

# The Effect of Science Learning on Students' Critical Thinking Ability: A Review

Rosi Pratiwi<sup>1\*</sup>, Aris Doyan<sup>1</sup>

<sup>1</sup> Master of Science Education, Postgraduate, University of Mataram, Mataram, Indonesia.

Received: October 20, 2023

Revised: February 21, 2024

Accepted: March 25, 2024

Published: March 30, 2024

Corresponding Author:

Rosi Pratiwi

[rosipratiwi253@gmail.com](mailto:rosipratiwi253@gmail.com)

© 2024 The Authors. This open access article is distributed under a (CC-BY License)



**Abstract:** Critical thinking ability is one of the high-level thinking abilities in solving problems. Several learning models can be applied to improve students' critical thinking skills. Some of these models include problem based learning, discovery learning, project based learning, and so on. This research is a literature study or literature review of 25 articles related to students' critical thinking abilities. The articles reviewed are articles published during the last 5 years, 2018 to 2022. Based on the results of a literature review that was carried out on 25 national and international articles, the highest average score for critical thinking ability was 92.56. This value was obtained by applying the discovery learning model through integrated science practicum activities. Therefore, it can be concluded that the discovery learning model is the most effective model for improving students' critical thinking abilities. The value of critical thinking ability that most often appears in the range of 71-80 in 11 articles.

**Keywords:** A Review; Critical Thinking Ability; Science Learning.

## Introduction

Science learning is important in increasing students' understanding of the development of Science and Technology (IPTEK) because through science learning educators can develop thinking skills, arouse students' curiosity, motivation and interest in science and technology (Jamaluddin et al., 2019). According to Sari et al. (2022), science learning can develop a scientific attitude through learning experiences in achieving learning goals so that it can develop students with excellence and good quality. Ramdani et al. (2020) explain science learning requires students to have 21st century skills.

21st century learning emphasizes that students have the skills needed in aspects of life including critical thinking skills, creativity, collaboration and communication [Sari et al., 2022]. According to Siwi & Setiawan (2021) in science learning, critical thinking skills need to be taught. Critical thinking skills are very important for students in learning. The importance of critical thinking according to Walfajri & Harjono (2019)

is so that students can solve all problems that exist in the real life.

Critical thinking ability is one of the high-level thinking abilities in solving problems (Safitri & Mediatati, 2021). Critical thinking is based on updating knowledge, analyzing comparisons and differences, observing and identifying cause and effect relationships, extracting ideas and evaluating science learning (Marudut et al., 2020). Critical thinking is an inner urge to find out as many sources or information as possible with the ability to think rationally (Siwi & Setiawan, 2021).

Someone who thinks critically can determine relevant information. This ability must be trained in students because this ability is very necessary in life (Kusumah, 2019). Marudut et al. (2020) in Wahyuni et al. (2022) said the purpose of critical thinking is to evaluate arguments, truth, and richness and provide evidence for the relationship between two or more topics, as well as to accept or reject ideas.

Critical thinking involves inductive thinking skills such as recognizing relationships, analyzing open-ended problems, determining cause and effect, making

### How to Cite:

Pratiwi, R., & Doyan, A. (2023). The Effect of Science Learning on Students' Critical Thinking Ability: A Review. *International Journal of Science Education and Science (IJSES)*, 1(1), 1-5. Retrieved from <https://journals.balaipublikasi.id/index.php/ijse/article/view/105>

conclusions and taking into account relevant data (Kusumah, 2019). When students think critically, they are encouraged to think for themselves, question hypotheses, analyze and synthesize events to go further by developing new hypotheses and looking at existing facts (Wahyuni et al., 2022).

Critical thinking abilities can be improved by applying several models, strategies and learning approaches that support these abilities. Several learning models can be applied to improve students' critical thinking ability. The learning model that can be used is a learning model in which students are directly involved in developing their thinking abilities. The author reviewed articles published in various journals to find out how to improve students' critical thinking skills.

## Method

This research is a literature study or literature review of the research results of various relevant articles regarding critical thinking skills in science learning. The articles reviewed are articles obtained from various journals, both national and international journals. This research limited the articles reviewed to 25 articles with the keywords critical thinking skills and science learning. The articles studied were articles published in the period 2018 to 2022.

## Result and Discussion

The articles reviewed are articles that discuss critical thinking skills in science learning. The results of the review of articles on critical thinking skills in science learning can be seen in Table 1.

**Table 1:** Results of Review of Articles on Models, Approaches, Methods and/or Learning Strategies to Improve Students' Critical Thinking Abilities.

Writer	Title	Score of Critical Thinking Ability
Suparya, 2018	The Influence of the Think Talk Write (TTW) Cooperative Learning Model on Learning Outcomes and Critical Thinking Abilities in Science Learning in Elementary Schools.	58.74
Pratiwi et al, 2019	The Influence of the Video-Assisted Probing Prompting Learning Model on Students' Learning Outcomes and Critical Thinking Abilities.	54.86
Khofiyah et al, 2019	The Influence of the Discovery Learning Model Assisted by Real Object Media on Students' Critical Thinking Ability and Understanding of Concepts.	80.50
Mabrurroh, 2019	The Influence of the Project Based Learning Model in Science Subjects on the Critical Thinking Ability of Class VI Students at Margorejo VI Public Elementary School, Surabaya.	81.57
Herlina et al, 2019	The Influence of the Group Investigation (GI) Learning Model on Students' Critical Thinking and Social Skills in Class X Biology Science Learning at SMAN 2 Argamakmur.	76.82
Nurza et al, 2020	Effect of Inquiry Learning Model on Science Process Skills and Critical Thinking Ability in Human Movement Organ in Class V Public Elementary School 050666 Lubuk Dalam Stabat	87.68
Halmuniati et al, 2020	Application of the Problem Posing Learning Model to the Critical Thinking Skills of Class X Students at MAN 1 Kendari.	72.50
Devi & Bayu, 2020	Critical Thinking and Science Learning Outcomes Through Problem Based Learning Assisted by Visual Media.	70.00
Noviyanto & Wardani, 2020	Meta Analysis of the Influence of the Discovery Learning Approach on the Critical Thinking Ability of Class V Students with Thematic Science Content.	83.36
Wulandari et al, 2020	The Influence of Multimedia-Based Problem Based Learning Models on Critical Thinking Abilities and Science Learning Outcomes.	77.08
Rahman et al, 2020	The Influence of the PBL Model on the Critical Thinking Ability and Understanding of Science Concepts of Class V Students at SDN 30 Sumpangbita.	79.16
Safitri & Setiawan, 2020	Differences in the Influence of Discovery Learning and Problem Based Learning Models on Students' Science Critical Thinking Abilities.	74.97
Ariyatun & Octavianelis, 2020	The Influence of the STEM Integrated Problem Based Learning Model on Students' Critical Thinking Ability.	85.49
Wale & Bishaw, 2020	Effects of Using Inquiry-based Learning on EFL Students Critical Thinking Skills	65.95
Marudut et al, 2020	Increasing Critical Thinking Abilities in Science Learning Through a Process Skills Approach.	74.60

Writer	Title	Score of Critical Thinking Ability
Sarimuddin et al, 2021	The Influence of the Problem Based Learning Model on Cognitive Abilities and Critical Thinking Skills in Science Material for Class V Elementary School Students in Herlang District, Bulukumba Regency.	53.13
Puspita & Dewi, 2021	Effectiveness of E-LKPD based on an Investigative Approach on Primary School Students' Critical Thinking Abilities.	70.37
Meriyanti et al, 2021	Analysis of Junior High School Students' Critical Thinking Ability towards Science Subjects Through the Use of Google Classroom Media.	86.80
Rachamatika et al, 2021	The Influence of Learning Models and Learning Independence on the Science Critical Thinking Ability of Class V Elementary School Students in East Jakarta.	80.60
Fauziah & Fitria, 2022	The Influence of Problem-Based Learning Models and Initial Abilities on Students' Critical Thinking Abilities in Integrated Thematic Learning.	89.01
Bahtiar et al, 2022	The Influence of the Discovery Learning Model Through Integrated Science Practicum Activities on Students' Critical Thinking Ability.	92.56
Sari et al, 2022	The Influence of the Learning Cycle 7e Learning Model on Collaboration Skills and Critical Thinking Abilities of Middle School Science Students.	78.23
Rahmadansah et al, 2022	The Influence of the TAI Learning Model Assisted by Interactive E-LKPD on Students' Critical Thinking Ability on Acid-Base Material.	77.10
Wahyuni et al, 2022	Development of Interactive Learning Media Based on Articulate Storyline for Junior High School Students' Critical Thinking Ability on Solar System Material.	72.18
Salama, 2022	The Influence of the Guided Inquiry Learning Model on Critical Thinking Skills and Science Learning Outcomes in Class V UPTD Students at SD Negeri 18 Barru.	79.83

Based on Table 1, there are several learning models that can be used to improve critical thinking skills, including cooperative Think Talk Write (TTW), learning cycle 7e, inquiry, problem based learning, discovery learning, probing prompting, TAI, PjBL, and GI. The lowest score for students' critical thinking skills in science learning is 53.13. This value shows that critical thinking skills are in the medium category. From the start, students' critical thinking abilities in the experimental class were classified as very low. However, Sarimuddin et al, (2021) stated that the problem based learning model influences students' critical thinking abilities. This can be seen from the increase in critical thinking skills in the experimental class.

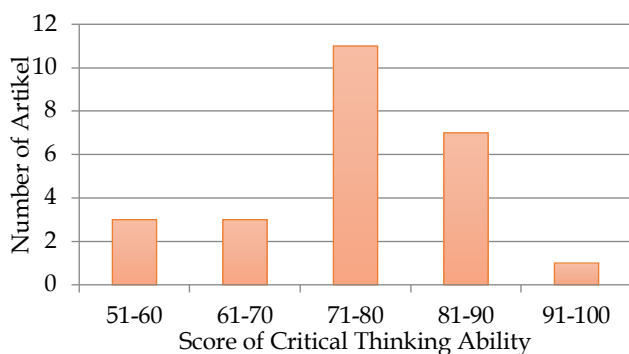


Figure 1. Distribution of Critical Thinking Ability Scores

The highest critical thinking ability score was 92.56 which was improved by using the discovery learning model through science practicum activities. The discovery learning learning model can improve critical

thinking skills because this model emphasizes the active learning process so that students are able to find for themselves the problems being studied, are able to express ideas and critical ideas, are able to communicate and can work well (Bahtiar et al, 2022). The results of the article review are outlined in Figure 1. Based on Figure 1, it can be seen that the critical thinking ability score most often appears in the range of 71-80 in 11 articles.

## Conclusion

Based on a review of 25 articles, several models were obtained that can help improve students' critical thinking skills. The most effective model used is the discovery learning model, as seen from the average critical thinking ability score of 92.56. Critical thinking scores appeared most frequently in the 71-80 range in 11 articles.

## Acknowledgments

Thank you to everyone involved in writing this article so that the article can be completed.

## Author Contributions

This article was prepared by two people. All research members carried out each stage cooperatively until this article was completed.

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

## References

- Ariyatun., & Octavianelis, D.F. (2020). Pengaruh Model *Problem Based Learning* Terintegrasi STEM Terhadap Kemampuan Berpikir Kritis Siswa. *Journal of Educational Chemistry*, 2(1): 33-39.
- Bahtiar., Maimun., & Anggriani, B.L. (2022). Pengaruh Model *Discovery Learning* Melalui Kegiatan Praktikum IPA Terpadu Terhadap Kemampuan Berpikir Kritis Siswa. *Jurnal Pendidikan MIPA*, 12(2): 134-142. <https://doi.org/10.37630/jpm.v12i2.564>
- Devi, P.S., & Bayu, G.W. (2020). Berpikir Kritis dan Hasil Belajar IPA Melalui Pembelajaran *Problem Based Learning* Berbantuan Media Visual. *Mimbar PGSD Undiksha*, 8(2): 238-252. <https://doi.org/10.23887/jjpsgd.v8i2.26525>
- Fauziah, U., & Fitria, Y. (2022). Pengaruh Model Pembelajaran Berbasis Masalah dan Kemampuan Awal terhadap Kemampuan Berpikir Kritis Siswa pada Pembelajaran Tematik Terpadu. *Jurnal Basicedu*, 6(2), 2836-2845. <https://doi.org/10.31004/basicedu.v6i2.2502>
- Halmuniati., Hisnan., Erdiyanti., Obaid, M.Y., & Fua, J.L. (2020). Penerapan Model Pembelajaran *Problem Posing Learning* Terhadap Keterampilan Berpikir Kritis Siswa Kelas X MAN 1 Kendari. *KULIDAWA*, 1(1): 1-5.
- Herlina, M., Rahayu, I., & Wiksya, D. (2019). Pengaruh Model Pembelajaran *Group Investigation* (GI) Terhadap Berpikir Kritis dan Keterampilan Sosial Siswa dalam Pembelajaran IPA Biologi Kelas X SMAN 2 Argamakmur. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi*, 3(2): 142-152. <https://doi.org/10.33369/diklabio.3.2.142-152>
- Jamaluddin., Jufri, A.W., Ramdani, A., & Azizah, A. (2019). Profil Literasi Sains dan Keterampilan Berpikir Kritis Pendidik IPA SMP. *Jurnal Penelitian Pendidikan IPA*, 5(1): 120-130. <https://doi.org/10.29303/jppipa.v5i1.185>
- Khofiyah, H.N., Santoso, A., & Akbar, S. (2019). Pengaruh Model *Discovery Learning* Berbantuan Media Benda Nyata Terhadap Kemampuan Berpikir Kritis dan Pemahaman Konsep IPA. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 4(1): 61-67. <http://dx.doi.org/10.17977/jptpp.v4i1.11857>
- Kusumah, R.G.T. (2019). Peningkatan Kemampuan Berpikir Kritis Mahasiswa Tadris IPA Melalui Pendekatan Saintifik pada Mata Kuliah IPA Terpadu. *Indonesian Journal Integration Science Education*, 1(1): 71-84. <http://dx.doi.org/10.29300/ijisedu.v1i1.1762>
- Mabruroh, M. (2019). Pengaruh Model Pembelajaran *Project Based Learning* pada Mata Pelajaran IPA Terhadap Kemampuan Berpikir Kritis Siswa Kelas VI SD Negeri Margorejo VI Surabaya. *Child Education Journal*, 1(1): 28-35. <https://doi.org/10.33086/cej.v1i1.879>
- Marudut, M.R.H., Bachtiar, I.G., Kadir., & Iasha, V. (2020). Peningkatan Kemampuan Berpikir Kritis dalam Pembelajaran IPA Melalui Pendekatan Keterampilan Proses. *Jurnal Basicedu*, 4(3): 577-585. <https://doi.org/10.31004/basicedu.v4i3.401>
- Meriyanti., Pratiwi, R.H., Gresinta, E., & Sulistyaniningsih, E. (2021). Analisis Kemampuan Berpikir Kritis Siswa SMP Terhadap Mata Pelajaran IPA Melalui Penggunaan Media Google Classroom. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi*, 5(2): 226-232. <https://doi.org/10.33369/diklabio.5.2.226-232>
- Noviyanto. W.Y & Wardani, M.S. (2020). Meta Analisis Pengaruh Pendekatan *Discovery Learning* Terhadap Kemampuan Berpikir Kritis Siswa Kelas V Tematik Muatan IPA. *Thinking Skill and Creativity Journal*, 3(2): 1-7. <https://doi.org/10.23887/tscj.v3i1.27959>
- Nurza, U.M.S., Suyanti, R.D., & Dewi, R. (2020). Effect of Inquiry Learning Model on Science Process Skills and Critical Thinking Ability in Human Movement Organs in Class V Public Elementary School 050666 Lubuk Dalam Stabat. *Journal of Physics: Conference Series*, 1811(1): 1-7. <https://doi.org/10.1088/1742-6596/1811/1/012097>
- Pratiwi, R., Hikmawati., & Gunada, I.W. (2019). Pengaruh Model Pembelajaran *Probing Prompting* Berbantuan Video Terhadap Hasil Belajar dan Kemampuan Berpikir Kritis Peserta Didik. *Jurnal Pendidikan Fisika dan Teknologi*, 5(2): 213-220. <http://dx.doi.org/10.29303/jpft.v5i2.1207>
- Puspita, V., & Dewi, I.P. (2021). Efektifitas E-LKPD Berbasis Pendekatan Investigasi Terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 5(1): 86-96. <https://doi.org/10.31004/cendekia.v5i1.456>
- Rachmatika, T., Sumantri, M.S., Purwanto, A., Wicaksono, J.W., Arif, A., & Iasha, V. (2021). Pengaruh Model Pembelajaran dan Kemandirian Belajar Terhadap Kemampuan Berpikir Kritis IPA Siswa Kelas V SDN di Jakarta Timur. *Buana Pendidikan*, 17(1): 59-69. <https://doi.org/10.36456/bp.vol17.no1.a3162>
- Rahmadansah, R., Haryanto, H., Sanova, A., Asrial, A., Yusnidar, Y., & Raidil, M. (2022). Pengaruh Model Pembelajaran Tai Berbantuan E-LKPD Interaktif Terhadap Kemampuan Berpikir Kritis Siswa Materi Asam Basa. *Jurnal Zarah*, 10(1), 38-46. <https://doi.org/10.31629/zarah.v10i1.4252>
- Rahman, A., Khaeruddin., & Ristiana, E. (2020). Pengaruh Model PBL Terhadap Kemampuan Berpikir Kritis dan Pemahaman Konsep IPASiswa Kelas V SDN 30 Sumpangbita. *Edumaspul: Jurnal Pendidikan*, 4(1): 29-41. <https://doi.org/10.33487/edumaspul.v4i1.201>

- Ramdani, A., Jufri, A., Jamaluddin, & Setiadi, D. (2020). Kemampuan Berpikir Kritis dan Penguasaan Konsep Dasar IPA Peserta Didik. *Jurnal Penelitian Pendidikan IPA*, 6(1): 119-124. [10.29303/jppipa.v6i1.388](https://doi.org/10.29303/jppipa.v6i1.388)
- Safitri, W.C.D., & Mediatati, N. (2021). Penerapan Model *Discovery Learning* dalam Pembelajaran IPA untuk Meningkatkan Kemampuan Berpikir Kritis dan Hasil Belajar Siswa Sekolah Dasar. *JURNAL BASICEDU*, 5(3): 1321-1328. <https://doi.org/10.31004/basicedu.v5i3.925>
- Safitri, A., & Setiawan, Y. (2020). Perbedaan Pengaruh Model *Discovery Learning* dan *Problem Based Learning* Terhadap Kemampuan Berpikir Kritis IPA Siswa. *Jurnal Tematik*, 10(1). <https://doi.org/10.24114/jt.v10i1.17728>
- Salama, S. (2022). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Berpikir Kritis dan Hasil Belajar IPA Pada Siswa Kelas V UPTD SD Negeri 18 Barru. *Jurnal Banua Oge Tadulako*, 2(1): 13-21. <https://doi.org/10.22487/jbot.v2i1.1962>
- Sari, F.N., Indrawati., & Wahyuni, D. (2022). Pengaruh Model Pembelajaran *Learning Cycle 7e* Terhadap Keterampilan Kolaborasi dan Kemampuan Berpikir Kritis Siswa IPA SMP. *LENSA: Jurnal Pendidikan IPA*, 12(2): 105-114. <https://doi.org/10.24929/lensa.v12i2.241>
- Sarimuddin, S., Muhiddin, M., & Ristiana, E. (2021). Pengaruh Model *Problem Based Learning* Terhadap Kemampuan Kognitif Dan Keterampilan Berpikir Kritis Materi Ipa Siswa Kelas V Sd Di Kecamatan Herlang Kabupaten Bulukumba. *Jurnal Pendidikan dan Pengajaran Guru Sekolah Dasar (JPPGuseda)*, 4(3), 281-288. <https://doi.org/10.55215/jppguseda.v4i3.4864>
- Siwi, E.F., & Setiawan, Y. (2021). Pengembangan Buku Cegahan IPA untuk Meningkatkan Kemampuan Berpikir Siswa di Sekolah Dasar. *JURNAL BASICEDU*, 5(4): 2220-2230. <https://doi.org/10.31004/basicedu.v5i4.1157>
- Suparya, I.K. (2018). Pengaruh Model Pembelajaran Kooperatif Tipe Think Talk Write (TTW) Terhadap Hasil Belajar dan Kemampuan Berpikir Kritis pada Pembelajaran IPA di Sekolah Dasar. *WIDYACARYA*, 2(2): 19-24.
- Wahyuni, S., Ridlo, Z.R., & Rina, D.N. (2022). Pengembangan Media Pembelajaran Interaktif Berbasis *Articulate Storyline* Terhadap Kemampuan Berpikir Kritis Siswa SMP pada Materi Surya. *Jurnal IPA dan Pembelajaran IPA*, 6(2): 99-110. <https://doi.org/10.24815/jipi.v6i2.24624>
- Wale, B.D., & Bishaw, K.S. (2020). Effects of Using Inquiry-Based Learning on EFL Student's Critical Thinking Skills. *Asian J. Second. Foreign. Lang. Educ*, 5(9): 1-14. <https://doi.org/10.1186/s40862-020-00090-2>
- Walfajri, R.U., & Harjono, N. (2019). Peningkatan Kemampuan Berpikir Kritis dan Hasil Belajar Tematik Muatan IPA Melalui Model *Problem Based Learning* Kelas 5 SD. *JURNAL BASICEDU*, 3(1): 16-20.
- Wulandari, T., Kadir, A., Fua, J.L., & Zainuddin. (2020). Pengaruh Model *Problem Based Learning* Berbasis Multimedia Terhadap Kemampuan Berpikir Kritis dan Hasil Belajar IPA. *KULIDAWA*, 1(1): 29-34. <https://doi.org/10.31332/kd.v1i1.1806>