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Guided Inquiry Learning Model with Socio Scientific Issue Approach: A Systematic Literature Review

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ABSTRACT
This study aims to explore the application of the guided inquiry learning model integrated with the Socio-Scientific Issues (SSI) approach through a Systematic Literature Review (SLR) following the PRISMA framework. The review employed the Publish or Perish software to extract and analyze relevant scientific articles published between 2018 and 2024. The data analysis involved identifying, screening, and synthesizing studies aligned with the research focus. From an initial pool of 1,755 articles, only 9 met the inclusion criteria. The findings indicate that the guided inquiry model combined with the SSI approach positively influences various educational outcomes, including students' science process skills, scientific argumentation abilities, critical thinking, and the overall quality of the learning environment. Despite its potential benefits, the integration of guided inquiry and SSI remains underexplored in existing literature, revealing a significant research gap. This underscores the relevance and urgency of further empirical investigations in this area. The positive correlation observed in the selected studies highlights the potential of this pedagogical integration to foster more meaningful and contextually rich science education. Consequently, this topic presents a valuable avenue for future research and innovation in science teaching and learning.

Keywords: *guided inquiry, socio scientific issues, systematic literature review*

INTRODUCTION

Natural science is a discipline concerned with understanding natural phenomena and materials through systematic observation and experimentation, governed by universal principles (Mulyanti, 2018). In science education, it is essential to provide students with opportunities to develop hypotheses and engage directly with scientific concepts relevant to the subject matter (Fairuzabadi et al., 2017). Science instruction offers diverse learning experiences to facilitate conceptual and procedural understanding. However, previous studies have revealed that students often lack focus and motivation to engage deeply with scientific content (Ratnaningrum et al., 2016). This limited engagement has been attributed to the dominance of teacher-centered instruction, which restricts students' active participation in practical learning experiences (Astutik et al., 2012). Furthermore, low student achievement in cognitive domains and science-related motivation has been linked to insufficient teacher support and reliance on traditional lecture-based methods (Ratnaningrum et al., 2015). Students also tend to struggle in articulating their ideas when they encounter unfamiliar concepts. They passively listen to explanations without offering feedback, leading to classroom boredom and minimal involvement in learning activities.

This situation may result from the lack of teacher innovation in selecting appropriate instructional models, which in turn limits student engagement (Huki et al., 2023). Choosing a pedagogical model that aligns with the learning environment is thus critical to achieving educational goals, particularly in enhancing students' conceptual understanding, process skills, and scientific competencies (Handoko & Setiawan, 2023). The guided inquiry learning model has been recognized for its potential to foster active, long-term learning. Knowledge constructed through structured inquiry often transforms into applicable, transferable skills (Suwardani et al., 2021). In guided inquiry, the teacher plays a central role in planning and facilitating the learning process, including guiding students through problem formulation and investigation (Mulyanti, 2018). This model encourages student engagement in actively seeking and constructing knowledge (Nurdyansyah & Fahyuni, 2016).

When combined with real-world issues, guided inquiry can be situated within the framework of Socio-Scientific Issues (SSI)—controversial, socially relevant problems grounded in scientific concepts. The SSI approach has been shown to support students in forming reasoned judgments and making informed decisions regarding societal challenges (Roiefah et al., 2021). These issues serve as effective contexts for inquiry-oriented and constructivist science learning, elevating both the content and process dimensions of science education (Hidayat & Hidayati, 2024). Despite its pedagogical promise, the integration of guided inquiry with SSI remains underrepresented in current research. This gap presents a valuable opportunity for further investigation. Therefore, this study aims to conduct a preliminary analysis of literature examining the guided inquiry learning model in relation to Socio-Scientific Issues (SSI), emphasizing its relevance and potential in enhancing science education.

METHODOLOGY

This study employed a systematic literature review (SLR) approach to collect and analyze data (Alber et al., 2019). The review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which is a widely accepted standard for conducting transparent and replicable systematic reviews and meta-analyses (Page & Moher, 2017). A systematic literature review involves the identification, evaluation, and interpretation of all relevant research related to a specific question or area of interest (Paul et al., 2021). To gather relevant articles, the Publish or Perish software was utilized to access databases such as Google Scholar and CrossRef. The keyword used for the literature search was "Guided Inquiry Learning Model with Socio-Scientific Issue Approach". The SLR methodology allows for a rigorous and systematic identification of journal articles based on predetermined criteria (Suantara et al., 2019). Subsequently, bibliometric mapping was performed using metadata retrieved through Publish or Perish to analyze publication trends and patterns.

The analysis process involved multiple steps, including an initial screening, followed by three rounds of article scanning. Data quantification was carried out using Microsoft Excel to calculate relevant percentages (Lestari & Ilhami, 2022). The inclusion criteria were limited to articles published between 2018 and 2024, focusing on topics within the field of Natural Science. Articles were excluded if they were incomplete, inaccessible in full text, outside the scope of Natural Science, or written in languages other than English or Indonesian. The literature search strategy was structured based on specific research questions (RQs) to ensure a clear analytical direction and support the consistency of the review process. The table below outlines the Research Questions (RQs) guiding this study:

Table 1. Tabel Research Question

Research Question	Motivation
1. What are the variables that can be measured in quided inquiry learning?	Identify what variables can be measured in quided inquiry learning.
2. Is there a relationship between guided inquiry and Socio Scientific Issues (SSI)?	Identify the relationship between guided inquiry and Socio Scientific Issues (SSI).

The articles used in this literature search are publications or articles from the Google Scholar and Crossref article databases. This research requires a literature search relevant to its topic using the keywords: "guided inquiry" AND "Socio Scientific Issues (SSI)".

The selection of articles to be used for literature review requires inclusion and exclusion in the selection of primary studies. The authors used the results of the information search according to these criteria to review the articles. The inclusion and exclusion criteria for this literature are listed in the following table:

Table 2. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1) Research topics include science learning 2) Language used is Indonesian and English 3) Full text 4) Journal article	1) Research topics do not include science learning (Materials outside of science) 2) Non Indonesian/English language 3) Only abstracts / articles cannot be downloaded 4) Non article / book chapter, / HTML

Once the inclusion and exclusion criteria were set, the articles to be reviewed were selected. Below is a diagram of the selection process using the Prism method.

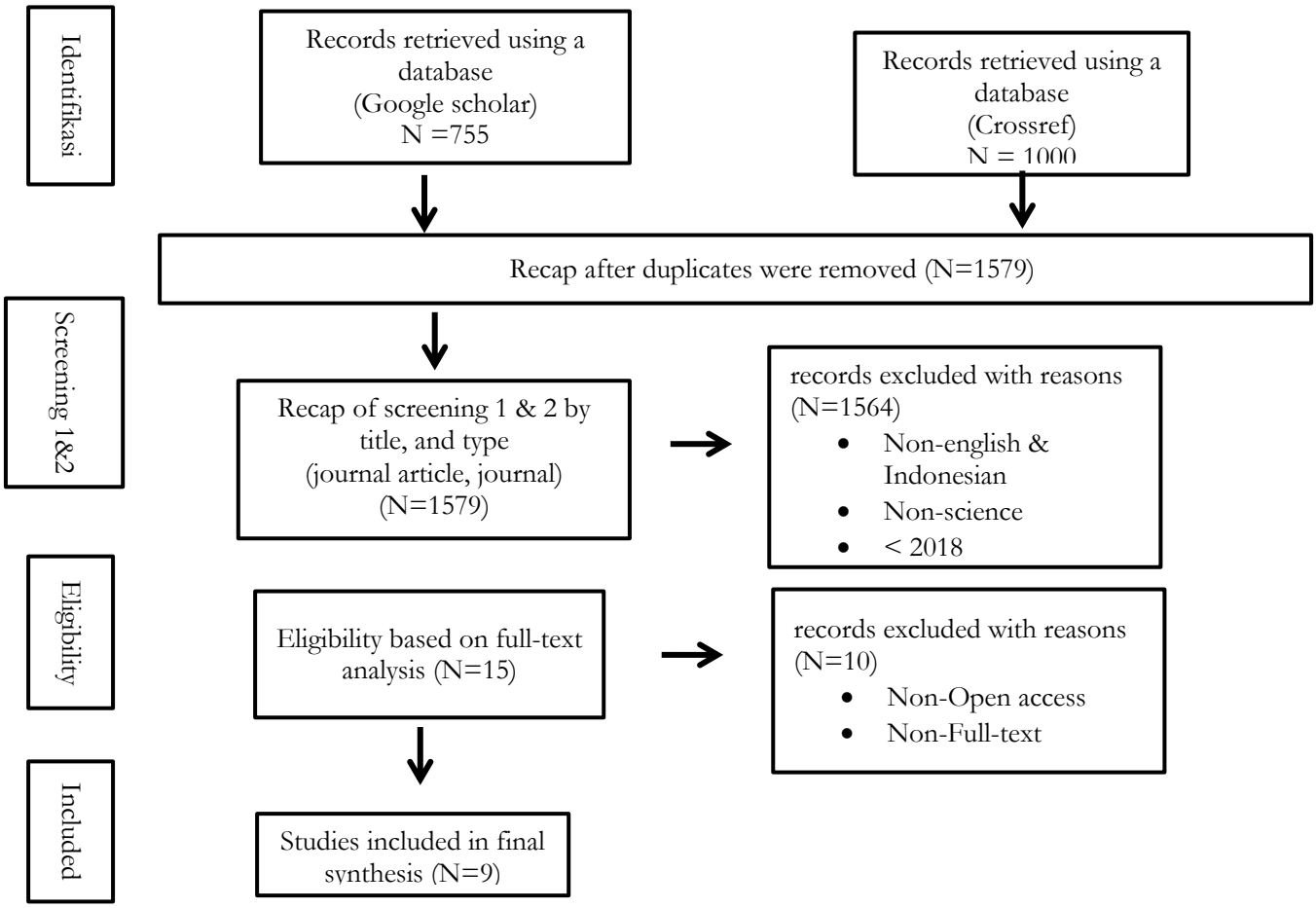

Figure 1. Flow of Article Selection (Prism Method)

Based on the initial search results illustrated in Chart 1, a total of 1,755 articles were identified—comprising 1,655 articles from Google Scholar and 100 articles from CrossRef. During the screening phase, 179 duplicate records were detected based on similarities in titles and publication types, reducing the dataset to 1,579 articles. The next phase involved applying exclusion criteria, which filtered out articles that were not written in English or Indonesian and those that were unrelated to the Natural Sciences domain, resulting in 15 eligible articles. A final selection was then conducted based on predefined inclusion criteria, yielding a total of 9 articles for in-depth analysis.

RESULT AND DISCUSSION

Based on the results of the systematic literature review, a total of 9 articles were identified that met the inclusion criteria and were deemed relevant for analyzing the relationship between the guided inquiry learning model and the Socio-Scientific Issues (SSI) approach. These articles provide insights into how the integration of guided inquiry and SSI contributes to various educational outcomes in science learning. Detailed data on the selected articles—highlighting their alignment with the research focus—are presented in the following table:

Table 3. Final Article with References

No	Article Title	Author Name	Methods	Material	Results
1.	Implementation and Student Responses to the Application of Guided Inquiry Assisted with Socio-Scientific Issues Oriented LKPDs	(Hidayat & Hidayati, 2023)	pre-experimental design	Liquid pressure	The study found that using the guided inquiry learning model with LKPD on Socio-Scientific Issues worked well. There was improvement between the first and second meetings.
2.	The Effect of Socioscientific-Issues Contextualized Inquiry Learning on Critical Thinking Skills and Scientific Explanation	(Mahanani et al., 2019)	posttest only control group design	Reaction Rate	The study found that students who used the SSI inquiry learning method improved their scientific explanation skills more than students who used the inquiry and verification method. The extended abstract level had the most..
3.	The Impact of Socioscientific Issue-Based Guided Request Learning on the Logical Thinking Capacity of Understudies at MTsN 7 Madiun	(Purwaningrum & Fauziah, 2022)	quasi experimental	Science	The study found that when students used a specific method to explore real-world issues in science, it helped them think more like scientists. Students who learn using the guided inquiry method, where they investigate real-world issues, think differently than students who learn through traditional lectures.
4.	Impact of Process-Oriented Guided Request Learning contextualized with socioscientific issues on argumentation skills of high school students	(Setyaningsih et al., 2019)	posstest only design	Acid Bases	Based on the findings and analysis in accordance with the research objectives, it can be concluded that the level of argumentation quality of students who use the POGIL model in learning socioscientific issues is superior to students who use the conventional

No	Article Title	Author Name	Methods	Material	Results
					POGIL method.
5.	The Effectiveness of Process-Oriented Guided Inquiry Learning (Pogil) Based on Socioscientific Issues (SSI) on Students' Critical Thinking Ability	(Utami, 2023)	control group design	Science	Overall, the application of the POGIL (Process Oriented Guided Inquiry Learning) method has been shown to provide positive benefits in improving critical thinking skills in students.
6.	Improving the Quality of Learning Environment through Process-Oriented Guided Inquiry Learning (Pogil) Enriched with Socioscientific Issues (SSI) on Chemical Solution Materials	(Rahayu et al., 2018)	quasy experimental	Chemistry	The results showed that students in the three groups had different opinions. However, Experiment Group 1 and Experiment Group 2 were not much different from each other.
7.	Construction of Learning Tools Using the Guided Inquiry Model Accompanied by Socioscientific Issues (Ssi) Towards Critical Thinking Skills	(Kristiana et al., 2022)	Research and Development (R&D)	Environmental changes	Students' critical thinking skills are at an adequate level, which means that students have not fully utilized their critical thinking skills optimally. This happens because of the lack of effort from teachers in observing the development of students' critical thinking skills, so that these skills only reach an adequate level and have not reached an optimal level.
8.	Guided Inquiry and Simple Science KIT Media : Their Implications for Students Science Process Skilss	(Syafrilianto et al., 2024)	quasi-experimental	Temperature and heat	This research found that students' science skills improved after using guided inquiry models and simple science kits in their learning. Especially on stuff about temperature and heat.
9.	Science Learning with SSI Context Based on Direct Learning to Improve the Ability to Make Inferences and Think Logically	(Almasari & Fadly, 2024)	quasi-experimental	Substances and their changes	The study found that using the SSI method can help students improve their logical thinking skills. In this case, it will be really useful for learning about science.

According to the data presented in Table 3, nine relevant articles were identified that specifically examine the integration of the inquiry learning model with the Socio-Scientific Issues (SSI) approach. These studies were selected based on their alignment with the research questions and their focus on measurable outcomes related to students' competencies. The findings from these articles provide evidence of the impact of guided inquiry and SSI on various student abilities, as summarized in the table according to the specific skills or domains assessed.

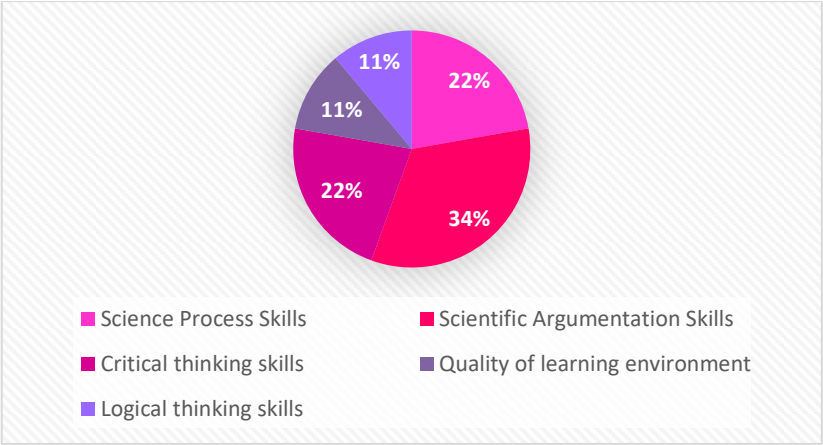

Figure 2. Student Ability Variables Measured

Figure 2 illustrates that the guided inquiry learning model integrated with the Socio-Scientific Issues (SSI) approach most significantly enhances students' scientific argumentation skills, with a contribution rate of 34%. This finding aligns with the observations of Setyaningsih et al. (2019), who noted that students engaged in guided inquiry learning within an SSI context demonstrate improved quality in constructing scientific arguments. Furthermore, the distribution of subject matter integrated within the Guided Inquiry and SSI learning framework is detailed in Figure 3.

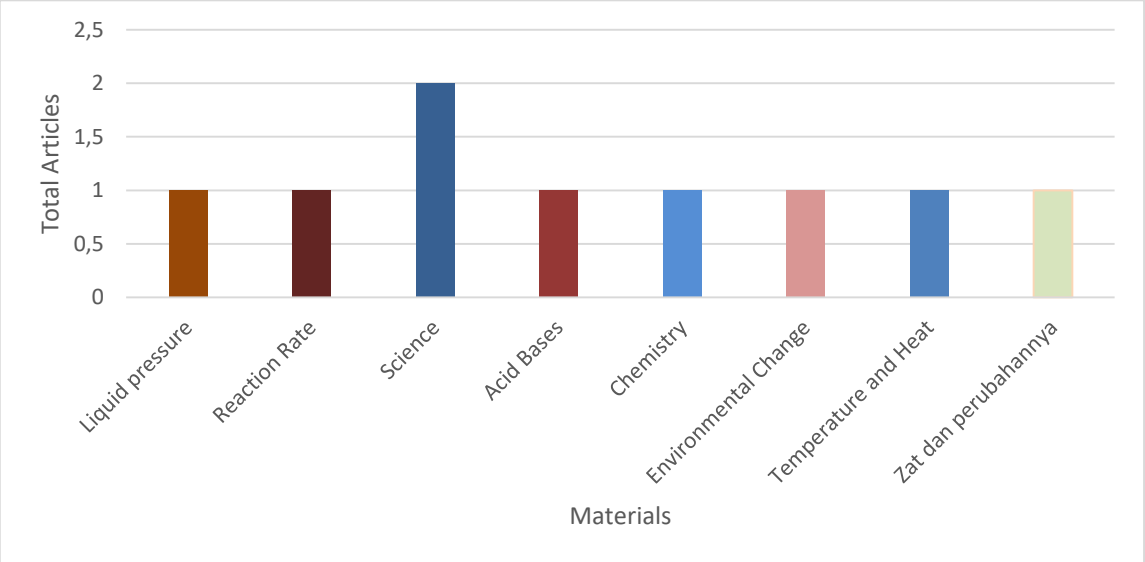

Figure 3. Materials Used

Figure 3 reveals that science-related content is the most frequently integrated subject matter within the guided inquiry learning model combined with the Socio-Scientific Issues (SSI) approach. This finding is consistent with research by Putra (2022), which demonstrated that the SSI-based inquiry model plays a significant role in enhancing the effectiveness of science learning. To further map the development of research on the integration of guided inquiry learning with the SSI approach, a bibliometric analysis was conducted using VOSviewer. In configuring the data extraction, the researcher selected the option to create maps based on text data. The data source was obtained by importing reference metadata from a reference manager in RIS file format. For the analysis, binary counting was used as the counting method, with a minimum threshold of four term occurrences. A total of 70 terms were selected for inclusion in the final visualization map as illustrated in figure 4.

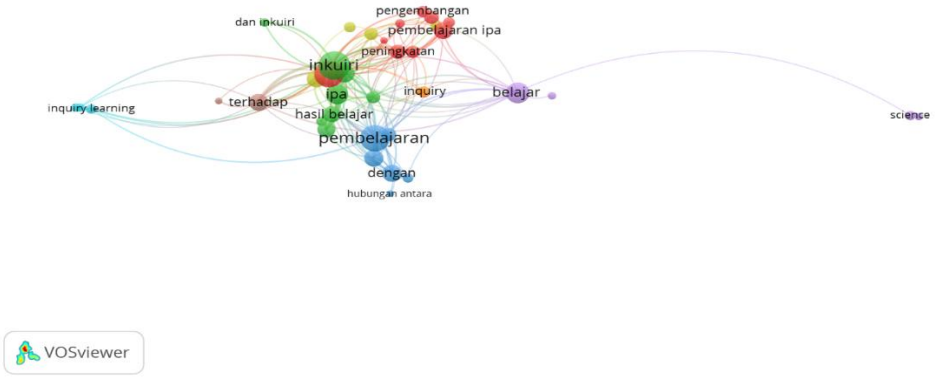

Figure 4. Mapping Results of The Quided Inqury model with SSI with Network Visualization Display Mode

The bibliometric analysis conducted using VOSviewer identified a total of 38 key terms, which were categorized into eight clusters based on their co-occurrence in the literature. Cluster 1, consisting of 9 terms, includes keywords such as inquiry-based, with models, through models, problem models, science learning, development, improvement, differences, and students, indicating a strong emphasis on student-centered inquiry and model-driven instruction in science education. Cluster 2 contains 8 items, including improving, inquiry, learning outcomes, science, science subjects, models, and model application, reflecting the focus on enhancing academic performance through the use of inquiry-based strategies. Cluster 3, which includes 6 terms such as learning science, with, relationship, relationship between, perception relationship, and learning, emphasizes the relational aspects of students' understanding in science learning contexts. Cluster 4 comprises 4 terms—analysis, in science learning, using models, and influence of models—highlighting the role of analytical thinking and model-based approaches in instructional design. Similarly, Cluster 5 also includes 4 items: learning, influence of learning models, relationships, and science, further reinforcing the centrality of model influence in science pedagogy. Cluster 6 is composed of 3 terms: inquiry learning, POGIL (Process Oriented Guided Inquiry Learning), and SSI (Socio-Scientific Issues), directly pointing to the core themes of this study. Finally, Cluster 7 includes 2 terms: influence and towards, which may represent transitional or relational elements often used in research conclusions. Altogether, these clusters offer a comprehensive mapping of the conceptual landscape surrounding guided inquiry and SSI-based research, revealing the dominant themes and interrelated concepts in recent literature.

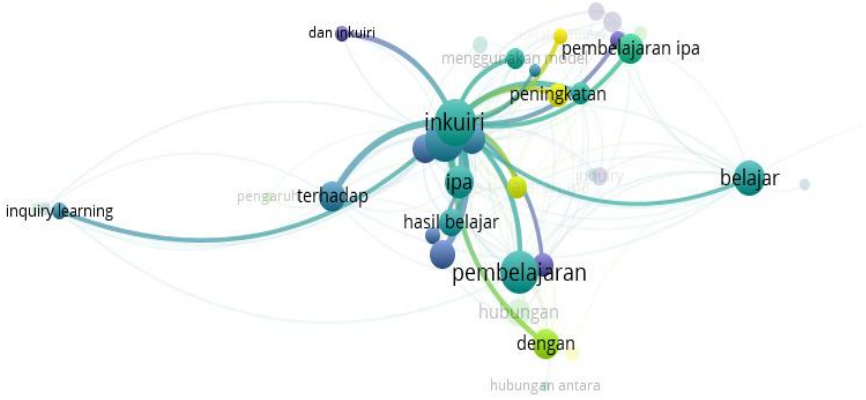

Figure 5. Mapping Results with Overlay Visualization Display Mode

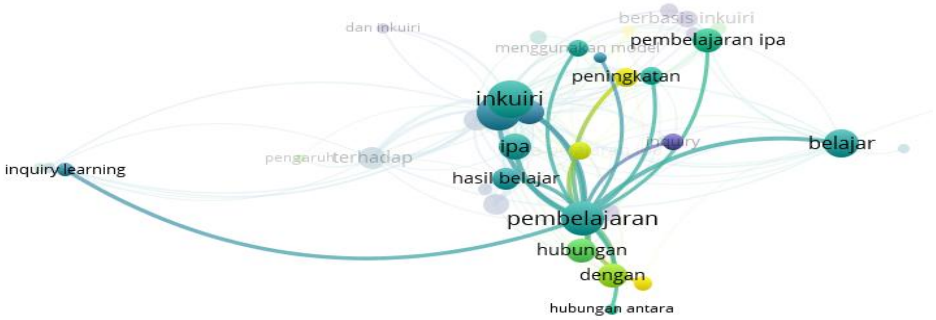

Figure 6. Mapping Results with Overlay Visualization Display Mode

Based on Figures 5 and 6, it can be seen that science learning is closely related to the inquiry learning model and can improve student learning outcomes.

Figure 7. Mapping Results of Inquiry Model with SSI Approach

Figure 7 illustrates a potential correlation between the guided inquiry learning model and the Socio-Scientific Issues (SSI) approach; however, the current body of literature reveals limited research exploring this connection in depth. This gap presents a valuable opportunity for further investigation, underscoring the significance of this research topic. Accordingly, the present study seeks to contribute to the growing body of knowledge by examining the integration of the guided inquiry learning model with SSI as a pedagogical strategy.

This research adds meaningful value to the discourse on educational effectiveness by enriching the literature surrounding guided inquiry learning and the application of SSI in classroom settings. The novelty of this study lies in its exploration of the intersection between these two approaches—an area that has received little to no attention in existing academic literature. The findings have significant implications for educational development, particularly in equipping educators with effective, research-informed instructional models that promote critical thinking and real-world relevance.

Nonetheless, this literature review acknowledges certain limitations. First, the scope of reviewed sources was restricted to publications in English and Indonesian, potentially excluding relevant studies published in other languages. Second, the review was confined to literature published between 2018 and 2024, which may limit the inclusion of the most recent research developments. Third, the focus of the analysis was primarily within the domain of science education, and thus, findings may not fully extend to other disciplines.

CONCLUSION

Based on a comprehensive review of nine selected articles, the findings indicate a positive relationship between the guided inquiry learning model and the Socio-Scientific Issues (SSI) approach. The integration of guided inquiry with SSI has been shown to enhance students' science process skills, scientific argumentation abilities, and overall learning environment quality. Research conducted over the past five years has predominantly focused on specific science topics such as liquid pressure, reaction rates, acid-base reactions, and the chemistry of environmental change—all within the broader domain of science education. Furthermore, the VOSviewer mapping analysis reveals that science learning is closely associated with the inquiry learning model, which contributes to improved student engagement and comprehension. Although a link between the inquiry-based approach and the SSI framework is evident, the literature remains limited in addressing this intersection comprehensively. This gap highlights a promising avenue for future research, emphasizing the need for more in-depth studies on the combined application of guided inquiry and SSI in diverse scientific contexts.

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