

Effectiveness of Implementing Guided Inquiry to Improve Students' Critical Thinking Skills

Istiana Istiana¹, Budi Jatmiko¹, Binar Kurnia Prahani¹

¹ Universitas Negeri Surabaya, Surabaya, Indonesia

Abstract – Guided inquiry is known as a learning approach that can stimulate students' critical thinking skills. In the initial phase, this research undertook a comprehensive literature review, accessing the latest scholarly publication through diverse channels, including but not limited to Google Scholar, SINTA-registered journals, and official websites of national universities. The main objective of this research is to evaluate the effectiveness of implementing guided inquiry in improving students' critical thinking skills at elementary, middle school, high school and student levels. This research uses a guided inquiry-based learning method as the main approach. A literature study was carried out to obtain secondary data from journals that discuss the application of guided inquiry. Thoughtfully curated sources encompassing reputable journals published between 2017 and 2023 were meticulously chosen for inclusion. The results of the analysis of 27 journals show that the application of guided inquiry is significantly more effective in improving students' critical thinking skills compared to non-inquiry approaches. Substantive distinctions in critical thinking aptitudes emerge between students exposed to the guided inquiry model and those who are not.

Keywords – Guided Inquiry, Critical Thinking Skills, Learning Effectiveness.

DOI: 10.18421/SAR64-07

<https://doi.org/10.18421/SAR64-07>


Corresponding author: Istiana Istiana,
Universitas Negeri Surabaya, Surabaya, Indonesia
E-mail: istiana.22009@mhs.unesa.ac.id

Received: 06 November 2023.

Revised: 15 December 2023.

Accepted: 20 December 2023.

Published: 25 December 2023.

 © 2023 Istiana Istiana, Budi Jatmiko & Binar Kurnia Prahani; published by UIKTEN. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 License.

The article is published with Open Access at <https://www.sarjournal.com/>

1. Introduction

Natural science encompasses a wide range of scientific disciplines, including biology, chemistry, physics, astronomy, geology, and environmental science. Basically, science is a framework of knowledge, research methods and a scientific mindset [1]. According to Susanto in [2] science is a human effort to understand the universe by making accurate observations of the objects under study, following certain procedures, and providing explanations using rational thinking, thereby producing a conclusion.

Physics is a branch of science. Physics education is one of the key components in students' intellectual development. Physics is also a process of discovery. Physics provides explanations regarding all phenomena that occur in nature so that problems related to physics often arise in everyday life [3]. Therefore, the role of physics is to train students to understand the concepts, knowledge and principles of physics, as well as to have scientific skills and scientific processes. This shows that physics not only explains natural phenomena but also involves a structured scientific process to understand and describe the universe.

As part of the learning process, students have to be directly involved with nature when it comes to physics. Students have to become learning subjects in the learning process, especially in science material, specific activities and practices that lead to the learning process as a subject that varies from one learning to another [4]. In physics material, students often need to understand what is a fact and what is a concept. Therefore, teachers have to be creative in using models or learning media. An approach that is widely recommended by experts and a learning process that is centred on students learning on their own, not just receiving it from the teacher.

In an effort to ensure that students not only understand physics concepts but can also develop students critical thinking skills, effective approaches have to be applied in the learning process. One that has received widespread attention in this context is the guided inquiry approach.

Guided inquiry is the approach that gives students active role in the learning process. This approach encourages students to ask questions, investigate and formulate their solutions to the physics problems that students face. [5] states that guided inquiry can increase high school students' thinking skills in physics material.

The importance of critical thinking skills in physics has to be addressed. This skill includes students' ability to analyze, evaluate and formulate arguments based on the evidence they find. Critical thinking skills are not only relevant in academic contexts but also in everyday life. Critical thinking skills help students make better decisions, be effective problem solvers, and be more independent individuals.

Implementing guided inquiry in physics learning requires careful planning, the right resources, and the right approach to ensure that students are truly involved in the learning process. Therefore, this article will review the effectiveness of implementing guided inquiry in improving students' critical

thinking skills in physics material. Through a deeper understanding of the role of guided inquiry in physics education, we can explore the great potential it has for strengthening students' critical thinking skills.

2. Methodology Section

This study employs literature reviews to elucidate and evaluate the efficacy of implementing guided inquiry for enhancing student's critical thinking skills. It seeks to identify the advantages and disadvantages associated with the application of guided inquiry in each analyzed piece of literature. This research was conducted in several studies. This literature study was taken from 27 journals from various sources published over the last few years between 2017-2023 regarding the application of guided inquiry.

The steps for a literature study to analyze the effectiveness of applying guided inquiry to improve critical thinking skills are shown in Figure 1.

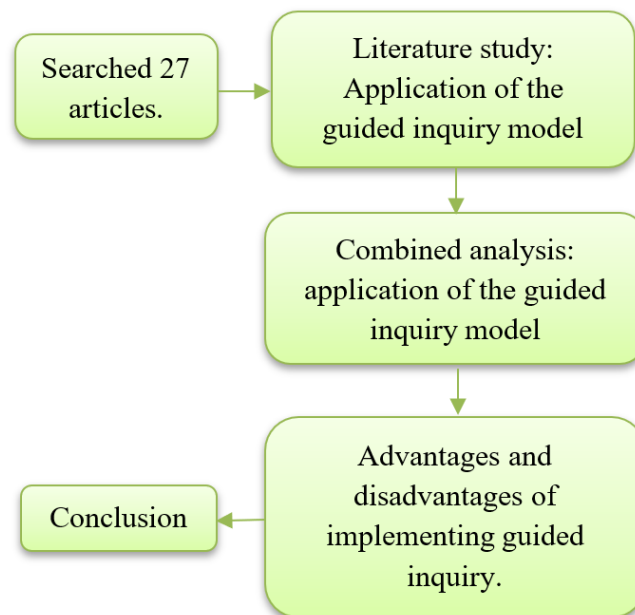


Figure 1. Flowchart of literature study research analyzing the effectiveness of implementing guided inquiry to improve students' critical thinking skills.

3. Results

Guided inquiry is a learning approach that emphasizes thinking skills and provides examples of how scientists work when they develop new knowledge. Using the discovery method in learning can encourage students to be more active in learning

activities and help students feel confident that the lessons they are implementing can improve their abilities. Therefore, in the context of the guided inquiry learning approach is used to improve critical thinking skills. The following results from the analysis of 27 international and national journals can be seen in Table 1.

Tabel 1. Results Of Analysis Of 27 International and National Journals

Author and Year	Sample Characteristics	Methodology	Findings
[6]	35 students	REACT Strategy	The inquiry learning model is effective in improving student learning outcomes.
[7]	30 students	Experimental research	The guided inquiry learning model is effective in improving science process skills.
[8]	46 students	R&D	The guided inquiry model based on E-module ethnoscience is effective in improving problem-solving skills.
[9]	108 students	Literature studies and field studies	The guided inquiry model is effective in improving students' higher-order thinking skills.
[10]	5 students	4D development model	Guided inquiry-oriented Google sites have the potential to be quality learning media in improving students' understanding.
[11]	20 questions	ADDIE development model	The guided inquiry-based e-module developed is very valid, effective and practical.
[12]	13 students	4D Models	Guided inquiry-based e-books are very valid in improving critical thinking skills on plant growth and development material.
[5]	60 students	Quantitative research with a non-equivalent control group design.	The guided inquiry model is very influential in improving critical thinking skills.
[13]	53 students	Experimental research	The guided inquiry model is very influential in improving critical thinking skills in acid and base material
[14]	60 students	Quantitative research	The guided inquiry model influences student learning outcomes.
[15]	46 students	Quasi-experimental	The guided inquiry model influences scientific attitudes and science learning outcomes.
[16]	58 students	Quasi experiment	The guided inquiry model through virtual laboratories affects students' science process skills.
[17]	43 students	Quasi-experimental	The guided inquiry model assisted by concrete object media influences scientific attitudes and science learning outcomes.
[18]	Cluster random sampling	Experimental research	Guided inquiry model in improving critical thinking skills in physics learning.
[19]	82 students	Experimental research	The video-assisted inquiry learning model influences the science learning outcomes of fifth-grade elementary school students.
[20]	34 students	Quasi experiment	The scientifically assisted LKS-based guided inquiry learning model is effective for science learning outcomes.

[21]	30 students	Action research	The guided inquiry method can improve science learning outcomes.
[22]	120 students	Quasi experiment	The guided inquiry model affects improving learning outcomes, understanding concepts and students' creative thinking skills.
[23]	37 students	Quasi experiment	The guided inquiry model influences the science learning outcomes of SDI Wae Ratun students.
[24]	43 students	Quantitative research using experimental methods	The guided inquiry model influences the physics learning outcomes of class XI SMAN 6 Lubuk Linggau.
[25]	32 students	R&D	Guided inquiry-based science practicum is valid, practical and effective in guiding class VII middle school students' practicum activities.
[26]	223 students	Quasi experimental design	The guided inquiry model influences students' chemistry learning outcomes on hydrocarbon material.
[27]	60 students	Scientific method	There is a positive impact of laboratories to improve students' research skills.
[28]	55 students	Quasi experiment	Science learning on material objects and changes in the properties of objects using a guided inquiry model influences critical thinking skills.
[29]	18 students	R&D	Science teaching materials based on the guided inquiry model are interesting to use in learning activities.
[30]	Cluster random sampling	Quasi experiment	The guided inquiry model assisted by PhET influences students' understanding of concepts.
[31]	32 students	R&D	Guided inquiry-based LKPD affects improving critical thinking skills and student learning outcomes.

4. Discussion

Analysis of 27 international and national journals related to the guided inquiry model found that learning activities using the guided inquiry model are an alternative for teachers in creating an active learning process, and for students as the centre of the learning process, the teacher only acts as a facilitator. Physics is a scientific discipline concerned with the study of natural phenomena, encompassing both matter and energy. Students still need to practice and familiarize themselves with developing critical thinking skills. In fact, students show that many things need to be improved, both in terms of creativity and independent thinking in learning activities. This journal analysis aims to realize this goal, so it requires learning alternatives in developing critical thinking processes and increasing students' understanding of learning activities.

The guided inquiry learning model has several methods and learning steps that can encourage students to develop critical thinking skills so they can ask questions and answers based on the student's curiosity. Guided inquiry is used in accordance with the definition of guided inquiry in Physics learning in high school.

There are several advantages to implementing guided inquiry: (1) In teacher guidance, the teacher acts as a facilitator who provides guidance and direction to students. This helps students feel more secure and encourages them to explore concepts that may be difficult to understand without guidance. (2) Structured learning, in this approach, is a clear framework for the inquiry process so that students have guidance in developing questions, planning experiments, and analyzing results. (3) Development of critical thinking skills, in helping to develop critical thinking skills in a structured context.

Students are invited to ask relevant questions and develop deep understanding. (4) Increasing understanding of concepts, allowing students to deepen their understanding of the concepts being taught because they are actively involved in learning activities. (5) Increased interest and motivation: students are often motivated to learn when they are given the opportunity to investigate topics that interest them and when they feel they have control over their learning.

On the other hand, guided inquiry also has several areas for improvement, namely: (1) It takes longer than direct teaching methods. (2) Effective teacher guidance is needed. (3) Limited resources. (4) It requires careful preparation. (5) Thorough evaluation, especially on the final results of the investigation process. Teachers have to be vigilant in implementing the guided inquiry model so that there are no obstacles when teaching and learning activities take place. To achieve maximum goals, teachers need to pay attention to teaching modules according to the characteristics of students.

Based on the literature review of research results in Table 1 at various elementary, middle school, high school and student levels, it can be concluded that the inquiry method generally has a positive impact on improving cognitive learning abilities, such as critical thinking abilities and learning outcomes. Apart from that, the inquiry method is also able to improve psychomotor learning skills, including skills in basic and integrated science processes as well as critical thinking abilities. [14] states that critical thinking skills and student learning outcomes are better using the guided inquiry model than using conventional methods. The scientific attitudes and learning outcomes of students following the guided inquiry model are higher than those following conventional learning [15].

In implementing the guided inquiry learning approach, teachers have the flexibility to develop various methods and strategies that are appropriate to the science topics being taught by students. [13] stated that students prefer lessons using the guided inquiry model more dominantly than using the lecture method. Teachers can explore their creativity in designing appropriate approaches. In addition, the use of direct and virtual practical activities in the guided inquiry learning approach is considered more effective in improving students' physics learning outcomes when compared to direct teaching methods.

5. Conclusion

Based on a literature review from 27 international and national journals, the guided inquiry learning model is effective in improving students' thinking skills.

Implementing learning with this approach is also useful in improving students' critical thinking skills and student learning outcomes. To avoid obstacles in implementing guided inquiry, it is necessary to maintain vigilance and plan teaching modules carefully based on the characteristics of the students. In the context of further research, the scale used in literature studies can be expanded, especially if the aim includes several aspects of students' science skills, such as critical thinking, HOTS and scientific thinking.

References:

- [1]. Desstya, A., Novitasari, I. I., Razak, A. F., & Sudrajat, K. S. (2018). Refleksi Pendidikan Ipa Sekolah Dasar Di Indonesia (Relevansi Model Pendidikan Paulo Freire dengan Pendidikan IPA di Sekolah dasar). *Profesi Pendidikan Dasar*, 4(1), 1. Doi: 10.23917/ppd.v1i1.2745.
- [2]. Meidawati, S. A. N. B. R. (2019). Persepsi Siswa Dalam Studi Pengaruh Daring Learning Terhadap Minat Belajar Ipa. *SCAFFOLDING. Jurnal Pendidikan Islam Dan Multikulturalisme*, 1(2), 30–38. Doi: 10.37680/scaffolding.v1i2.117
- [3]. Sukiminiandari, Y. P., Budi, A. S., & Supriyati, Y. (2015, October). Pengembangan modul pembelajaran fisika dengan pendekatan saintifik. In *Prosiding seminar nasional fisika (e-journal)*, 4, SNF2015-II.
- [4]. Ha, H., & Kim, H.-B. (2019). A theoretical investigation on agency to facilitate the understanding of student-centered learning communities in science classrooms. *Journal of the Korean Association for Science Education*, 39(1), 101–113. Doi: 10.14697/jkase.2019.39.1.101
- [5]. Ariska, A., Simanullang, A. F., & Lumbangaol, S. T. P. (2022). Pengaruh Model Pembelajaran Guided Inquiry terhadap Keterampilan Berpikir Kritis Fisika Siswa di SMA Swasta Tamansiswa Tapian Dolok TA 2022/2023. *Jurnal Pendidikan Dan Konseling (JPDK)*, 4(6), 742–750.
- [6]. Miftahul Jannah, Z. A. Imam Supardi, & Prabowo. (2020). Guided Inquiry Model with the REACT Strategy Learning Materials to Improve the Students' Learning Achievement. *IJORER: International Journal of Recent Educational Research*, 1(2), 156–168. Doi: 10.46245/ijorer.v1i2.45
- [7]. Ramadhani, P. I., Hariyono, E., & Sudibyo, E. (2023). Development of Students' Worksheet Through Guided Inquiry Model to Increase Science Process Skills in The Harmonic Vibration Subject. *IJORER: International Journal of Recent Educational Research*, 4(4), 469–480. Doi: 10.46245/ijorer.v4i4.319

- [8]. Syahmani, S., Rahmatilah, J., Winarti, A., Kusasi, M., Iriani, R., & Prasetyo, Y. D. (2022). Development of Guided Inquiry Lesson Based on Ethnoscience E-Modules to Improve Students' Problem-solving Ability in Chemistry Class. *Journal of Innovation in Educational and Cultural Research*, 3(4), 670–682. Doi: 10.46843/jiecr.v3i4.363
- [9]. Jumilah, J., Jatmiko, B., & Hariyono, E. (2021). Comparative Study Of Effectiveness Between Inquiry Lab and Guided Inquiry Learning Models to Improve Students' Higher Order Thinking Skills. *JPPS (Jurnal Penelitian Pendidikan Sains)*, 12–26.
- [10]. Nurlatifah, N., & Suprihatiningrum, J. (2023). Pengembangan Google Sites Berbasis Inkuiri Terbimbing pada Materi Asam Basa sebagai Media Belajar Mandiri Siswa SMA/MA Kelas XI. *Jurnal Pendidikan Sains Indonesia*, 11(1), 67–83. Doi: 10.24815/jpsi.v11i1.27391
- [11]. Sari, I. S., Lestari, S. R., & Sari, M. S. (2020). Development of A Guided Inquiry-Based E-module on Respiratory System Content Based on Research Results of the Potential Single Garlic Extract (*Allium sativum*) to Improve Student Creative Thinking Skills and Cognitive Learning Outcome. *Jurnal Pendidikan Sains Indonesia*, 8(2), 228–240.
- [12]. Fitri, H. M. M., & Rahayu, Y. S. (2021). Pengembangan E-Book Berbasis Inkuiri Terbimbing pada Materi Pertumbuhan dan Perkembangan Tumbuhan untuk Melatihkan Kemampuan Berpikir Kritis Siswa Kelas XII SMA. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 11(1), 28–38. Doi: 10.26740/bioedu.v11n1.p28-38
- [13]. Saridah, S., Agustina, S., & Perkasa, M. (2022). Pengaruh Model Inquiry Terhadap Kemampuan Berpikir Kritis Siswa Kelas Xi Sma Negeri 2 Langgudu. *Jurnal Redoks: Jurnal Pendidikan Kimia Dan Ilmu Kimia*, 5(2), 56–60.
- [14]. Pitri, P., Tanjung, I. F., & Khairuddin, K. (2022). Pengaruh Model Pembelajaran Guided Inquiry Terhadap Berpikir Kritis dan Hasil Belajar Siswa di MAS PAB 2 Helvetia Deli Serdang. *BIODIK*, 8(1), 80–89. Doi: 10.22437/bio.v8i1.15121
- [15]. Kadek Tri Widani, N., Nyoman Sudana, D., & Gusti Ayu Tri Agustiana, I. (2019). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Ipa Dan Sikap Ilmiah Pada Siswa Kelas V Sd Gugus I Kecamatan Nusa Penida. *Journal of Education Technology*, 3(1), 15-21. Doi: 10.23887/jet.v3i1.17959
- [16]. Gunawan, Harjono, A., Hermansyah, & Herayanti, L. (2019). Guided inquiry model through virtual laboratory to enhance students' science process skills on heat concept. *Jurnal Cakrawala Pendidikan*, 38(2), 259–268. Doi: 10.21831/cp.v38i2.23345
- [17]. Suryantari, N. M. A., Pudjawan, K., & Wibawa, I. M. C. (2019). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbantuan Media Benda Konkret Terhadap Sikap Ilmiah dan Hasil Belajar IPA. *International Journal of Elementary Education*, 3(3), 316-326. Doi: 10.23887/ijee.v3i3.19445
- [18]. Nasution, S. W. R. (2018). Penerapan model inkuiri terbimbing (guided inquiry) dalam meningkatkan kemampuan berpikir kritis pada pembelajaran fisika. *Jurnal Education and Development*, 3(1), 1-1.
- [19]. Muliani, N. K. D., & Wibawa, I. M. C. (2019). Pengaruh model pembelajaran inkuiri terbimbing berbantuan video terhadap hasil belajar IPA. *Jurnal Ilmiah Sekolah Dasar*, 3(1), 107–114. Doi: 10.23887/jisd.v3i1.17664
- [20]. Nahak, R. L., & Bulu, V. R. (2020). Efektivitas Model Pembelajaran Inkuiri Terbimbing Berbantu Lembar Kerja Siswa Berbasis Saintifik Terhadap Hasil Belajar Siswa. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, 6(2), 230-237.
- [21]. Yasmini, N. M. (2022). Metode Inkuiri Terbimbing untuk Meningkatkan Hasil Belajar IPA Siswa Kelas V. *Journal of Education Action Research*, 6(1), 73-79. Doi: 10.23887/jear.v6i1.44013
- [22]. Suparmi, N. W. (2019). Hasil Belajar Pemahaman Konsep Dan Berpikir Kreatif Siswa Dalam Pembelajaran Inkuiri Bebas Dan Inkuiri Terbimbing. *Journal of Education Technology*, 2(4), 192-196. Doi: 10.23887/jet.v2i4.16548
- [23]. Jundu, R., Tuwa, P. H., & Seliman, R. (2020). Hasil belajar IPA Siswa SD di Daerah Tertinggal dengan penerapan model pembelajaran inkuiri terbimbing. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, 10(2), 103–111. Doi: 10.24246/j.js.2020.v10.i2.p103-111
- [24]. Lovisia, E. (2018). Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Hasil Belajar. *Science and Physics Education Journal (SPEJ)*, 2(1), 1–10. Doi: 10.31539/spej.v2i1.333
- [25]. Syamsu, F. D. (2018). Pengembangan penuntun praktikum ipa berbasis inkuiri terbimbing untuk siswa smp siswa kelas vii semester genap. *Bionatural: Jurnal Ilmiah Pendidikan Biologi*, 4(2).
- [26]. Asni, A., Wildan, W., & Hadisaputra, S. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Kimia Siswa Materi Pokok Hidrokarbon. *Chemistry Education Practice*, 3(1), 17-22. Doi: 10.29303/cep.v3i1.1450
- [27]. Maknun, D., Prasetyo, Z. K., & Djukri, D. (2022). Guided inquiry laboratory to improve research skills of prospective biology teachers. *International Journal of Evaluation and Research in Education*, 11(4), 2122–2128. Doi: 10.11591/ijere.v11i4.22104
- [28]. Liwa Ilhamdi, M., Novita, D., & Nur Kholifatur Rosyidah, A. (2020). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Berpikir Kritis IPA SD. *Jurnal Ilmiah KONTEKSTUAL*, 1(2), 49–57. Doi: 10.46772/kontekstual.v1i02.162
- [29]. Komalasari, B. S., Jufri, A. W., & Santoso, D. (2019). Pengembangan Bahan Ajar IPA Berbasis Inkuiri Terbimbing untuk Meningkatkan Literasi Sains. *Jurnal Penelitian Pendidikan IPA*, 5(2), 219–227. Doi: 10.29303/jppipa.v5i2.279
- [30]. Rais, A. A., Hakim, L., & Sulistiawati, S. (2020). Pemahaman Konsep Siswa melalui Model Inkuiri Terbimbing Berbantuan Simulasi PhET. *Physics Education Research Journal*, 2(1), 1-8. Doi: 10.21580/perj.2020.2.1.5074
- [31]. Firdaus, M., & Wilujeng, I. (2018). Pengembangan LKPD inkuiri terbimbing untuk meningkatkan keterampilan berpikir kritis dan hasil belajar peserta didik. *Jurnal Inovasi Pendidikan IPA*, 4(1), 26–40.