cooperative attitudes are very low. This is due to the lack of student participation and involvement in learning. Based on this, it is important for teachers to choose and determine a learning model that suits students' needs.

Teachers must design a learning design that provides direct experience to students. The model used must involve students in learning. Because, in the 21st century, learning is no longer teacher-centered but student-centered (Rosnaeni, 2021). One of the learning models that can provide direct learning experiences to students is the guided inquiry learning model. The guided inquiry learning model is a student-centered learning method, which encourages students to be more active and can find their own answers to the problems they face, either through questions and answers or discussions. In the guided inquiry learning model, the teacher is only a facilitator while the students will play an active role in learning. Guided inquiry learning as the center of learning is the student, where students are required to be responsible for the education they undergo and are directed not to depend on the teacher (Utami et al., 2017), and covers physics concepts that are expected to attract students' interest, creating a conducive teaching and learning environment (Fauziah et al., 2024).

Students' scientific attitudes can be developed by creating a learning process that allows students to

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explore and improve their scientific attitudes. Students who have a high scientific attitude will find it easier to understand and master learning so that it can affect student learning achievement. Guided inquiry can trigger curiosity and build students' knowledge of learning (Utami et al., 2017).

Based on several research results, it shows that one of the learning models that can be used to improve students' scientific attitudes is the guided inquiry learning model. Therefore, this study was conducted to determine the research trends of guided inquiry learning models in improving students' scientific attitudes. To conduct research, an analysis is needed, namely bibliometric analysis. Bibliometrics is a method used to introduce scientific publications according to the scientific citations used in a field (Rohanda et al., 2019). Bibliography is a science that studies writing and mathematical analysis (Winardi et al., 2022). Bibliometrics is a library in scientific publications to find out the analysis of writing, authors, and literature. Bibliometric research aims to see research trends by utilizing VOS Viewer and analyzing those that have not been widely researched (Wulandari et al., 2023).

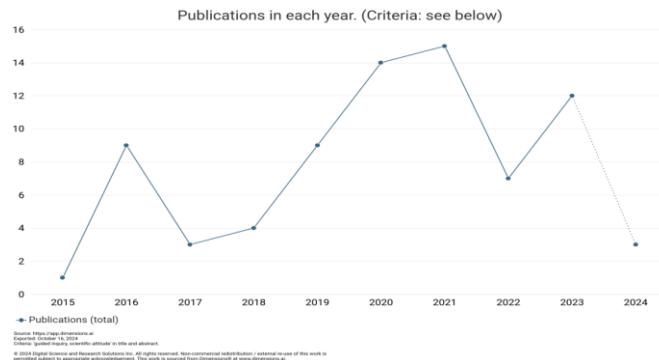
This research is expected to be a reference for developing further research related to the guided inquiry learning model in improving students' scientific attitudes.

## Method

The method in this study is an analytical descriptive method to understand and describe trends related to the guided inquiry learning model to improve students' scientific attitudes. The analysis in this study is in the form of a bibliometric analysis to answer research questions by looking at the development of research and literature (Hakim, 2020). Bibliometric analysis aims to provide knowledge regarding research trends, mapping of scientific dominance, productivity of authors or institutions and the impact of scientific publications (Dzakiyah, 2023). Data retrieval in this study was via Google Scholar using Publish or Perish and Dimension ai. The analysis in this study was conducted on 200 articles on Google Scholar with a period of 2015-2024.

## Result and Discussion

The purpose of this study is to describe the research trends of guided inquiry learning models in improving scientific attitudes conducted from 2015-2024. Figure 1 shows that the research trend of guided inquiry learning models in improving scientific attitudes in science learning has fluctuated from 2015-2024.



**Figure 1.** Research trends of guided inquiry learning models in improving scientific attitudes

If we look at the graph of the development of publications related to research trends on guided inquiry learning models in improving scientific attitudes from 2015-2024, there have been ups and downs. In 2015, publications related to research trends on guided inquiry learning models in improving scientific attitudes were very low, namely only 1 publication. Then in 2016 the number of publications increased drastically to 9 publications. But in 2017, the number of publications decreased again to 3 publications. In 2018, publications increased again to 4 then in 2019 it increased again to 9 publications. In 2020 it increased further to 14 publications then in 2021 it increased to 15 publications. The number of publications decreased again in 2022 to 7 publications. Then in 2023 the number of publications increased drastically again to 12 publications and decreased again in 2024 to 3 publications. This shows that the trend of research on guided inquiry learning models in improving scientific attitudes has fluctuated in the last 10 years, namely from 2015-2024.

**Table 1.** Trends in Guided Inquiry Learning Models in Improving Scientific Attitudes Based on Types of Research Publications

Publication Type	Publications
Article	76
Monograph	1
Proceeding	6
Chapter	3
Preprint	2

Based on the trend table of guided inquiry learning models in improving scientific attitudes based on the type of research publication, it is known that the largest number of publications is in articles. Articles on guided inquiry learning models in improving scientific attitudes are 76 publications. While monographs are only 1 publication. Proceedings have 6 publications, then chapters have 3 publications and preprints have only 2 publications. Thus, the most publications on the trend of guided inquiry learning models in improving scientific attitudes are based on the type of research publication,

namely the type of article. The following table 2 presents the top 10 source title trends in research on guided inquiry learning models in improving scientific attitudes.

**Table 2.** Top 10 Sources of Guided Inquiry Learning Model Trends to Improve Scientific Attitudes in Science Learning Research in 2015-2024

Rank	Journal Name	Publications
1	Jurnal Penelitian Pendidikan IPA	6
2	Journal of Physics Conference Series	5
3	AIP Conference Proceedings	3
4	CBE-Life Sciences Education	2
5	Journal of Innovative Science Education	2
6	BIODIK	2
7	Jurnal Ilmu Pendidikan Fisika	2
8	Advances in Social Science, Education and Humanities Research	2
9	Jurnal MIPA dan Pembelajarannya	2
10	Journal of Phenomenological Psychology	1

Table 2 shows the most publications related to the trend of guided inquiry learning models in improving scientific attitudes, namely the Journal of Science Education Research. This journal published 6 publications, 14 citations and an average citation of 2.33. All editions of this journal are open access and can be freely accessed and downloaded by anyone.

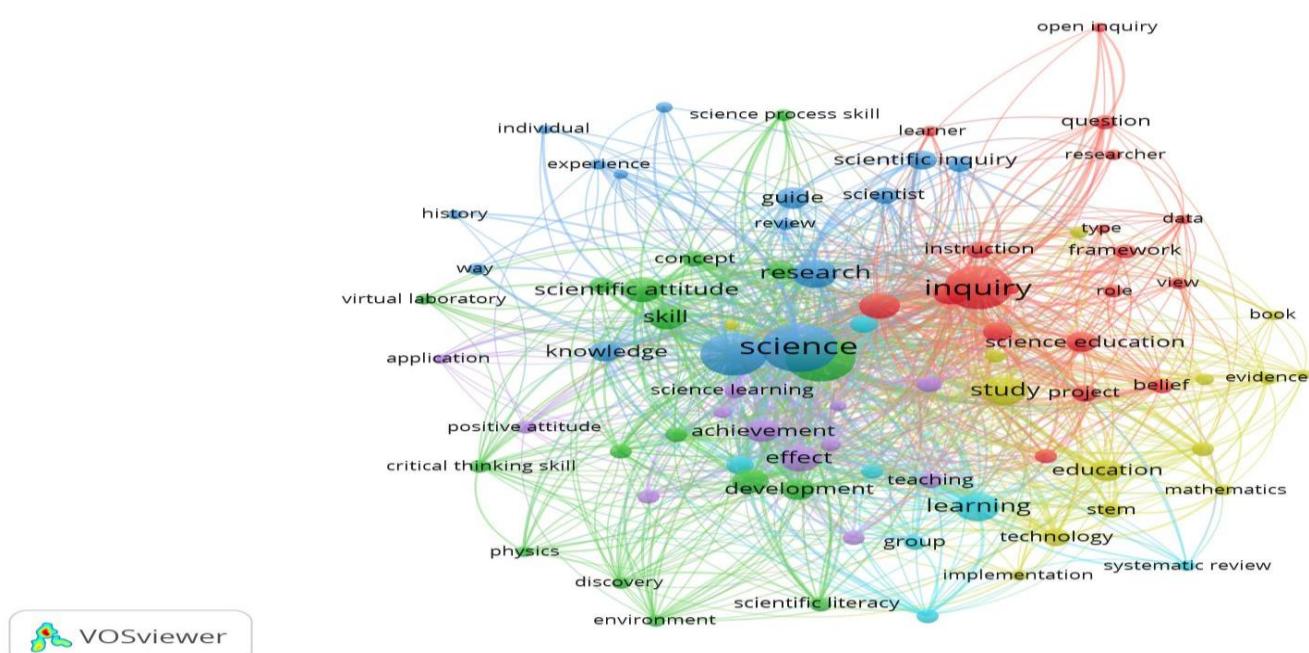
Table 4 shows the keywords that frequently appear related to the trend of guided inquiry learning models in improving scientific attitudes, namely Individual 4 times with a level of 3.01. Table 4 also shows that Mathematics is also a keyword that often appears 5 times with a level of 2.79. Then the keywords that often appear are Researcher 5 times with a level of 2.76 and Scientific research 4 times with a level of 2.71.

**Table 3.** Top 10 Sources of Guided Inquiry Learning Model Trends to Improve Scientific Attitudes in Science Learning Research in 2015-2024

Terms	Occurrences	Relevance
Individual	4	3.01
Mathematics	5	2.79
Researcher	5	2.76
Scientific research	4	2.71
Engineering	8	2.57
Philosophy	5	2.48
Open inquiry	4	2.21
Book	4	1.90
Experience	5	1.73
21st century	4	1.67

The results of bibliometric mapping of articles related to the trend of guided inquiry learning models to improve scientific attitudes. In the visualization there are nodes (circles) that indicate the author while edges (networks) are used to determine the relationship between authors. The distance of the circles associated with the network indicates that the larger the circle, the more variables are studied together (Aribowo, 2019). Figure 2 shows the results of mapping the trends of the guided inquiry learning model to improve scientific attitudes.

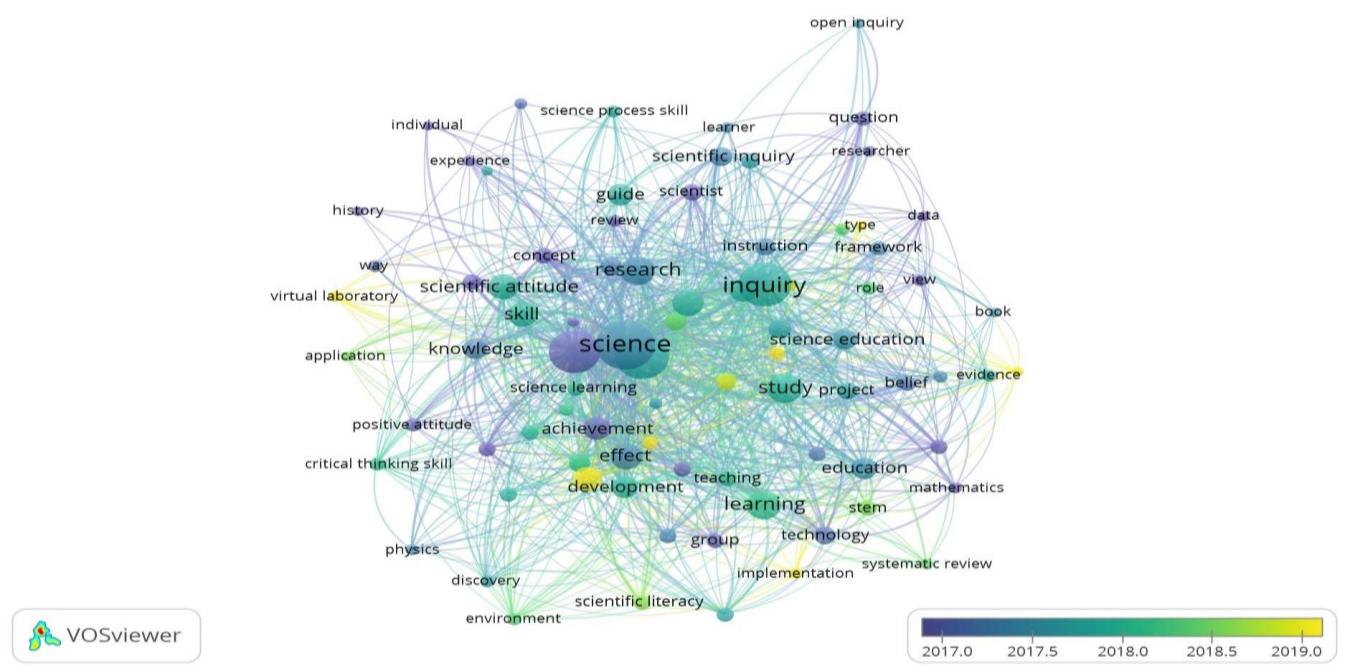
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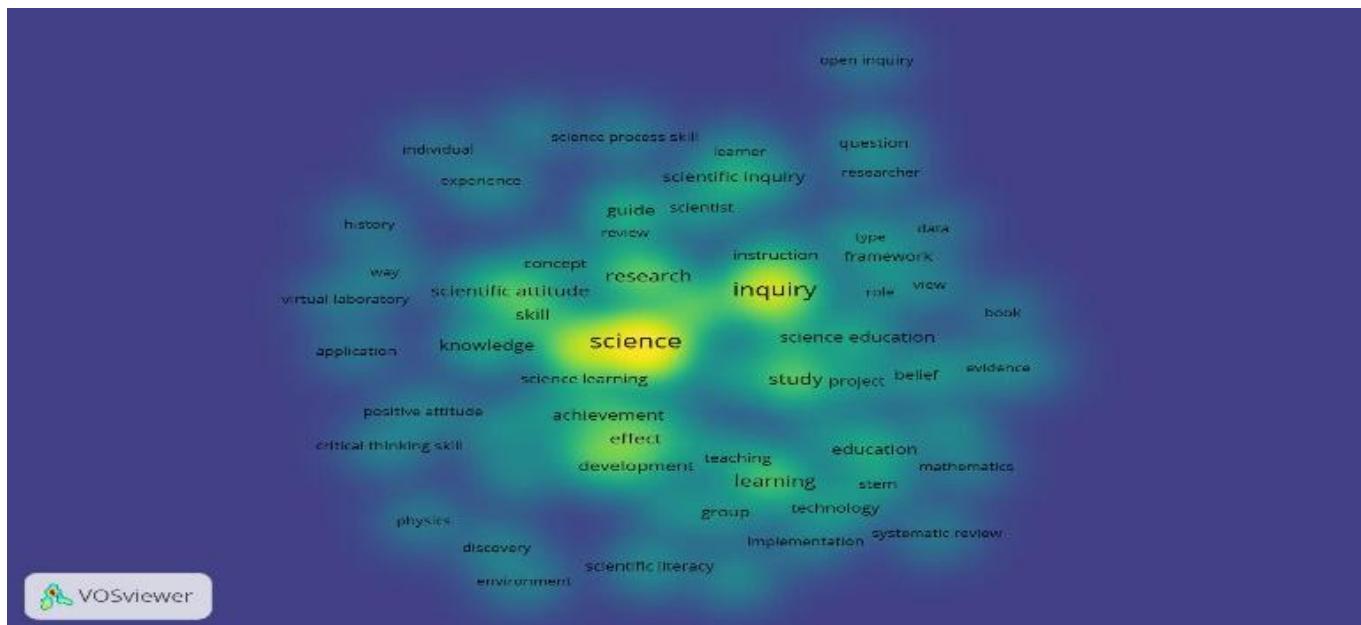
**Figure 2.** Network visualization on guided inquiry learning model trends in improving scientific attitudes

Figure 2 is a bibliometric result that shows the relationship between various concepts in research with a focus on trends in education and inquiry-based learning, especially guided inquiry. Based on the image, the term inquiry on the red line acts as one of the centers in the network that is connected to various concepts such as science education, research, and learning. This shows that the guided inquiry learning model is a topic that often appears. The scientific attitude node is closely related to other nodes such as skills, knowledge, and achievement. This shows that inquiry-based learning contributes to developing students' scientific skills and attitudes.

From Figure 2, it can be seen that guided inquiry and scientific attitude are closely related to components such as skills, learning, and achievement. This shows that this model is effective in developing scientific attitudes because students are involved in the process of critical thinking, asking questions, and solving problems. Guided inquiry can improve students' critical thinking skills (Sarifah et al., 2023). Figure 2 also shows a visualization of the network of terms classified into several clusters arranged in a color chart indicating the interconnected divisions. Next, we present keywords related to the guided inquiry learning model to improve scientific attitudes in overlay visualization.



**Figure 3.** Overlay visualization on guided inquiry learning model trends in improving scientific attitudes



**Figure 4.** Density visualization trends in guided inquiry learning models in improving scientific attitudes

Figure 3 shows the trend of keywords related to research on guided inquiry learning models in improving scientific attitudes in Google Scholar indexed journals from 2015 to 2024. The trend of article writing themes related to the theme of guided inquiry learning models in improving scientific attitudes is marked by the colors purple, light green, turquoise, and yellow. The keywords seen in the image are science, inquiry, research, knowledge, discovery, critical thinking skills, education, learning, and so on. Keywords that frequently appear are relevant to the research trends taken, namely inquiry.

Figure 4 is the result of density visualization using VOS Viewer that occurred in the topic of guided inquiry learning model trends in improving scientific attitudes from 2015-2024. In density visualization, there are several regional colors such as yellow, green and blue which indicate each result obtained according to the color of the region (Silaban et al., 2023). If the color of the area is yellow, like the keywords science and inquiry, it means that it has been widely researched. Meanwhile, the areas that are colored greenish yellow and blue mean that not much research has been carried out, such as scientific attitude skills which have a greenish yellow area, so that these results indicate that there is something new that can be developed. Scientific attitude skills need further research to reveal more tricks that students master related to solving a problem (Leonisa et al., 2022).

## Conclusion

Based on the findings and results and discussions, the number of scientific publications on the Google Scholar site from 2015-2024 was the highest in 2021, with 15 publications, while the lowest number of publications was in 2017 and 2024, with only 3 publications.

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## Conflicts of Interest

No conflict interest.

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