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Profile of Guided Inquiry in Science Learning in Junior High Schools

Firdausy Rahma Agustiningrum Setiawan[1*], Zainul Arifin Imam Supardi[2], Budi Jatmiko[3]
[1,2,3] Universitas Negeri Surabaya, Surabaya, Indonesia

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ABSTRACT

Objective: This study aims to discover that guided inquiry is related to science learning at the high school and junior high school levels, which can increase students' knowledge in learning. The researchers also found that guided inquiry could only improve students' literacy skills to a moderate level, which indicated that guided inquiry was needed to improve these abilities. **Method:** The research method used is the literature review method by collecting sources that can be used as references or related references. **Results:** Based on the results of the literature review that has been carried out, it was found that the use of the guided inquiry learning model is proven to be an alternative to active science learning in terms of students' thinking and cognitive skills. Learning outcomes when applying the guided inquiry learning model follow the nature of science learning, including scientific attitudes, processes, products, and applications. **Novelty:** Research that previous researchers have carried out needs coordination with related parties, namely schools, which will also affect the research results. In addition, this research uses a lot of guided inquiry models rather than free inquiry models, which shows a less significant difference in the results to be achieved.

INTRODUCTION

Science subjects are related to how to systematically find out about nature so that Science is not only mastering a collection of knowledge in the form of facts, concepts, or principles but also a process of discovery. The science teaching and learning process emphasizes the process skills approach, so students can find facts and scientifically build concepts, theories, and attitudes (Iswatun et al., 2017). In essence, natural Science studies natural phenomena in the form of facts, concepts, principles, and laws that can be verified through scientific activities. The goal of science subjects in junior high schools (JHS) is to increase scientific knowledge, concepts, and skills as a basis for continuing to a higher level of education and to be able to carry out scientific activities to develop abilities in thinking and have a scientific attitude and be able to communicate it as an essential aspect to raise awareness and curiosity, think positively in maintaining and utilizing the environment and available natural resources.

Science is seen as essential to be taught in junior high schools; in addition to adding knowledge to students, Science is also a vehicle for developing skills in finding out and doing. Science subjects equip students with knowledge, understanding, and the ability to apply in everyday life. The reality in the field shows that students only study Science by memorizing concepts, theories, and laws heard from teacher explanations and reading from source books and do not involve students in the learning process. Science learning currently tends to be test-oriented. According to Sakdiah et al. (2018), the result is that Science as a process, attitude, and application still need to be achieved in the learning process. Learning is more teacher-centered, so students tend to be passive and not creative. As a result, the learning objectives still need to be achieved. Usually,

students tend to learn Science in the lowest cognitive category. Students have yet to become accustomed to developing abilities in scientific thinking. The reality shows that many students need to be more creative and active to think independently in learning.

The science learning process should no longer be too teacher-centered, which does not optimize students' learning activities. The role of the teacher needs to be changed from preparing material that must be learned to how facilitating and developing students' learning experiences. A learning experience for students can be obtained through scientific activities by exploring learning activities through active interaction with colleagues and all learning facilities. To achieve this goal, an alternative learning model is needed to develop thinking processes and improve students' understanding and learning activities in science learning (Cindikia et al., 2020). Guided inquiry learning is the science learning model that aims to find information about nature. The guided inquiry follows its understanding, namely a collection of knowledge in the form of facts. However, the intellectual development of students at junior high school age is just concepts, principles, and a process of discovery. Science must be taught with learning that allows students to develop their abilities and also be able to build their concepts.

RESEARCH METHOD

This study uses the literature review research method by explaining information and data from various sources. The sources used in this study were several journals related to guided inquiry methods in science learning. Apart from journals, sources were also obtained through several internet web pages. All data obtained in this research is secondary data. Secondary data is obtained indirectly from the object under study or through intermediaries from various sources such as journals, archives, and books. After obtaining several journals related to the guided inquiry learning model, the journals obtained will be analyzed. Data analysis in this study used qualitative data analysis techniques. The analysis consists of three activities simultaneously: data reduction, data presentation, and conclusions. Schematically the data analysis process using the interactive data analysis model Miles & Huberman can be seen in **Figure 1.**

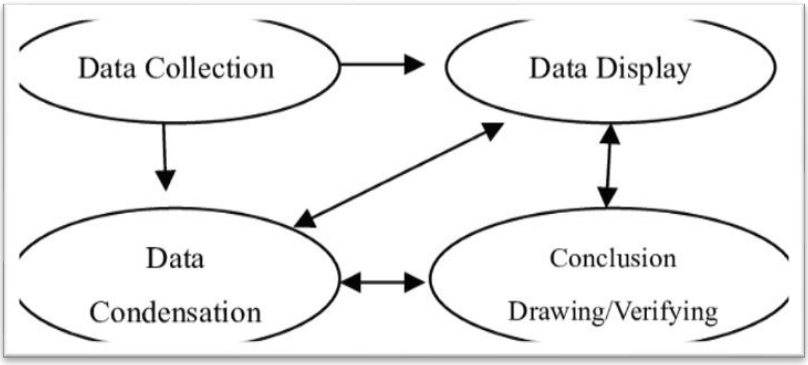

Figure 1. Model of interactive data analysis.

RESULTS AND DISCUSSION

Results

Guided inquiry is a learning model that utilizes thinking performance and can provide examples of scientists' performance when discovering knowledge. Learning with the discovery method can stimulate students to be more active and can trust these students

that the learning that has been done is more effective in order to improve students' abilities. Based on the description above, the guided inquiry learning model is carried out to train scientific literacy in energy material. The steps of inquiry learning can be explained in **Table 1.**

Table 1. The steps of inquiry learning.

Steps	Teacher role
Orientation	To foster a conducive learning atmosphere. At this stage, what the teacher does is: a. Explain the topics, objectives, and learning outcomes expected by students. b. Explain the main activities that students must carry out to achieve goals. c. Explain the importance of topics and learning activities.
Formulate the problem	The teacher brings students to a problem that contains a puzzle.
Formulate hypotheses	The teacher guides students to determine a quick answer to a problem under study which can encourage students to formulate an approximate answer to a problem under study.
Collecting data	The teacher guides students in collecting the information needed to test the proposed hypothesis.
Test the hypothesis	The teacher guides students in determining the answers they feel follow the data or information obtained during data collection.
Formulate conclusions	The teacher guides students to describe the findings obtained based on the results of hypothesis testing.

(Wina, 2008)

Definition of Guided Inquiry

Guided inquiry is one of many learning methods, the most profound inquiry learning in implementation. The teacher provides students with guidance and instructions about the study materials (Ratnaningrum et al., 2015). The inquiry learning model the other research show that groups with teacher guidance give students the experience of thinking independently and interacting with friends through discussion forums (Umniyatun et al., 2019). Guided inquiry can develop various abilities possessed by students. They allow students to participate actively in learning activities. In addition, an inquiry is straightforward and practical to use and can be combined with other learning strategies (Rizki et al., 2021). A study by Rosengrant et al. (2021) shows that learning using guided inquiry can increase students' attention to the material presented.

Guided Inquiry of Generic Science Skills

Guided inquiry can be combined with a digital swing, stimulating students to conduct practicum activities to increase students' Generic Science abilities (Khoiri et al., 2020). The same thing can also be applied to vocational students in generic science abilities, which can be improved using guided inquiry learning (Yohana et al., 2018). An increase in GSS was also found in applying guided inquiry in animal respiration practicum (Destryani et al., 2022). GSS in students increases because the teacher can create or even provoke students' curiosity with guided inquiry. Because GSS can be significantly

improved if students' curiosity also increases, as shown by research by Herianto & Wilujeng (2020). Virtual laboratory-based guided inquiry also has the same capability to improve general science skills as physical laboratories (Husnaini & Chen, 2019). This is because the higher the level of student creativity, the more scientific generic abilities will also increase (Razali et al., 2020).

Guided Inquiry of Science Process Skills

Guided inquiry can also be used as a basis for learning tools in the learning method. As in the research of Saputra et al. (2021), a virtual lab taught using a guided inquiry model can improve science process skills in junior high school students. Science process skills of junior and senior high school students can be improved by using guided inquiry models in learning Science and physics (Setiawan et al., 2016; Yuniastuti, 2016; Iswatun et al., 2017; Wegasanti & Maulida, 2017; Nuryadin & Delinda, 2018; Dijaya et al., 2018; Rafiah et al., 2018; Khairuna & Panggabean, 2019; Putri et al., 2019; Hasan et al., 2020; Jehadan et al., 2020; Saidaturrahmi et al., 2020; Suwardani et al., 2021; Anwar et al., 2020). This is also supported by research developed by Irmi et al. (2019), with the inquiry learning model assisted by QR codes that can improve science process skills and student learning outcomes. The research by Marheni et al. (2014) also revealed similar results, guided inquiry improved science process skills slightly better when compared to free inquiry. In other words, guided inquiry can improve science process skills and student learning outcomes (Zani et al., 2019). Guided inquiry can also be combined with multiple intelligence to improve science process skills (Hairunisa & Hakim, 2018).

Guided inquiry blends with science teaching modules can be used as a reference for improving science process skills in science learning (Astuti et al., 2018). In line with this research, the chemistry module can also improve science process skills using guided inquiry learning (Arantika et al., 2019). Science process skills can also be improved by combining guided inquiry and virtual laboratory (Gunawan et al., 2019). Research conducted by Siahaan et al. (2020), guided inquiry can improve science process skills and understanding and mastery of physics concepts in physics learning. This is supported by the research of Sakdiah et al. (2018) and research Mahrun et al. (2017); in learning physics, process skills and mastery of the material can be improved through guided inquiry-based learning. This is also supported by Sari et al.'s (2017) research on substance stress by developing guided inquiry-based science learning tools. The results show that science process skills and understanding of the material can be improved.

Guided Inquiry of Literacy Ability

Guided inquiry-based learning can improve students' scientific literacy skills (Aulia et al., 2018). One of the developments is contextual-based guided inquiry learning, which can increase the profile of students' chemical literacy abilities in the aspects of context, knowledge, competence, and attitude (Anggraeni et al., 2020). Without a contextual basis of guided inquiry, it is also proven to be able to increase students' literacy skills but only gets a moderate category of improvement (Saefullah et al., 2017; Bagiarata et al., 2018; Agustina et al., 2020; Haryadi & Pujiastuti, 2020; Yhawita et al., 2020). Guided inquiry by combining learning tools can improve scientific literacy skills with the highest indicators of improvement in describing scientific phenomena and understanding concepts, especially in Lorentz-style material (Gunawan et al., 2021).

Guided inquiry combined with specific content can also improve students' literacy skills. One of them is the research conducted by Herdiana et al. (2021) combines guided inquiry-based e-modules with potential local content, which can increase students' scientific literacy skills. In line with the research by Setyaningsih et al. (2018), which combines guided inquiry with the Nature of Science (NOS) can improve students' literacy skills compared to only applying guided inquiry. However, the increase in scientific literacy is much better by using guided inquiry when compared to conventional methods (Ristanto et al., 2017; Choirunnisak et al., 2018; Kurniati et al., 2018; Fitri & Fatisa, 2019; Nikmah & Ellianawati, 2019; Nasir et al., 2023).

Guided Inquiry of Critical Thinking Ability

Learning carried out using the guided inquiry model in several studies shows that it can improve students' critical thinking skills. Critical thinking is included in the High Order Thinking Skill category, which ends other thinking skills. Purwasi's research (2020) using guided inquiry showed that its application improved students' abilities in High Order Thinking Skills in junior high school students. Because guided inquiry that uses critical thinking indicators will increase the qualifications of the indicators for students to become "good" and "very good" (Prihatin & Baskoro, 2017; Zain & Jumadi, 2018), this research is supported by the research of Annisak et al. (2019), which compares learning that uses Constructive controversy with guided inquiry to improve critical thinking skills. This research shows that CC learning cannot improve students' critical thinking skills. This is supported by research by Diska et al. (2022). Guided inquiry assisted by electronic modules can improve students' critical thinking skills. Another study from Diska in the same article shows that LKS-assisted guided inquiry can improve critical thinking skills. In line with Maknun's research (2020), guided inquiry can significantly improve students' critical thinking skills, especially in a static fluid material. In addition, e-Worksheets developed through guided inquiry-based Focus Group Discussions (FGD) can attract students in the high category of students' thinking abilities (Riyadi et al., 2018). Not only is the e-Worksheet the development of an e-module based on guided inquiry can also improve students' critical thinking skills (Kurniawan & Syafriani, 2021). Guided inquiry improves critical thinking skills in the high category because, with the teacher's guidance, students' curiosity can be built by the teacher (Nisa et al., 2018).

Guided Inquiry of Learning Outcomes

Research shows that student learning outcomes increase by using local culture-based guided inquiry learning. The guided inquiry learning model can also be developed on student worksheets; according to research conducted by (Riyani et al., 2022), the quality of Student Worksheets, according to experts, is very good according to the BNSP criteria with an average score obtained of 87.50%. This is in line with the research of Risna et al. (2019) that the Green Chemistry-oriented guided inquiry model can improve the learning outcomes of students who also apply the guided inquiry model in the implementation of their learning. With the results of data analysis using hypothesis testing (t-test), which shows the value of t count > t table (7.612 > 1.993), it is concluded that the Green Chemistry-oriented guided inquiry model can improve student learning outcomes. Students give a positive response to the guided inquiry learning model. Learning with local culture-based guided inquiry models also influences junior high school student learning outcomes.

Applying guided inquiry to elementary school students can improve learning outcomes (Purnawati et al., 2019; Tiro & Risakotta, 2020). The research by Saniah et al. (2017) showed that the application of guided inquiry showed 56.00% of junior high school student learning outcomes. This is supported by research by Sapitri et al. (2022), which uses a step-by-step method in its application. Using guided inquiry, results are obtained by increasing student learning outcomes from the first to the second stage. The application of guided inquiry is more capable of improving student learning outcomes than conventional learning (Karlina et al., 2019).

Guided Inquiry of Other Results

Guided inquiry can also be applied to find the relationship between teacher self-control and job satisfaction. As was done by Aida (2020) that there is an influence in the use of the Inquiry Model on Teacher Self-Control with the Covariate Analysis value using SPSS, namely 55.20 ± 15.65. It was concluded that there was an effect of using model-guided inquiry and conventional learning on Teacher Self-Control material. The development of the environmental pollution practicum module collaborating with videos will improve environmental care attitudes and student learning outcomes, following the research of Nugroho & Puspitasari (2019) with the results of the implementation of the guided inquiry-based environmental pollution module collaborating videos resulting in students' environmental care attitudes increasing by percentage (74.40; 78.00; and 85.07) and learning outcomes also increased by percentage (79.87; 83.00; and 86.40).

The application of the guided inquiry model with the experimental method can complete students' scientific attitudes (Dynamika et al., 2018), with the results of research on the application of the guided inquiry model with the experimental method completing students' scientific attitudes with an average percentage score of 80.81% which is included in the good category. This is also supported by research by Sari et al. (2020) which shows that the guided inquiry-based experimental method can improve students' scientific attitudes. Including caring for the surrounding environment, such as caring for the natural surroundings, can use guided inquiry (Ar & Maknun, 2015). When linked to scientific work skills, the guided inquiry model has a moderate category in reaction rates (Seratih et al., 2022).

Discussion

A review of several articles on guided inquiry found that learning using the guided inquiry model can be an alternative indicator of active learning in which students become the center of the learning process, and the teacher acts as a facilitator. Science learning is a science that studies natural phenomena in the form of facts, concepts, principles, and laws that can be verified through scientific activity. Students have yet to become accustomed to developing abilities in scientific thinking. The reality shows that many students need to be more creative and active to think independently in learning. This journal review aims to realize these goals, which require an alternative learning model to develop thinking processes and increase students' understanding and learning activities in science learning. One is by applying the guided inquiry learning model. This learning model has learning methods and steps that can encourage students to develop thinking skills by asking questions and getting answers based on their curiosity. The use of guided inquiry is following its understanding, namely a collection of knowledge in the form of facts but the intellectual development of students at junior

high school age are only concepts or principles but also a process of discovery and the role of the teacher acting as a facilitator or guide in the learning process. In addition, the use of guided inquiry can improve scientific literacy skills, student's creative thinking skills, students' cognitive learning outcomes, and students critical thinking skills for suggestions from researchers for future researchers that can integrate the guided inquiry learning model with other learning methods in the hope of making it better.

CONCLUSION

Fundamental Finding: From the articles that the researcher reviewed found that guided inquiry is a reliable learning model in Science learning at both high and junior high school levels. Primarily junior high school students can provoke curiosity and build students knowledge of learning. **Implication**: The researchers also found that guided inquiry could only improve students' literacy skills to a moderate level, which indicated that guided inquiry was lacking in improving these abilities. However, guided inquiry is considered more capable of improving students' literacy skills when compared to conventional learning models. In addition, guided inquiry can also be easily integrated with other learning strategies. **Limitation:** Researchers experienced obstacles in finding additional literature that contained guided inquiry abilities to improve students' literacy skills to a high stage or category. **Future Research:** Another researcher needs more guided inquiry development literature on science learning. Focus on the role of guided inquiry as one of the abilities researchers want to instill in students because focusing on research can get more perfect results.

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* **Firdausy Rahma Agustiningrum Setiawan, S.Pd (Corresponding Author)**
Science Education Program Postgraduate Faculty,
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: firdausy.21001@mhs.unesa.ac.id

Dr. Z. A. Imam Supardi, M.Si
Department of Science Education Faculty of Science and Mathematics,
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: zsupardi02@gmail.com

Prof. Dr. Budi Jatmiko, M.Pd
Department of Science Education Faculty of Science and Mathematics,
Universitas Negeri Surabaya,
Jl. Lidah Wetan, Surabaya, East Java, 60213, Indonesia
Email: budijatmiko@unesa.ac.id