Proceedings Series of Educational Studies

The 4th International Conference on Educational Management and Technology (ICEMT) 2025

THE EFFECT OF SOCIO SCIENTIFIC ISSUES APPROACH ON CRITICAL THINKING SKILLS OF GRADE V ELEMENTARY SCHOOL STUDENTS

Sheila Farah Diba, Lilik Bintartik*, Surayanah

State University of Malang, Jl. Semarang No. 5 Malang, East Java, Indonesia

*Author of correspondence, Email: lilik.bintartik.fip@um.ac.id

Abstract

This study aims to determine the effect of the Socio Scientific Issues approach on environmental damage material on the critical thinking skills of fifth grade students at SDN 2 Sentul. This type of research is quantitative research with the Quasy Experiment method. The subjects of this study were 40 fifth grade students of SD Negeri 2 Sentul consisting of 20 students as the experimental class and 20 students as the control class. The result od the studey indicate that the Socio Scientific Issues approach has a positive effect on students crtitical thingking skills as indicated by the results of independent Sample T-Test statistical test assisted by SPSS statistic 25 which has a significance value of 0,000 < 0,05 so that there is an effect of the Socio Scientific Issues approach on the critical thingking skills od fifth grade students of SDN 2 Sentul on enviromental damage material.

Keywords: Socio Scientific Issues, Critical Thinking Skills

1. Introduction

The development of human life in the era of globalization has experienced quite significant changes in various sectors, including the development of technology and science. This change requires humans to become more qualified people so that new innovations are needed, as well as more actual steps that will become a new perspective to answer various challenges in this era of globalization (Ma'rifah, 2023). The competencies that must be possessed by every individual in facing the challenges of this era of globalization are creativity, critical thinking, collaboration, and communication. These four competencies are known as 4C (Creative, Critical Thinking, Collaboration, and Communication) (Nisak & Suprapto, 2022).

Education in Indonesia has essentially played a role in developing competencies in this era of globalization, known as 4C. The government, through the Independent Curriculum, has established a policy stated in the Regulation of the Minister of Education and Culture Number 22 of 2020 concerning the Strategic Plan of the Ministry of Education and Culture for 20202024 that Pancasila Students are the embodiment of Indonesian students as lifelong learners who have global competence and behave in accordance with the values of Pancasila, with six main characteristics: faith, devotion to God Almighty, and noble character, global diversity, mutual cooperation, independence, critical and creative reasoning (Kemendikbud, 2025). This study focuses on critical thinking skills through education. In the Pancasila Student Profile, students who reason critically are able to objectively process information, build relationships between information, analyze information, evaluate and conclude (Kemendikbud, 2025). The success of a person's life is also determined by their thinking skills, especially in dealing with problems in the future. Critical thinking skills help students analyze, evaluate, solve problems, and make

decisions logically and rationally (Azka, Masrukan, & As, 2024). Critical thinking skills help humans to identify and solve problems more efficiently (Ariadila, et al., 2023).

Elementary school students are at the concrete operational stage, where students' thinking is based on logic and can be applied in solving real problems that they encounter in everyday life. Therefore, competencies in this era of globalization need to be inserted into every material and subject, one of which is the subject of science and natural sciences. Science and natural sciences learning is not just memorizing concepts, theories or a collection of knowledge, but science and natural sciences is also a process of discovery (Adisty, Evayenny, & Hasanah, 2021). However, the facts in the field show that the critical thinking skills of elementary school students are still relatively low. This can be seen from the dominance of teachers in the learning process, the lack of active learning experiences, and the difficulty of students in analyzing and expressing opinions. One approach that is appropriate for improving students' critical thinking skills is the Socio Scientific Issues approach.

Learning with the SSI approach can enable students to relate science concepts to current social issues. In addition, SSI learning can increase the effectiveness of learning, especially in aspects of daily life by involving science and social issues, so that this learning will make students have a high curiosity about controversial issues in everyday life. The problems taken in this learning must be related to relevant science issues, and can enable students to have indepth discussions. The application of the SSI approach is expected to be able to train students to analyze, communicate, and understand the natural environment scientifically. This SSI approach has several advantages, namely the presentation of science issues, meaningful learning, and students' critical thinking skills can be improved. By utilizing this SSI approach, teachers can combine scientific concepts with critical thinking and concern for local and global issues. Based on these advantages, this SSI needs to be tested on elementary school students where in the learning process critical thinking skills have not been developed optimally.

One of the topics related to science and social is environmental damage. This material contains various causes and impacts of environmental damage, this material requires a deep understanding of the concept. This material is also related to everyday life experiences in the surrounding environment. Having a proper understanding of the concept will make students understand better, and can provide explanations through knowledge as new information. This material requires critical thinking skills in understanding and analyzing environmental damage. This is because this material is closely related to students' daily lives, so there will be many problems found in the surrounding environment. Therefore, the right learning approach not only makes students understand the contents of the material, but also is able to explain and apply the knowledge that has been obtained in everyday life. In this environmental damage material, students are required to understand the causes and impacts of environmental damage, formulate appropriate solutions, and be able to show a caring attitude towards the environment around them. So, students need to be trained to think critically. Therefore, this study aims to determine the effect of the Socio Scientific Issues approach on critical thinking skills in environmental damage material for grade V Elementary Schools at SD Negeri 2 Sentul.

2. Method

The research was conducted using a quantitative approach with a quasi-experimental nonequivalent control group design method. The subjects in this study consisted of two research groups, namely the experimental class with a socio-scientific issues approach, and the control class using a conventional approach with a lecture method. This study used a quantitative approach with a quasi-experimental method with a Nonequivalent control group design,

consisting of two research groups, namely the experimental class with a Socio-Scientific Issues learning approach, and the control class without using the Socio-Scientific Issues approach. Quasi-experiments were chosen because this study can determine the effect of a treatment. This research was conducted in the 2024/2025 academic year, even semester, with the research subjects being 40 fifth-grade students of SDN 2 Sentul, consisting of 20 students in class VA and 20 students in class VB. The instruments used were interview sheets, observation sheets, and critical thinking skills tests in the form of pretest and posttest questions. The technique used in sampling was non-probability sampling. The data collection techniques used were observation, interview, test, and documentation techniques. This data analysis technique uses the SPSS Statistics 25 application. The data analysis techniques used are validity test analysis, reliability test, discriminatory power test, and question difficulty test. Then, a normality test, homogeneity test, paired sample t-test, and the last one is the independent sample t-test.

3. Results and Discussion

The Socio Scientific Issues approach is a learning approach that raises social science issues in the surrounding environment. This approach can develop students' critical thinking towards an issue or problem. By teaching SSI to students, students will be able to make decisions on the problems they are facing. In addition, students will also be trained to make decisions rationally and with critical thinking. Therefore, the experimental class was given an approach using Socio Scientific Issues and the control class was given treatment using the conventional lecture method approach. Activities in the experimental class lasted for 2 meetings. Learning activities in this experimental class require an interactive and dynamic approach, with the aim of encouraging students to be actively involved in learning so that they can improve students' critical thinking skills.

In the first lesson, students are directed to better understand the causes and impacts of environmental damage, students are only focused on environmental damage due to waste and analyze the causes and impacts of littering. In the second meeting, students are given the opportunity to analyze and find out problems that can be applied in everyday life. The first step taken is to present an issue or problem, the activity of presenting a problem includes interpretation and understanding the problems contained in the social issues given by the teacher. Then the second step is analysis and discussion, this analysis and discussion are carried out to further discuss the topics or issues in the SSI. The third step is to develop problem solving, the problems that have been given and analyzed will give rise to an assumption or opinion that will lead to a solution to the problem that occurs. The last step is decision making, in this case students are invited to be involved in making decisions related to the social problem and deciding which solution is most appropriate to apply in everyday life.

Before the learning process, students were given pretest questions on the first day, then on the second day students were given learning in meeting 1 followed by meeting 2. After learning in meetings 1 and 2 ended, students were given posttest questions to measure their critical thinking skills after being treated. Before the pretest and posttest questions were given to students who were the research samples, a trial of the pretest and posttest instruments was conducted on students from other schools. Then a validity test was conducted using the SPSS version 25 for Windows application using the Pearson Correlation test and obtained results, where 12 questions were declared valid and 3 questions were declared invalid in the pretest, while the posttest obtained results of 14 valid questions and

1 invalid question. After the validity test was conducted, a reliability test was conducted using the SPSS Statistic 25 application. The reliability test in this study used the Cronbach's Alpha formula. The results of the reliability test of the critical thinking skills pretest instrument produced a value of 0.823, this indicates that the data is reliable. Meanwhile, the results of the reliability test of the critical thinking skills post-test instrument produced a value of 0.872, this shows that the data is reliable.

Table 1. Result of Critical Thinking Skills Normality Test

Class	Test	Sig.	Conclusion
Control Class			
	Pretest	0,468	Normal
	Posttest	0,077	Normal
Experiment Class	*Pretest*	0,514	Normal
	Posttest	0,526	Normal

Table 1. shows the results of the normality test assisted by the SPSS Statistic 25 application from the pretest and posttest data of critical thinking skills from both the control class and the experimental class. In general, the results of the pretest and posttest normality tests have a significance value of > 0.05 in the control and experimental classes. Therefore, the pretest posttest values from both the control and experimental classes are normally distributed, so they can be continued for the homogeneity test. The results of the normality test on the control class pretest got a significance value of 0.468, for the control class posttest got a significance value of 0.077, the results of the normality test on the experimental class pretest got a result of 0.514, while the posttest got a significance value of 0.526, these significance values were > 0.05 so that the data was declared normally distributed. After the normality test, a homogeneity test was carried out using the Lavene test assisted by the SPSS Statistic 25 application and produced a significance value of 0.162 where the significance value was > 0.05, based on the Lavene test decision-making criteria, the data was declared homogeneous. After the normality and homogeneity tests were carried out, the analysis above showed that the data was normally distributed and homogeneous. Then, a paired sample t-test was carried out to determine statistically significant differences in the control class and the experimental class before and after treatment.

The paired sample t-test below is to calculate the average difference in the control class before and after treatment.

Table 2. Results of Paired Sample T-Test Control Critical Thinking Skills

Statistical Test	Sig	Conclusion
Paired Sample T-Test	0,140	There is no incluence

The results of the paired sample t-test of students' critical thinking skills after being treated using the Conventional approach (caramah method) obtained a result of 0.140. Where 0.140 <0.05, it can be concluded that there is no significant difference in the control class before being treated and after being treated using the Conventional approach (lecture method).

After conducting a paired sample t-test to calculate the average difference against the control class, a paired sample t-test was conducted to calculate the average difference

against the experimental class before and after treatment. In this case, the experimental class uses the Socio Scientific Issues approach.

Table 3. Results of Paired Sample T-Test Experiment Critical Thinking Skills

Statistical Test	Sig	Conclusion
Paired Sample T-Test	0,000	Positive effect

The results of the Paired Sample T-Test of students' critical thinking skills after being treated using the Socio Scientific Issues approach obtained a result of 0.000. Where 0.00 <0.05, then from the results of the independent sample t-test above, it can be concluded that there is a significant difference in the class before being treated and after being treated using the Socio Scientific Issues approach.

Then an Independent Sample T-Test was conducted to determine the difference between the control class and the experimental class.

Table 4. Independent Sample T-Test of Critical Thinking Skills

Statistical Test	Sig.	Conclusion
Independent Sample T-Test	0,000	Terdapat Perbedaan

Table 4 is the result of statistical test assisted by SPSS Statistic 25 application used to determine the influence of Socio Scientific Issues approach on critical thinking skills using independent sample t-test. The table above shows the result of independent sample t-test of 0.000. So, it can be concluded that the result of the table gets a significance value of 0.000 <0.05. So it can be concluded that there is an influence of Socio Scientific Issues approach on critical thinking skills.

Based on the test results above, in line with research from Wahyu Kartika, (2024) which states that the Socio Scientific Issues approach has a significant influence on critical thinking skills. Another study by Fahrizal and Badrul (2022) also supports that the application of Socio Scientific Issues can have an influence on critical thinking skills. This is because the teacher invites students to work together to solve an issue or problem that exists around them and communicate strategies and problems in the classroom. The following are the differences in the average critical thinking skills in the experimental class and the control class.

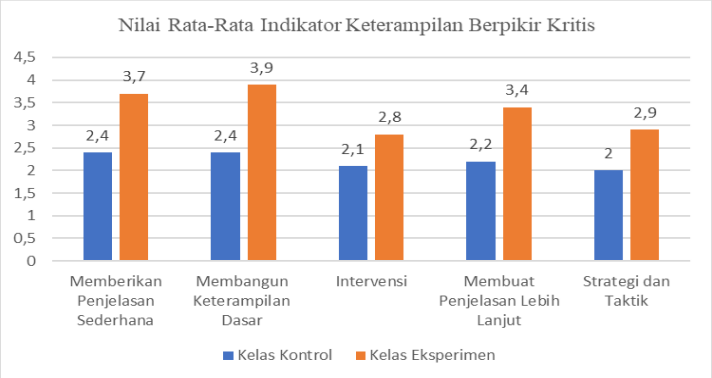

Figure 1. Average Value of Critical Thinking Skills Indicators

Figure 1. shows that the average value of students' critical thinking skills in each indicator is different. Based on these data, it can be seen that in each indicator of the experimental class, the critical thinking skills tend to have a higher average value than the

control class. The average value of the experimental class that showed the greatest difference was in the indicator of building basic skills, where the experimental class got an average value of 3.9 while the control class got 2.4. This shows that students in the experimental class who used the SSI learning approach were better able to identify basic information that they obtained through observation, data, or reading. Where students were assigned to observe video clips about environmental damage, read human and garbage readings, and discuss in groups to identify the causes and impacts of environmental damage problems. This activity encourages students to actively access information from various sources, so that it can support the formation of basic skills in critical thinking.

After these indicators, the second indicator that experienced an increase was the indicator of providing a simple explanation, where the experimental class got an average score of 3.7 and the control class got an average score of 2.4. This shows that the experimental class is better able to understand and explain a problem rationally and logically. Learning activities that contribute to improving this indicator are group discussions on the relationship between human activities and environmental change, as well as reflective questions and answers based on trigger questions. Through these activities, students are trained to express their opinions logically and rationally on environmental issues, such as the reasons why plastic waste is difficult to decompose and its impact on the surrounding environment. By applying real examples, their ability to convey simple explanations increases.

The third improvement is in the indicator of making further explanations with an average value of 3.4 in the experimental class and 2.2 in the control class. This shows that students in the experimental class have better abilities in developing explanations and compiling deeper arguments. Activities carried out in class to improve this indicator are that students are asked to read news articles about flooding due to garbage, then analyze the causes, impacts, and compile various solutions to the issue. This activity directly trains students to develop explanations based on data and compile deeper and more structured arguments.

On the Strategy and Tactics indicator, students in the experimental class got an average score of 2.9 while the control class got 2. This shows that the experimental class is more capable of designing strategies or steps that can be used and are relevant in everyday life, but students still have difficulty determining which solutions are more applicable in everyday life. Activities carried out in class, after discussing various solutions, students are asked to determine which solution is appropriate and can be applied in everyday life. Although there has been an increase, students still face several challenges in developing critical skills on this indicator. Some students still have difficulty in determining the most appropriate solution from the solutions that have been discussed previously. In addition, some of the solutions proposed tend to be unrealistic, without considering time, resources, or the ability to apply the solution in everyday life.

Then, the lowest average value is in the intervention indicator, in the experimental class getting an average value of 2.8 and in the control class 2.1. This intervention indicator is the lowest indicator compared to other indicators. This shows that the experimental class is still superior to the control class, but students still have to improve their ability to respond to a problem according to their own views. This can be seen from the tendency of students to express opinions or views personally. This can be seen from the tendency of students to convey solutions in general or simply repeat group opinions without the courage to express

individual views on environmental damage. Some of the solutions given are also still abstract "must protect the environment" or "don't litter", without any application in everyday life. Therefore, based on the results of the descriptive analysis, it shows that there are differences in critical thinking skills in the control class and the experimental class.

4. Conclusion

Based on the results of the analysis and discussion, it can be concluded that the Socio Scientific Issues approach has a positive influence on critical thinking skills in class V of SDN 2 Sentul. This is evidenced by the results of data analysis using the Independent Sample T-Test which shows a significance value of 0.000 <0.005, so it can be concluded that there is a significant difference in critical thinking skills between the experimental class and the control class. Critical thinking skills with indicators 1) Providing simple explanations, 2) Building basic skills, 3) Intervention, 4) Making further explanations, 5) Strategies and tactics.

References

Abigail Soesana., d. (2023). *Metodologi Penelitian Kuantitatif.* Yayasan Kita Menulis.

Adiawantri, A. (2024). Penerapan Media Benda Konkret dalam Pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS) di MI MUHAMMADIYAH Sidabowa, Banyumas. *Repository UIN Profesor Kiai Haji Saifuddin Zuhri*, 17.

Adisty, A. N., Evayenny, & Hasanah, N. (2021). Analisis Kemampuan Berpikir Kritis Pada Pembelajaran Ilmu Pengetahuan Alam (IPA). *Jurnal Ilmu Pendidikan*, 2.

Agnes Vivin Prismayadi, N. L. (2024). Pengaruh Model PBL Berbasis SSI terhadap Keterampilan Berpikir Kritis Siswa Materi Sistem Pernapasan Kelas V SD. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, 1-10.

Arafah, A., Sukriadi, & Samsuddin, A. (2023). Implikasi teori belajar konstruktivisme pada pembelajaran matematika. *Jurnal Pendidikan Mipa*.

Ariadila, S. N., Silalahi, Y. F., Fadiyah, F. H., Jamaluddin, U., Setiawan, S., & dkk. (2023). Analisis Pentingnya
Keterampilan Berpikir Kritis Terhadap Pembelajaran Bagi Siswa. *Jurnal Ilmiah Wahana Pendidikan*.

Attaqi, V. (2020). Analisis Argumentasi dalam Socio Scientific Issues (SSI). *Repository UIN Jakarta*, 12-15.

Azka, M., Masrukan, & As, T. (2024). Kemampuan Berpikir Kritis Siswa Model Problem Based Learning dengan Asesmen Dinamis Berpendekatan Pembelajaran Berdiferensiasi Ditinjau dari Kemandirian Belajar. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 1260-1261.

Diyana Septiningrum, N. K. (2021). Development Of Biology Teaching Materials of Virus Based on Socio Scientific Issues (SSI) to Improve Student's Critical Thingking Ability. *Jurnal Phenomenon*, 90.

Heni Rahmawati, P. P. (2023). Kategorisasi Kemampuan Berpikir Kritis Siswa Kelas Empat SekolahDasar di SD se-Gugus II Kapanewon Playen, Gunung Kidul. *Jurnal Pendidikan dan Kebudayaan*, 89.

Juni Ratnasari, S. C. (2020). Kerusakan Lingkungan Menurut Sains dan Ahmad Mustafa Al-Maraghi: Studi Tafsir Al-Maraghi pada Surat Al-Rum Ayat 41,Al-Mulk Ayat 3-4 dan Al-A'raf Ayat 56). *Al-Tadabbur: Jurnal Ilmu Al-Qur'an dan Tafsir*, 122.

Kartika, W. (2024). Pengaruh Pendekatan Socio Scientific Issues terhadap Kemampuan Berpikir Kritis pada Hasil Belajar IPAS Siswa Kelas III Samarinda Ulu. *Universitas Mulawarman* , 1-6.

Kemendikbud, D. S. (2025). Profil Pelajar Pancasila. *Kementrian Pendidikan Dasar dan Menengah*.

Ma'rifah, A. (2023). Pengaruh Model Socio Scientific Issues Teaching and Learning (SSI-TL) terhadap Arguemntasi Ilmiah dan Literasi Kesehatan Siswa pada Materi Sistem Koordinasi. *eprint.walisongo*.

Nisak, F., & Suprapto, N. (2022). Analisis Kemampuan Argumentasi Ilmiah Siswa dengan Penggunaan Media Photovoice pada Materi Pembiasan Cahaya. *IPF : Inovasi Pendidikan Fisika*, 36.

Prihatiningsih, N. (2022). Socio Scientific Issues dalam Penalaran Informal Peserta Didik SMP di Kota Bengkulu. *repository iain bengkulu*, 36.

Rahardhian, A. (2022). Kajian Kemampuan Berpikir Kritis (Critical Thingking Skill) dari Sudut Pandang Filsafat. *Jurnal Filsafat Indonesia*.

Refi Mariska, A. K. (2024). Implementasi Aliran Konstruktivisme Terhadap Kurikulum Merdeka Dalam Perspektif Filsafat Pendidikan Islam. *Jurnal Inspirasi Pendidikan (ALFIHRIS)*.

Rosiana Mufliva, J. P. (2024). Teknologi Digital dalam Pembelajaran di Sekolah Dasarsebagai Isu Prioritas dalam Upaya Membangun Masyarakat Masa Depan. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, 235.

Sa'adah, A. Y. (2022). Analisis Kemampuan Berpikir Kritis Siswa SMP Materi Pemanasan Global dengan Soal Berbasis Pendekatan Socioscientific Issues (SSI). *Jurnal Natural Science Educational Research*, 1-11.

Sahertian, D. P., & Hidayati, S. N. (2022). Analisis Keterampilan Pemecahan Masalah Siswa Berbantuan Artikel Socio-Scientific Issue pada Materi Energi Alternatif. *Pensa E-Jurnal: Pendidikan Sains*.

Sari, P. N. (2022). Implementasi Metode Problem Solving pada Mata Pelajaran Al-Qur'an Hadist dalam Meningkatkan Kemampuan Berpikir Kritis Siswa Kelas X di MA Nuril Huda Tarub. *Repository IAIN Kudus* , 13.

Shakila Maisa, C. U. (2024). Manfaat dan Tantangan Kurikulum Merdeka Perspektif Guru SDN Pandanwangi 2. *Jurnal Citra Magang dan Persekolahan*.

Sugiyono. (2019). *Metode Penelitian Kuantitatif Kualitatif dan R&D.* Alfabet.

Suhelayanti, S. Z. (2023). *Pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS).* Yayasan Kita Menulis .

Syahputra, R. M. (2024). Perbandingan Model Socio Scientific Issues (SSI) dengan Problem Based Learning (PBL) terhadap Kemampuan Berpikir Kritis Siswa Pada Materi Perubahan Lingkungan. *Universitas Lampung*, 9.

Ubaidillah, S. &. (2019). Strategi Socio Scientific Issues untuk Meningkatkan Kemampuan Argumentasi Ilmiah Siswa pada Konsep Sistem Respirasi Di Kelas XI MIPA SMAN 1Suranenggala. *Jurnal Ilmu Alam Indonesia*, 51-52.