

The Use of Socioscientific Issues in Science Learning: Review Literature

Nurul Hidayah Nasution¹⁾, Irda Wahidah Nasution²⁾

¹⁾ Elementary Madrasah Teacher Education (PGMI)/ Tarbiyah, STIT HASIBA, Indonesia

²⁾ Science Education/ Faculty of Education, Tjut Nyak Dhien University, Indonesia

*Corresponding Author

Email: 1nnurul407@gmail.com

Abstract

The goal of education is to develop students' abilities. These abilities are expected to grow and develop in accordance with the values prevailing in society and the nation's culture. The approach related to scientific and social issues is known as the socioscientific approach. In general, this approach provides a way for students to learn about scientific research through case development, which can be implemented through classroom discussions and problem-based learning. The method applied in this article is the review literature Study (SLR). This approach is generally used to review articles and publish the results of the review in new articles. The procedures used in this technique include formulating the topic to be researched, establishing inclusion and exclusion criteria or a screening process. If necessary, these elements are found and then analyzed. The results of the analysis are organized based on what has been read. Articles to be analyzed will be obtained by searching the Publish Or Perish application for databases from Google Scholar and Crossref, searching for research literature that aligns with the keywords: socioscientific issues in science learning. The SLR method allows researchers to systematically review and identify journals where each process follows predetermined steps. The inclusion criteria used were articles from 2023-2026, research topics covering socioscientific issues in science learning. Exclusion criteria were research articles that cannot be accessed completely, are not full text, non-science, non-junior high school, and all those in languages other than English and Indonesian. The literature stages are based on using Research Questions to make the discussion more focused and to make it easier for researchers in the review literature process. Socioscientific issues (Socioscientific Issues) are issues that describe social problems in society within a conceptual, procedural, or technological context of science. The use of socioscientific issues in science learning can encourage students to actively engage in dialogue, discussion, and debate, which can provide opportunities for them to evaluate their understanding and improve their mastery of concepts related to the material they have learned. Currently, one of the topics being discussed is environmental challenges, namely climate change and rising global temperatures. Global temperature rise is a phenomenon that can be studied and addressed with the help of science.

Keywords: Education, Socioscientific Issues, Science Learning, Riview Literature, Environmental Challenges

INTRODUCTION

Education is a crucial aspect of an individual's life. Everyone has the right to it and must continue to develop it. The development of modern education is in line with changes in cultural life. These changes are crucial for improving education in the modern era . The goal of education is to develop students' abilities. These abilities are expected to grow and develop in accordance with the values prevailing in society and the nation's culture. Therefore, human education is crucial and must be fulfilled throughout life. Thus, education helps humans advance (Makkawaru, 2019). Improving students' pedagogical competence through socioscientific issues (SSI) focuses on developing critical thinking, scientific literacy, and decision-making based on real-life dilemmas such as the environment or health. This effort is carried out through discussion methods, case analysis, and evaluation of learning outcomes to improve scientific literacy and professionalism. The following are key points related to efforts to improve these competencies:

- Socioscientific Issue-Based Learning Method: The use of socioscientific issue discussions facilitates students' analysis and search for solutions to real-world problems, which improves critical thinking skills (interpretation, analysis, evaluation, inference, and explanation).

- Scientific Literacy Component: The primary focus is on developing students' ability to link scientific concepts to social issues, which enhances professionalism and scientific literacy.
- Decision-Making Process: Learning steps involve negotiation and decision-making related to conceptual social issues.
- Pedagogical Competency Development: Efforts include student understanding, designing/implementing learning, and conducting evaluations.
- Improving Critical Thinking: Real-world issue-based learning has been shown to improve critical thinking outcomes in topics such as the circulatory system.

Based on the characteristics above, in learning based on socio-scientific issues, it can be done in four stages namely: 1) presenting issues from the perspective of scientific knowledge (scientific background); 2) evaluating the presented socio-scientific issues (evaluation of information); 3) examining the local, national, and global impacts (local, national, and global dimension); and 4) making decisions related to socio-scientific issues (decision making). By using these steps, SSI can be applied in learning and is expected to improve students' science process skills and train students to think critically about the issues presented. Scientific material is closely related to real life and therefore requires pedagogical challenges (Pratiwi et al., 2019). Therefore, students must be trained to solve problems using scientific learning. Recognizing the existing challenges, science education must be able to produce qualified individuals with logical, critical, and creative thinking skills and possess the scientific expertise to solve various complex everyday problems. Problems or issues that arise in society are not simple but involve many interconnected aspects. Therefore, the use of current issues in learning was initiated to help students prepare for their future (Azizah et al., 2022). Utilizing current events or issues in the learning process can be done through approaches (M. R. Putri & Miterianifa, 2023).

The approach related to scientific and social issues is known as the socioscientific approach. In general, this approach provides a way for students to learn about scientific research through case development, which can be implemented through classroom discussions and problem-based learning (Rahmawati et al., 2018). Socioscientific issues are increasingly relevant in science education because they can provide a good context for teaching and learning processes, thus helping students understand the importance of science in everyday life and developing the ability to think critically about scientific knowledge. Thus, through this socioscientific approach, learning activities can stimulate student discussions and arguments, which in turn improve their thinking skills (Rahayu et al., 2020). This article aims to understand the purpose of learning based on socioscientific issues in science learning, its stages, advantages and disadvantages, and examples of materials in science learning

RESEARCH METHODS

The method applied in this article is the Review Literature Study (SLR). This approach is generally used to review articles and publish the results of the review in new articles. The procedures used in this technique include formulating the topic to be researched, establishing inclusion and exclusion criteria or a screening process. If necessary, these elements are found and then analyzed. The results of the analysis are organized based on what has been read. Articles to be analyzed will be obtained by searching the Publish Or Perish application for databases from Google Scholar and Crossref, searching for research literature that aligns with the keywords: socioscientific issues in science learning. The SLR method allows researchers to systematically review and identify journals where each process follows predetermined steps. Research topics covering socioscientific issues in science learning. Exclusion criteria were research articles that cannot be accessed completely, are not full text, non-science, non-junior high school, and all

those in languages other than English and Indonesian. The literature stages are based on using Research Questions to make the discussion more focused and to make it easier for researchers in the review literature process.

The articles used in this literature search were publications or articles from the Google Scholar and Crossref article databases. The articles were then selected according to the research topic, resulting in a collection of 10 research articles deemed representative of all articles on socioscientific issues in science learning and critical thinking. The selection of articles to be used for the review literature required inclusion and exclusion in the selection of primary studies. The author used the information search results based on these criteria to review the articles.

RESULT AND DISCUSSION

Result

1. Socioscientific Issue-Based Learning

Socioscientific issues (Socioscientific Issues) are issues that describe social problems in society within a conceptual, procedural, or technological context of science (Imaduddin & Khafidin, 2018). Socioscientific issues are a form of learning that offers students the opportunity to examine ethical values in problems or issues that exist in social life related to science itself (Triani et al., 2020). This allows students to develop solutions from various aspects of life while applying social science problems. The socioscientific approach requires more active participation from students, but this approach is almost similar to the problem-based approach in terms of learning through contextual problems. The difference lies in the method of problem development. In the problem-based approach, the teacher presents the problem through questions, whereas in the social science approach, students must develop the problem themselves. Therefore, problem-based learning in social science is a learning method that examines facts, phenomena, or events by considering social problems related to science in society. The criteria for issues or problems that can be raised using socioscience are as follows: a) Based on scientific knowledge b) Influence the formation of opinions c) Often in the media spotlight d) There is incomplete information e) Relate to local, national, and global dimensions related to political and social frameworks f) Demand ethical values that must be adhered to and developed g) Require an understanding of the various opportunities and risks associated with environmental events so that socioscientific issues are very useful in learning applications to strengthen students' arguments, with the aim of increasing students' efficiency in learning science (Setyaningsih et al., 2019).

2. The Purpose of Using Socioscientific Issues in Science Learning

The use of socioscientific issues in science learning can encourage students to actively engage in dialogue, discussion, and debate, which can provide opportunities for them to evaluate their understanding and improve their mastery of concepts related to the material they have learned. This can also encourage students to reflect on personal experiences and existing social phenomena for reconstruction (Ramdani et al., 2020). The purpose of implementing a social science-themed approach in science learning is to encourage students to reach a level of completion or solution. By doing this, students can develop a creative attitude that is very important in helping them find solutions to everyday problems. Furthermore, using socioscientific issues can also help students understand concepts better. According to Rahayu, she explained that the true power of socioscientific issues lies in their use as a tool for learning science, because research shows that socioscientific issues can improve various skills, such as reasoning and critical thinking skills, as well as the ability to solve problems and understand scientific concepts (Setyaningsih et al., 2019). Some examples of social science issues that have been studied in various studies include the greenhouse effect, global climate change, and genetically modified foods.

3. Steps for Learning Science with Socioscientific Issues

The steps are as follows:

- a) Discussions about social sciences and science are conducted;
- b) Argumentation and debate: Thinking and discussion are beneficial for developing reasoning skills and thinking processes;
- c) Discussions serve to address controversial social science topics in a controlled manner;
- d) Decision-making involves students engaging in conceptual negotiation and decision-making regarding social issues.

4. Advantages and Disadvantages of Using Socioscientific Issues in Science Learning

In principle, the socioscientific issue-based approach has advantages and disadvantages in the context of learning. The advantages in learning are as follows:

- a) Increases student participation in discussions;
- b) Participants can express views from different perspectives;
- c) Makes science learning more lively through discussion;
- d) Improves critical thinking skills and decision-making abilities;
- e) More oriented towards the humanitarian aspects of science learning.

The disadvantages of using socioscientific issue-based learning are as follows:

- a) Discussions take longer;
- b) Discussions only explore pros and cons;
- c) Discussions allow for exploration of boundaries in knowledge construction and problem-solving;
- d) If participants feel uncomfortable in class discussions, individual arguments will not facilitate the situation (S. N. Putri et al., 2022).

5. Benefits of Using Socioscientific Issues in Science Learning

Learning with socioscientific issues has several advantages, including:

- (1) improving students' understanding of science so they can apply it in everyday life,
- (2) fostering social awareness so students can reflect on their own perspectives,
- (3) improving thinking skills and developing scientific knowledge about social phenomena,
- (4) honing critical thinking skills in analyzing, evaluating, explaining, and interpreting information. Therefore, socioscientific issues are crucial in the learning process, as students need to analyze social problems to draw appropriate conclusions (Solbes et al., 2018).

6. Examples of Socioscientific Issue-Based Materials and Teaching Materials in Science Learning

Currently, one of the topics being discussed is environmental challenges, namely climate change and rising global temperatures. Global temperature rise is a phenomenon that can be studied and addressed with the help of science. The effect of rising global temperatures is melting ice in the polar regions. If the ice continues to melt, coastal islands will be threatened with submersion. This is evidence that addressing global temperature rise must be done immediately. Therefore, scientific knowledge is essential for humans, commonly known as scientific literacy. Meanwhile, learning materials on social science topics can be utilized in teaching because they can improve scientific competence. One of the skills of scientific literacy is the ability to connect information with social problems related to scientific or social science issues (Zulaika et al., 2022). Books on social science issues can be used as learning materials. SSI is used because it can provide a connection between controversial issues in society and the scientific context, enabling students to learn science and making science teaching more meaningful. In this case, if students are provided with socioscientific-based books on global warming, they can solve problems related to science and life, rather than relying solely on the materials. Scientific issues certainly influence the development of students' scientific competencies (Danianty & Sari, 2022).

Furthermore, the socioscientific learning model used also influences students' scientific competencies, particularly through the textbooks available for students to read.

Discussion

With socioscientific issue-based learning, learning can be carried out with a learning approach that examines facts, phenomena, or events based on social issues related to science that exist in society. Socioscientific issues are open-ended, allowing students to think critically about these issues together with others who have different views, so socioscientific issues are very interesting to use as topics in scientific discussion activities. The use of socioscientific issues in learning is believed to train students' higher-order thinking skills to solve various problems that exist in their daily lives. Socioscientific Issues are representations of issues or problems in social life that are conceptually closely related to science with relative or uncertain answer solutions. The socioscientific issue approach has significant advantages and has practicality in providing conceptual understanding, this is supported by increased learning outcomes.

CONCLUSION

Education based on socioscientific issues requires students to be more active by engaging in dialogue, discussion, and debate about certain social phenomena. Using these issues in science learning also has advantages such as: (1) improving students' scientific literacy skills so they can apply science-based scientific knowledge in everyday life, (2) developing social awareness so students can reflect on the results of their research, (3) honing thinking skills about reflection, thought processes, and scientific reasoning regarding phenomena that occur in society, and (4) improving critical thinking skills, including analysis, reasoning, explanation, evaluation, and interpretation.

REFERENCES

- Azizah, H. P., Ilhami, A., & Hafiza, N. (2022). Pengembangan E-Modul IPA SMP Berbasis Socio Scientific Issues (SSI) : Systematic Review. *Jurnal Pendidikan Indonesia : Teori, Penelitian, dan Inovasi*, 2(4). <https://doi.org/10.59818/jpi.v2i4.206>
- Danianty, N., & Sari, P. M. (2022). Hubungan Literasi Sains dengan Keterampilan Proses Sains pada Peserta Didik Kelas V di Sekolah Dasar. *Ideas: Jurnal Pendidikan, Sosial, dan Budaya*, 8(3), 1007. <https://doi.org/10.32884/ideas.v8i3.894>
- Imaduddin, M., & Khafidin, Z. (2018). Pembelajaran Berbasis Socio-Scientific Issues di Abad ke-21. *Thabiea : Journal of Natural Science Teaching*, 1(2), 102.
- Makkawaru, M. (2019). Pentingnya Pendidikan Bagi Kehidupan dan Pendidikan . *Jurnal Konsepsi* , 8(3), 116–119.
- Pratiwi, N. S., Cari, & Aminah, S. N. (2019). Pembelajaran IPA Abad 21 dengan Literasi Sains Siswa. *Jurnal Materi dan Pembelajaran Fisika*, 9(1), 34–42.
- Putri, M. R., & Miterianifa. (2023). Penggunaan Isu Sosiosaintifik Dalam Pembelajaran IPA: Review Literatur. *Journal of Natural Sciences*, 4(2), 103–111. <https://doi.org/10.34007/jonas.v4i2.401>
- Putri, S. N., Manuk, I. L., Hedwidgis, M., & Nirmalasari, M. A. Y. (2022). Kajian Isu Sosiosaintifik dalam Warisan Budaya Sikka. *Jurnal Pendidikan MIPA*, 12(3), 761–771.
- Rahayu, Y., Suhendar, S., & Ratnasari, J. (2020). Keterampilan Argumentasi Siswa Pada Materi Sistem Gerak SMA Negeri Kabupaten Sukabumi-Indonesia. *Biodik*, 6(3), 312–318. <https://doi.org/10.22437/bio.v6i3.9802>

- Rahmawati, W., Ratnasari, J., & Suhendar, S. (2018). Pengaruh Pendekatan Pembelajaran Socioscientific Issues Terhadap Kemampuan Berpikir Kreatif Peserta Didik. *Jurnal Pelita Pendidikan*, 6(2), 124–132. <https://doi.org/10.24114/jpp.v6i2.10150>
- Ramdani, A., Jufri, A. W., Jamaluddin, J., & Setiadi, D. (2020). Kemampuan Berpikir Kritis dan Penguasaan Konsep Dasar IPA Peserta Didik. *Jurnal Penelitian Pendidikan IPA*, 6(1), 119–124. <https://doi.org/10.29303/jppipa.v6i1.388>
- Setyaningsih, A., Rahayu, S., Fajaroh, F., & Parmin, P. (2019). Pengaruh pembelajaran process oriented-guided inquiry learning berkonteks isu-isu sosiosaintifik dalam pembelajaran asam basa terhadap keterampilan berargumentasi siswa SMA kelas XI. *Jurnal Inovasi Pendidikan IPA*, 5(2), 168–179. <https://doi.org/10.21831/jipi.v5i2.20693>
- Solbes, J., Torres, N., & Traver, M. (2018). Use of socio-scientific issues in order to improve critical thinking competences. *Asia-Pacific Forum on Science Learning and Teaching*, 19(1), 1–22.
- Triani, W., Maryuningsih, Y., & Mujib Ubaidillah, D. (2020). Siska, Wili Triani, Yunita, Yuyun Maryuningsih, dan Mujib Ubaidillah. *Jurnal Pendidikan Sains & Matematika*, 8(1), 22–33.
- Zulaika, A., Erlina, & Rachmat Sahputra. (2022). Jurnal Pendidikan MIPA. *Jurnal Pendidikan MIPA*, 12(1), 1–7.